Annual Activity Report

December 2009

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**Message from the Director**

December 2009

This year we are giving a new look and feel to our annual activity report that we hope everyone will find easier to read and digest. We have not, however, cut any of the necessary information to advise our students, staff, faculty and sponsors about how we are performing, from finances to publications to new initiatives.

The most significant item to report this year is that through a series of forums, which included all ITRE staff and several Council members, we have identified and are working on several strategic initiatives in the areas of enhanced research competitiveness, distance learning and marketing. Thus, starting in 2010 we will be publishing a quarterly e-newsletter to tell our success stories and highlight recent ITRE involvements in projects at the national and local levels. We also plan to learn and add to our technical capabilities in the emerging High Speed Rail area.

While we continue to make good strides in pursuing national recognition, as evident by our strong showing at the Transportation Research Board meeting which included 16 presentations by 13 staff and students, two best paper/poster awards, and a student of the year award, we have not been immune to the downturn in the national and state economies. Both our state appropriations and new projects funding have continued to decline, although there is some evidence of an anticipated upswing in activities in early 2010. Our total expenditures in FY 2009 were $8.68 million, a 6% decline from the previous year. Our in-house activities however had a much smaller decline of 2.3%. Despite all of this, we continue to generate substantial overhead income to the tune of $815K in 2009, a slight increase compared to 2008. And we are undoubtedly in the top tier of the most cost-effective centers and institutes within the UNC system, generating close to $19 for every dollar spent by the state of North Carolina on ITRE.

I am confident that 2010 will be the year when ITRE will turn the corner. Much of our hard work is beginning to pay off, whether in being sought to be on national research and outreach project teams, or in getting our strategic priorities in the Center of Transportation and the Environment (CTE) or the new NextGen Air Transportation (NGAT) center off the ground. This is testimony to the quality of the individuals that make up ITRE who this year have experienced some real sacrifices, yet persisted in working hard and remaining loyal to their colleagues and institution. I am proud to be associated with each and every one of them.

Nagui M. Rouphail, PhD
Director
Professor of Civil Engineering
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This report summarizes ITRE’s activities for the year 2009 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:

♦ Increase national visibility.
♦ Conduct and disseminate research that impacts the transportation community.
♦ Sustain and enhance educational opportunities to improve the knowledge and skills of transportation professionals.
♦ Strengthen the relationship with, and gain recognition within, the University system.
♦ Provide superior technical assistance.
we continue to work
on our long-term major initiative
for securing long-term funding . . .

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 Website: http://itre.ncsu.edu.

Marketing/Public Relations

The ITRE Communications Office reorganized and refocused its efforts in 2009 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 American, 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 2008, the Office began a complete redesign and restructuring of the ITRE Web site. The new site reflects the progressive work of the Institute with a clean, modern feel and user-friendly interface. The site was officially launched in October 2009.

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

Due to budget cuts, ITRE administration was forced to reduce the full-time position of the sole Communications Office employee to part-time status in July 2009. The Office, however, continued to serve the ITRE staff with the best service possible, adhering to deadlines and budgets.

In addition to the launch of the new Website, highlights from mid-year 2009 include:

♦ Updating and reprinting of Work Zone safety guidebooks
♦ Graphic design and editing of NCDOT Ferry Division survey and report;
♦ Contributing ideas and resources to the marketing efforts of ITRE’s Strategic Planning Initiative;
♦ Providing a “clipping service” via Internet news alerts driven by ITRE-related key words. The alerts pull up a variety of links that point to ITRE research accomplishments and staff-specific accolades and references and;
♦ Our Portuguese post-doctoral student, Guilhermina Torrão, was featured in the October 2009 Office of International Studies newsletter article, Global Training Initiative’s (GTI) Short-term Research Program for Internationals: An NC State Success Story.
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 (CTE)

Mr. James B. Martin
Director, North Carolina Local Technical Assistance Program (LTAP)

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
2009 ITRE Advisory Council Membership

Mr. Jim Westmoreland
Council Chair

Ms. Stephanie Ayers
North Carolina Ports Authority

Dr. Eugene Conti, Jr.
NC Department of Transportation

Dr. Kathryn Dobie
NC A&T University

Mr. Mark Dunzo
Kimley-Horn and Assoc., Inc.

Mr. 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 Department of Civil, Construction and Environmental Engineering

Ms. Catherine McGhee
Virginia Transportation Research Council

Mr. John F. Sullivan, III
Federal Highway Administration NC Division

Dr. C. Michael Walton
University of Texas–Austin

Mr. Robert R. Wimmer
Toyota Motors North America
Summary of ITRE’s Finances

Exhibit III shows the most recent Fiscal Year (08/09) for which complete figures are available. Expenditures are broken down by the funding source.

- Overall, about 5% of all 2009 ITRE expenditures represent State Appropriated Funds related to administration, with additional operations support of 3% coming from Indirect Cost Return.
- State of North Carolina and Federal Contracts total 49% of all activity. Those figures have increased 1% compared to 48% for FY 07/08.
- Sales and Service activity (9%) is derived mainly from registration fees for workshops.
- Pass-Through projects to other departments at NCSU (23%) and other UNC universities (5%) have decreased in volume from the previous year (31%).
- Other Contracts (5%) include project activity primarily for municipalities and may include funding from other states.

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

ITRE’s total expenditures have again decreased in FY08/09 compared to the previous cycle; this reduction is due primarily to a substantial drop in our federal funded projects (by nearly 33%).

As indicated in the last annual report, the federal reduction in funding due to the new CTE designation is being reflected in our expenditures, while our ongoing, and long term, major initiative on the NextGen Air Transportation (NGAT) Center has yet to generate significant dollars.

We anticipate expenditures being down for at least the next two years due to the fluctuations we are seeing 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 appropriation.

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; basically 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 in the last two years, we do have a slight increase this year. Even in this tough economy ITRE is demonstrating itself to be a valuable asset to the state.

Exhibit VI shows that despite the reduction in our in-house expenditures last year, ITRE continues to generate Facilities & Administrative (F&A) funds for its operations, as well as for the University.

In the last fiscal year we generated over $815,000 of F&A dollars from our local, state, and federal projects.

In the past, between 33-35% of the F&A funds were returned to operate the institute and provide incentives for improving our national visibility. Now only about 31% are being returned due to a new allocation formula.
Summary of Projects

The following list summarizes ITRE’s research and education products at the national, state, and local levels for the calendar year 2009. Class descriptions and online registration information are available on the ITRE website.

Federal and International Research and Development

National research efforts at ITRE continue to be quite significant in terms of numbers and funding levels. Our capabilities are also being sought by large players in the national transportation research scene such as IBM, Northrup Grumman and Cambridge Systematics. Our staff has also increased their proposal development activities at the federal level. Various program groups at the Institute have been involved in eleven national-level projects, and two that are funded by the Korean Government through the Korea Transport Institute and Seoul National University in the area of Vehicle-to-Vehicle and Infrastructure-to-Vehicle Communications.

Blind Pedestrians’ Access to Complex Intersections, 2007-2010
Sponsor: Western Michigan University (N. Rouphail)

Center for Transportation and the Environment Tier II UTC, 2005-2011
Sponsor: United States Department of Transportation (J. Martin)

Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities (NCHRP 3-78), 2006-2010
Sponsor: National Academy of Science (R. Hughes)

Sponsor: National Science Foundation (N. Rouphail/C. Frey)

FHWA 2009 Environmental Excellence Awards Support Services, 2009-2010
Sponsor: United States Department of Transportation / Federal Highway Administration (J. Martin)

FHWA CSS Activities
Sponsor: North Carolina Department of Transportation (J. Martin)

FHWA Sponsorship of the International Conference on Ecology and Transportation (ICOET), 2008-10
Sponsor: United States Department of Transportation (J. Martin)

Guidelines on the Use of Auxiliary Through Lanes at Signalized Intersections (NCHRP 3-98)
Sponsor: Kittelson & Associates, Inc. (N. Rouphail /J. Hummer)

ICOET 2009 Conference Sponsorship: USDA Forest Service, 2008-2010
Sponsor: United States Department of Agriculture, Forest Service (J. Martin/E. Murray)
Recent U.S. Coast Guard regulations on minimum vessel crew size, number of vessels subject to USCG inspections and increased demands maintaining an aging fleet prompted a benchmarking and optimization study of the North Carolina ferry system which was conducted by ITRE’s OR/ED lab.
NGAT'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.

**Development of Local, Regional, and Cross-State Bicycle Transportation Systems, FY 2009-2010**
Sponsor: North Carolina Department of Transportation (T. Cook)

**Development of Performance Measures for the Assessment of Rural Planning Organizations, FY 2007/2008**
Sponsor: North Carolina Department of Transportation (R. Foyle)

**Economic Effects of Access Management, FY 2009-2010**
Sponsor: North Carolina Department of Transportation (R. Foyle/C. Cunningham)

**Ecosystem Enhancement Program (EEP) 2008-2009**
Sponsor: North Carolina Department of Environment and Natural Resources (J. Martin)

**Facilitation and Documentation Services for DMV Licensing Demonstration Grant**
Sponsor: North Carolina Department of Transportation (A. Hartell)

**GIS-based Pavement Management System projects for the following NC Municipalities:** Roanoke Rapids, Town of Chapel Hill, Carolina Beach, Town of China Grove, and City of Conover. (J. Oklevitch)

**GIS Data Conversion and Update Projects:** Beaufort County Schools, Guilford County Schools, Lee County Schools, Pender County Schools (J. Tsai)

**Integrated Planning for Schools and the Community OR/Ed Lab**
Sponsors: Alamance County Schools, Durham County Schools, Granville County Schools, Johnston County Schools, Lenoir County Schools, Nash-Rocky Mount Schools, Pitt County Schools, Randolph County Schools, Rowan-Salisbury Public Schools, Vance County Schools, Wake County Schools.

**Local Technical Assistance Program (LTAP) 2009**
Sponsor: North Carolina Department of Transportation (J. Martin)

**MCSAP FY09 Program Support**
Sponsor: North Carolina Crime Control (R. Hughes)

**NCDOT Maintenance Technical Assistance Program**
Sponsor: North Carolina Department of Transportation (T. Baughman)

**Plan for North Carolina Statewide Motor Coach Permit**
Sponsor: North Carolina Department of Public Instruction (J. Tsai)

**Pedestrian Operations at Single Point Interchanges**
Sponsor: North Carolina Department of Transportation (R. Foyle/C. Cunningham)

**Procedure for Identification and Investigation of Horizontal Curves with Insufficient Superelevation Rates**
Sponsor: NCDOT (R. Foyle/D. Findley)
The Transportation Information Management System (TIMS) program provides support and consulting for the Computer Assisted Routing Program used in every secondary school system in North Carolina.

**Professional Enhancement Program, FY 2008-2009**  
Sponsor: North Carolina Department of Transportation (T. Brown)

**PTD TPG/UTAP, Technology Implementation and Research - FY 2008/2009**  
Sponsor: North Carolina Department of Transportation (D. Collins)

**Rail Intern Program - July 1, 2008 - August 31, 2010**  
Sponsor: North Carolina Department of Transportation (T. Cook)

**Research Administration Facilitation in Transition and Technical Assistance, FY 2008-2009**  
Sponsor: North Carolina Department of Transportation (J. Martin)

**Statewide Logistics Plan for North Carolina**  
Sponsor: North Carolina Department of Transportation (G. List/R. Foyle)

**Superstreet Benefits and Capacities, 2008-2010**  
Sponsor: North Carolina Department of Transportation (J. Hummer/R. Foyle)

**TACT Enforcement Evaluation Program**  
Sponsor: North Carolina Crime Control (R. Hughes)

**Teach Fundamental Engineering Principles (FEP) Program, FY 2008-2009**  
Sponsor: North Carolina Department of Transportation (C. Cunningham / T. Brown)

**Technical Assistance to the State Board of Education in the Support of the Transportation Management System (TIMS) for 2008-2009**  
Sponsor: North Carolina Department of Public Instruction (J. Tsai)

**Technical Services for the North Carolina Division of Aviation Through the NextGen Air Transportation Center**  
Sponsor: North Carolina Department of Transportation (T. Brown)

**Technical Support for the NextGen Center, FY 2008-2009**  
Sponsor: North Carolina Department of Transportation (R. Foyle)

**Technical Support of NCSHP Motor Carrier Enforcement FY08 Size and Weight Enforcement Program**  
Sponsor: North Carolina Crime Control (R. Hughes)

**Technical Support Services for the NCDOT Division of Bicycle and Pedestrian Transportation, FY 2009-2010**  
Sponsor: North Carolina Department of Transportation (T. Cook)

**Technical Support for the Safe Routes to School Program, FY 2009-2010**  
Sponsor: North Carolina Department of Transportation (T. Cook)
Traffic Signal Inspection Course Presentation and Update  
Sponsor: North Carolina Department of Transportation (C. Cunningham)

Triangle Regional Model Service Bureau at ITRE, FY 2008/2009  
Sponsor: North Carolina Department of Transportation (J. Huegy)

Active Pass-through Projects to Other Universities

Monitoring, Prioritization, and Assessment of Ocean Outfalls of Stormwater in Dare Co., North Carolina  
Sponsor: North Carolina Department of Environment and Natural Resources (UNC, R. Noble)

Determining Vehicle Miles of Travel (VMT) for Statewide, County, Urban and Local Areas  
Sponsor: North Carolina Department of Transportation (UNC-Charlotte, Wang)

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

Performance Improvement from Deep Layers of Subgrade Stabilization  
Sponsor: North Carolina Department of Transportation (UNC-Charlotte, Ogunro)

Median Barrier Placement on Six-lane, 46-foot Median Divided Highways  
Sponsor: North Carolina Department of Transportation (UNC-Charlotte, Fang)

Subgrade Stabilization Alternatives to Lime and Cement  
Sponsor: North Carolina Department of Transportation North Carolina Department of Transportation (UNC-Charlotte, Janardhanam)

Traffic Operational and Safety Evaluation of Access Management Case Studies  
Sponsor: North Carolina Department of Transportation (UNC-Charlotte, Pulugurtha)

Additional Projects

All-Weather Paint for Work Zones Field Evaluation in North Carolina  
Sponsor: 3M Company (C. Cunningham)

ITE 2008-09: Manual of Transportation Engineering Studies  
Sponsor: Institute of Transportation Engineers (B. Schroeder and C. Cunningham)

Support for Development of the Maintenance Academy Course for the National Highway Institute, 2007-2009  
Sponsor: Perform Tech, Inc. (J. Martin)

Triangle Regional Model Proposed 2008-2009 Scope of Work for Model Development (D, CH, C-MPO)  
Sponsor: City of Durham (J. Huegy)

In order to improve visibility of pavement markers in wet weather, 3M developed a new all-weather paint that maintains retroreflective properties while covered in water. The key to this technology is specially developed elements that are dropped onto the paint along with glass beads. These unique elements retroreflect light in both dry and wet conditions.
**Staff Honors and Recognitions in 2009**

*State and National Committee and Panel Participation*

**TRB Committees**

- **ABG50**: Transportation History Committee, TRB 2010, Washington, DC (D. Findley)
- **ADA10**: TRB Statewide Multimodal Transportation Planning Committee (B. Mei, friend)
- **ADB50**: TRB Transportation Planning Applications Committee (B. Mei, friend)
- **ADC10**: Environmental Analysis and Transportation (D. Brill)
- **ADC30**: Transportation and Ecology (J. Martin)
- **ADD20**: Social and Economic Factors (A. Hartell)
- **ADH15**: Maintenance and Operations Personnel (J. Martin)
- **AHB40**: Highway Capacity and Quality of Service (R. Foyle, B. Schroeder, members)
- **AHB70**: Access Management Committee (C. Cunningham, friend)
- **ANB20**: Safety Data, Analysis and Evaluation (C. Cunningham, friend)
- **AHB25**: Traffic Signal Systems Committee (C. Cunningham, friend)
- **ANB40**: Traffic Law Enforcement Committee (C. Cunningham, member)
- **AHB65**: Operational Effects of Geometrics (C. Cunningham, friend)
- **ANB10**: Transportation Safety Management Committee (J. Tsai)
- **AP055**: Rural Public and Intercity Bus Transportation Committee (T. Cook, friend)
- **AP060**: Paratransit Committee (T. Cook, member)
- **AP085**: Ferry Transportation Committee (T. Cook, friend)
- **AR010**: Intercity Passenger Rail Committee (T. Cook, friend)

**Environmental Justice (A. Hartell, friend)**

**TRB Subcommittees**

- **AHB40**: Research Subcommittee (R. Foyle, chair)
- **AHB40**: User Liaison Subcommittee (R. Foyle, member)
- **Community Impact Assessment (A. Hartell)**
- **AHB40**: Traffic Simulation Applications Subcommittee (B. Schroeder, member)
- **AHB40**: Freeway Operations Subcommittee (B. Schroeder, member)
- **AHB70 (Z)**: Access Management Subcommittee (C. Cunningham, friend)
- **ANB10(6)**: School Transportation Subcommittee (J. Tsai, chair)

**TRB Task Forces**

- **ANB23T**: Task Force on Highway Safety Workforce Development (C. Cunningham, friend)
- **ANB75T**: Task Force on Roundabouts (B. Schroeder, member)
TRB Panel Participation

**Tough School Transportation Choices: Balancing Costs, Funding Cuts and Mode Shift While Maintaining Child Safety**, Panel Session 449 (J. Tsai, Chair)

TCRP Project G-10: *Guidebook for Estimating “Soft Costs” for Major Public Transportation Capital Infrastructure Projects* (J. Lawrie, participated)

TCRP Project B-31A: *Guidebook for Measuring, Assessing, and Improving Demand Response Transportation in Rural Areas* (T. Cook, panel member)

Other than TRB

North Carolina Section ITE (NCSITE) (4 staff are members)

NC Physical Activity Policy research Center Advisory Committee (M. Meletiou)

GIS in Transit Conference; National Center for Transit research (G. Ferrara, committee member)

Faculty Affiliate, Center for Mechanical Engineering Technology (TEMA), Department of Mechanical Engineering, the University of Aveiro, Portugal (N. Rouphail)

Annual Transportation Research Board Presentations

Based on research submitted in 2009, ITRE staff made presentations and presided at various meetings of the Transportation Research Board (TRB) at the Annual Meeting in January 2010. Many of the 17 papers will also be considered for publication in upcoming issues of the Transportation Research Record.

**Simulation-Based Support for Design and Evaluation of Auxiliary Through Lanes at Signalized Intersections**
Mike Alston/Bastian Schroeder, PhD/Nagui Rouphail, PhD/Joe Hummer

**FREEVAL-2010 Computation: Engine, Highway Capacity and QDS Committee** (AHB40 workshop)
Bastian Schroeder, PhD

**NCDOT Quality Control Methods for Weigh in Motion Data** (ABJ35 workshop)
John Stone, PhD, NCSU/Soheil Sajjadi/Kent Taylor/Aditya Ramachandran

**Overview of Uninterrupted-Flow Changes in HCM2010**
Bastian Schroeder, PhD/Roger Roess

**Estimating Operational Impacts of Freeway Work Zones on Extended Facilities**
Bastian Schroeder, PhD/Nagui Rouphail, PhD
Simulation Model for Studying the Impact of V2V Wireless Communications on Traffic Network Operations
Bing Mei/Nagui Rouphail, PhD/Hyejung Hu, PhD/Jae Joon Lee

Estimating Sustained Service Rates at Signalized Intersections with Short-Left Turn Pockets: Mesoscopic Approach
William Reynolds/Nagui Rouphail, PhD

Vehicle Energy Use and Safety Information Support System
Margarida Cabrita Coelho/Nagui Rouphail, PhD/H. Christopher Frey, PhD

CSS National Dialog: Highlighting Connections Between Transportation and Communities
Ann Hartell/James Martin

Title VI, Environmental Justice, and Limited-English Proficiency Effective Practices
David Aimen/Dana Braitman/Leigh Blackmon Lane

Mixed-Priority Pedestrian Delay Models at Single-Lane Roundabouts
Bastian Schroeder, PhD/Nagui Rouphail, PhD

Raleigh’s Art-on-the-Move Program: Leveraging an Existing Program, Building Interagency Partnerships, and Coping with Local Regulatory Constraints
Ann Hartell

Examination of Horizontal Curve Collision Characteristics and Corresponding Countermeasures
Joe Hummer/William Rasdorf/Daniel Findley/Charles Zegeer/Carl Sundstrom

Identification and Calibration of Site-Specific Stochastic Freeway Breakdown and Queue Discharge
Anxi Jia/Billy Williams, PhD/Nagui Rouphail, PhD

Impacts of Basic Rural Paratransit Characteristics on Organizational Culture
Kai Monast/Darcy Downs

Treatments to Aid Pedestrians Who Are Blind at Roundabouts: Findings from NCHRP Project 3-78
Bastian Schroeder, PhD

Workshop: The Role of Integrated Planning in Developing Sustainable Transportation Strategies
Leigh Blackmon Lane

At the Role of Integrated Planning in Developing Sustainable Transportation Strategies Workshop, information was presented on the best practices for initiating integrative planning from concept to reality.
Conference and Workshop Attendance, Participation and Exhibits in 2009 (by program group)

Center for Transportation and the Environment (CTE)

International Conference on Ecology and Transportation (ICOET), September 13-17, Duluth, MC (J. Martin, E. Murray, A. Hartell, W. Thomas, N. Bailey attended)

CSS National Dialog Workshop, Austin, TX (J. Martin, A. Hartell)

CSS National Dialog Workshop, Portland, OR, (J. Martin, A. Hartell, E. Murray)

Highways

North Carolina GIS Conference, Raleigh, NC, February 2009, Automated Asset Inventory Data Collection (D. Findley presented)

ADS-B Management Forum, Washington, DC, March 2009 (D. Findley participated)

Airborne Separation Assistance Systems Global Network Forum, Chicago, IL, May 2909, (D. Findley participated)

FAA Safety Summit for Helicopter Pilots, Charlotte, NC, January 2009 (R. Foyle participated)


NCSITE Annual Meeting, Raleigh, NC, November 2009 (R. Foyle participated)

Research Synthesis on Driver Yielding Behavior in the Context of Crossings by Pedestrians who are Blind at Complex Intersections. International Mobility Conference (IMC), Marburg, Germany. July 2009 (B. Schroeder presented)

Towards a Universal Design Approach to Accommodating the Needs of Pedestrians at Modern Roundabouts: Treatments Evaluated Under NCHRP Project 3-78a . International Mobility Conference (IMC), Marburg, Germany. July 2009 (B. Schroeder presented)


Workshop on FREEway eVALuation (FREEVAL) software. TRB Committee on Highway Capacity and Quality of Service Midyear Meeting. Irvine, CA, June 2009 (B. Schroeder presented)

TFF Seminar, *First in Flight: Recent Aviation Initiatives in North Carolina*; also one of the speakers on 'FAA's NextGen Airspace System Control', April 2009 (R. Foyle presented)

CE509 Highway Safety, Raleigh, NC, Spring 2009 (D. Findley)

ST512: Experimental Statistics for Biological Sciences II, Raleigh, NC, June 2009 (D. Findley)

CE538: Information Technology and Modeling, Raleigh, NC, Fall 2009 (D. Findley)

FHWA Pedestrian Road Safety Audits Workshop, Raleigh, NC, June 2009 (C. Cunningham, B. Schroeder)

VISSIM software training, Raleigh, NC, August 2009 (B. Schroeder, instructor; C. Cunningham, B. Foyle, D. Findley, B. Mei, attended)

**ITRE Director**


Rouphail, N.M. *Traffic Signal Control in the USA: Concepts and Advances*, Invited Seminar at Cairo University, Cairo Egypt, March 17, 2009

Webinar, *Overview of Traffic Congestion and Analysis in the USA*, presented online at the Transportation and Energy Course at the University of Aveiro, Portugal, April 17, 2009.

Schroeder, B. and N. Rouphail, *Overview of FREEVAL, the Freeway Facility Chapter Computational Engine*, Workshop at the Midyear Meeting of the Highway Capacity and Quality of Service Committee, Newport Beach, CA, June 11, 2009.


The FREEVAL workshop provided hands-on training exercises with the FREEVAL 2010 software module, which was developed at ITRE and which will be distributed with the 2010 HCM.
The NC LTAP program provides training to local municipalities across the state. TRACKS is published quarterly to provide training schedules, notices of upcoming events and interesting articles.
The Public Transportation Group helps North Carolina transit systems plan for and implement technology. The Technology Implementation Plan anticipates the next series of technology implementations so transit agencies can make business practice changes to prepare for the technology and make plans to obtain the local match. The graphic above identifies the review requirements and other tasks that must be completed before and after the technology implementation.


Americans With Disabilities Act Workshops, Raleigh and Hickory, NC, April 2009 (D. Collins, D. Downs, K. Monast)

Centralina Council of Governments Legal and Ethics Planning Workshop, Mooresville, NC, December 2009 (K. Monast, 4.25 CEU’s)

IDAS Training (D. Collins)

NTI Transit Trainers Workshop, Cleveland, OH, October 2009 (K. Monast)

**Pupil Transportation**

TIMS Spring Conference (Tymposium), March 16-18, 2009, (A. Michael, B. Sluder, M. Perez presented)

*Seat Belts in School Buses: Real-World Experiences*, Session 694, Motor Coach and School Bus Safety (J. Tsai)

**Triangle Regional Model Service Bureau**

TRB Planning Applications Conference in Houston, TX, May 19, 2009 *Managing Networks: A GIS-and Project-Based Network Management System for Highways and Transit*, (B. Mei, presenter)

WEBINAR: TMIP: Sharing Travel Model Development & Estimation Experience (M. Ingram)

WEBINAR: TMIP Dynamic Traffic Assignment (series of 9 webinars), (M. Ingram)

WEBINAR: TRB/SHRP 2: Capacity Project C10: Partnership to Develop an Integrated Advanced Travel Demane Model and a Fine-Grained, Time-Sensitive Network (M. Ingram)

FTA: New Starts Forecast Workshop (M. Ingram)

FHWA: Air Quality Analysis Software: MOVES Workshop (M. Ingram)

Planning Applications Conference, Houston, TX, May 2009 (J. Huegy 20 CEUs)

NC Model Users Group, Raleigh, NC, November 2009 (J. Huegy)

NC Section ITE Annual Meeting and NC MPO Meeting, Raleigh, NC, November 2009 (J. Huegy 4.5 CEUs)

TRB Annual Meeting, Washington, DC, January 2009 (J. Huegy)
Visual Analytics, Modeling and Simulation (VAMS)


**Published Refereed Journal Papers**

Schroeder, Bastian J., Nagui M. Rouphail and Ron G. Hughes (2009). *A Working Concept of Accessibility - Performance Measures for the Usability of Crosswalks for Pedestrians with Vision Impairments*. Accepted for Publication by the Transportation Research Record: Journal of the Transportation Research Board. Accepted for Publication.


*ITRE’s GIS support of the NCSHP Motor Carrier Enforcement group includes mapping size and weight enforcement activities. NCSHP Motor Carrier Enforcement has recently enabled GPS on all in-vehicle laptops, allowing troopers to capture the locations of size and weight enforcement activities.*
**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 2009 on new innovations in air transportation. Exhibit VII lists training areas and summary statistics.

**Exhibit VII**

**Training/Continuing Education Activities in 2009**

<table>
<thead>
<tr>
<th>Program Area</th>
<th>Training/Workshops in 2009</th>
<th>Instruction Hours per Session</th>
<th>Sessions Offered</th>
<th>Total Hours</th>
<th>Attendees</th>
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<td>CSS National Dialog Workshop and Webcast, Portland, OR</td>
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| **ITRE**           | TFF Speaker Series: First in Flight
Steven Keeny (Honda Aircraft); Rick Davis (Spirit Aerosystems); Bob Foyle (TRE/NGAT program) | 2                            | 1                | 2           | 60              |
<p>|                    | Distinguished Lecturer Series: University of Florida at Gainsville,                      | 2                            | 1                | 2           | 40              |
| <strong>VAMS</strong>           | Introduction to ArcGIS                                                                    | 24                           | 3                | 72          | 14              |
|                    | Intermediate ArcGIS                                                                      | 16                           | 2                | 32          | 8               |
|                    | Working with the Geodatabase                                                             | 8                            | 2                | 16          | 8               |
|                    | <strong>Exhibit VII Subtotal</strong>                                                                 | 70                           | 12               | 142         | 1476            |</p>
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<td>296</td>
</tr>
<tr>
<td><strong>Grand Totals</strong></td>
<td></td>
<td>530</td>
<td>279</td>
<td>1769.5</td>
<td>5862</td>
</tr>
</tbody>
</table>
Student Support

ITRE research and technical assistance projects continue to involve and support a large number of students from various disciplines and universities. The table on the left summarizes our record of accomplishments in student support, indicating continued graduate student participation in ITRE research. More importantly, much of the graduate student support has come from federal research dollars from agencies such as the National Science Foundation, the National Cooperative Highway Research Program (NCHRP), the Strategic Highway Research Program (SHRP-2) and even from international sources such as Seoul National University and the Korea Transport Institute. Many of the graduate students at ITRE have full Research Assistantship support. We also provide meaningful research experience for our undergraduate students, primarily in the areas of data collection, extraction and analysis. For the second year in a row we had an ITRE-supported undergraduate student presenting his research at the Annual Transportation Research Board Meeting in Washington, DC.

Post-Doctoral Fellows and Visiting Scholars

Ms. Hyejung Hu, Post_Doctoral Fellow (Resident at ITRE)
Ms. Margarida Coelho, PhD - Post-Doctoral Fellow (University of Aveiro, Portugal)
Ms. Guilhermina Torrao - Visiting Scholar/PhD Student (Split time between ITRE and Aveiro)

ITRE and CTE have made a conscious effort to recruit, engage, and support post-doctoral fellows in its research activities. In 2009, 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. Dr. Hyejung Hu, who defended her doctoral dissertation in December 2008 was given a Post-Doc appointment in 2009 to support research projects that required transportation modeling skills at the meso-scopic level, which was part of her dissertation research.

During the Fall Semester 2009, 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 who is co-advised by Dr. Roupahl, 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).
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. This 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 1980s 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; Microscopic Multimodal Transportation Simulation; Work Zone Safety; Maintenance Operations; Professional Development Training; and Professional Engineering Review. Two additional programs are under this group, with a brief explanation below.

♦ 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; and NCDOT. The bureau 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. Initial efforts are exploring ADS-B implementation and documenting the response from pilots on using this technology to improve situational awareness in the cockpit and other operational efficiencies for general aviation users.
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; passenger rail; trucking; and taxicab/livery. 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 a long-standing working partnership 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. In addition, program staff have provided guidance and assistance to the NCDOT Transportation Mobility and Safety Division’s Safe Routes to School program.

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); Transportation Research Board School Transportation Subcommittee (www.itre.ncsu.edu/anb10_6); and, North Carolina School Bus Safety (www.ncbussafety.org).

- OR/Ed. Lab Program (www.itre.ncsu.edu/ORED). 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.

- Transportation Information Management Systems (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.
Visual Analytics, Modeling and Simulation Group (VAMS)

VAMS researchers continued their analysis and program evaluation support of the two major Highway Patrol motor carrier enforcement programs: Motor Carrier Safety Assistance Program (MCSAP) and Truck Size and Weight. These programs are funded by FMCSA and FHWA respectively. These programs provide the primary vehicles for VAMS development of operational GIS-related capabilities. VAMS’ analysis work for the NCSHP and the NCDOT continues to provide an empirical basis for the consideration of safety and roadway infrastructure issues associated with the trucking industry’s push for ‘higher productivity (heavier, longer) vehicles’ (HPVs). This work also provides support of ITRE’s inputs to North Carolina’s development of a statewide ‘logistics’ (freight) plan.

VAMS also continued to develop and host ITRE-offered GIS training which included classes for NCDOT personnel. VAMS’ continued its pavement survey support of local municipalities and acquired an additional staff member to assist in this work. Eleven (11) pavement management system projects encompassing nearly 900 street miles were completed and the results delivered to various North Carolina municipalities.

Dr. Hughes continued as Principal Investigator of NCHRP 3-78 which has focused on identifying and evaluating potential solutions for improving the accessibility of modern roundabouts and channelized turn lanes for visually impaired pedestrians. This represents the first time that a Hybrid Pedestrian Signal (formerly known as a HAWK signal) has been evaluated for this purpose. A draft final report is presently under review by the NCHRP panel.

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 the ABJ95 standing technical committee on visualization. VAMS also maintained an active presence on the NC Traffic Records Coordinating Committee, the GIS in Transit Conference Committee, as well as the North Carolina State Government (SGIC) GIS Users Group.