

2009-2010
Annual Report



Center for Transportation
and the Environment

CTE



NC STATE UNIVERSITY

Table of Contents

3
Message
from the Director

4
Management Structure

6
Financial Report

7
Research Program

13
Education Program

16
Technology Transfer
Program

Center Theme and Mission



The Center for Transportation and the Environment conducts innovative programs of research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment.

CTE is an activity of the University Transportation Centers Program, administered by the Research and Innovative Technology Administration of the United States Department of Transportation. CTE is recognized as a national university transportation center of excellence.

Message from the Director



This annual report highlights the research, education, and technology transfer activities for 2009-2010 for The Center for Transportation and the Environment. CTE was established in 1991 as a national center within the Institute for Transportation Research and Education at North Carolina State University. CTE focuses on a wide range of environmental issues at the local, state, and national level, and many of its activities have been carried out in its role as a national university transportation center of excellence.

Numerous research projects, involving more than 22 faculty and 41 students, have been initiated or completed in this reporting period through our partnership with the North Carolina Department of Transportation. These projects address important

problems such as air and water quality management, wetlands mitigation and, as highlighted in this report, new approaches for controlling invasive plant species in right-of-ways. In addition, CTE researchers Ann Hartell and James Martin continued their work on Context Sensitive Solutions by partnering with the Federal Highway Administration on the CSS National Dialog. They, along with Leigh Lane and other researchers, have also partnered with other organizations to address a number of topics related to environmental justice, public art-in-transit initiatives, and sustainable transportation strategies. One project under the Strategic Highway Research Program (SHRP2) addressed the development of a web-based visioning resource for transportation practitioners; this work drew on the talents of our distance learning specialist Eugene Murray and web specialist Nancy Bailey as well as several other CTE researchers. Three projects, carried out with the Federal Highway Administration or through the National Cooperative Highway Research Program (NCHRP), provided educational materials and technical assistance services for citizen groups and a number of state agencies. Please see our Center's website, www.cte.ncsu.edu, for more detailed descriptions of all of the projects. Highlights of CTE's other activities during the year include national webcasts on water quality issues and sustainable communities, our co-sponsorship of the fifth International Conference on Ecology and Transportation (ICOET) in Duluth, Minnesota, and our co-sponsorship of the Transportation Research Board 2010 Environment and Energy Research Conference in Raleigh, North Carolina.

All of us at CTE look forward to continuing to work on the pressing environmental issues, and we welcome any ideas you may have for future initiatives and opportunities to develop partnerships.

Sincerely,

A handwritten signature in black ink, appearing to read "E. Downey Brill, Jr.", written over a light blue background.

E. Downey Brill, Jr., Ph.D.

Management Structure

CTE is administered by North Carolina State University, reporting to the Office of the Vice Chancellor for Research and Graduate Studies, and is one of over 60 research centers, institutes, and laboratories on campus. CTE is located on NCSU's Centennial Campus in the offices of the Institute for Transportation Research and Education (ITRE).

The Center's research, education, and technology transfer programs are guided by the CTE Advisory

Committee, which provides valuable input on program activities. The committee is composed of representatives from government, academia, and non-profits. In addition, ITRE's Advisory Council receives regular updates on CTE activities and provides input at the request of the Center's director, Dr. E. Downey Brill, Jr.

CTE Advisory Committee 2009-2010

Eugene Conti, Jr., PhD

Secretary

North Carolina Department of Transportation
Raleigh, NC

Gorman Gilbert, PhD, PE

Director, Oklahoma Transportation Center
Oklahoma State University
Stillwater, OK

Nagui M. Roupail, PhD

Director

Institute for Transportation Research and Education
Raleigh, NC

Robert E. Skinner

Executive Director

Transportation Research Board
Washington, DC

ITRE Advisory Council 2009-2010

Jim Westmoreland, PE (Council Chair)

North Carolina Department of Transportation
Raleigh, NC

Stephanie Ayers

North Carolina Ports Authority
Wilmington, NC

Eugene Conti, Jr., PhD

North Carolina Department of Transportation
Raleigh, NC

Kathryn Dobie, PhD

NC A&T State University
Greensboro, NC

Mark Dunzo

Kimley-Horn and Associates, Inc.
Cary, NC

Larry Goode, PhD, PE

Transportation Consultant
Raleigh, NC

David Harkey, PhD, PE

University of North Carolina
Highway Safety Research Center
Chapel Hill, NC

Edd Hauser, PhD, PE

Center for Transportation Policy Studies
University of North Carolina at Charlotte
Charlotte, NC

David King

Triangle Transit Authority
Research Triangle Park, NC

George List, PhD, PE

Civil, Construction and Environmental Engineering
North Carolina State University
Raleigh, NC

Catherine McGhee, PE

Virginia Transportation Research Council
Charlottesville, VA

John F. Sullivan, III

Federal Highway Administration
North Carolina Division
Raleigh, NC

C. Michael Walton, PhD, PE

Civil Engineering
University of Texas at Austin
Austin, TX

Robert Wimmer

Toyota Motor North America
Washington, DC

Center Staff



E. Downey Brill, Jr., PhD
Director



James B. Martin, MCE, PE
Associate Director



Leigh B. Lane, BSCE
Senior Research Associate



David Robinson, PhD, PE
Senior Research Associate



Ann Hartell, MRP
Research Associate



Nancy Bailey, MLS
Web Development Specialist



Eugene Murray, BA
Distance Learning Specialist



Walt Thomas, BA
Information Processing Assistant

University Faculty Affiliates

H. Christopher Frey, PhD
Professor of Civil Engineering
Water Resources/Environmental Engineering
North Carolina State University
Raleigh, NC

Joseph E. Hummer, PhD, PE
Professor of Civil Engineering
Transportation Systems and Materials
North Carolina State University
Raleigh, NC

Margery F. Overton, PhD
Professor of Civil Engineering
Water Resources/Environmental Engineering
North Carolina State University
Raleigh, NC

Sethu Raman, PhD
Professor of Atmospheric and Marine Sciences
North Carolina State University
Raleigh, NC

John R. Stone, PhD
Professor of Civil Engineering
Transportation Systems and Materials
North Carolina State University
Raleigh, NC

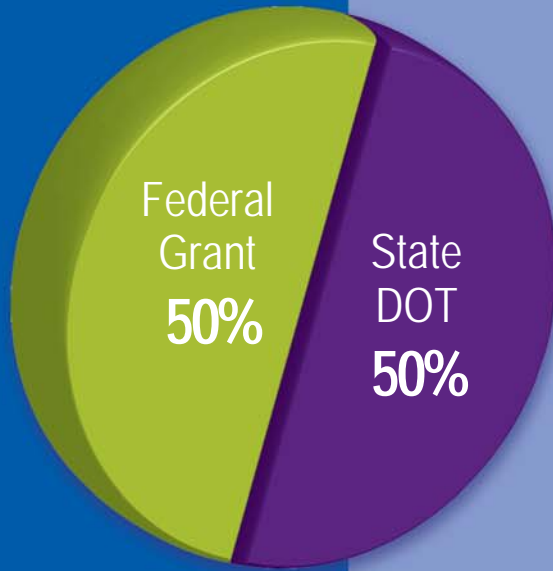
Billy M. Williams, PhD, PE
Associate Professor of Civil Engineering
Transportation Systems and Materials
North Carolina State University
Raleigh, NC

Financial Report

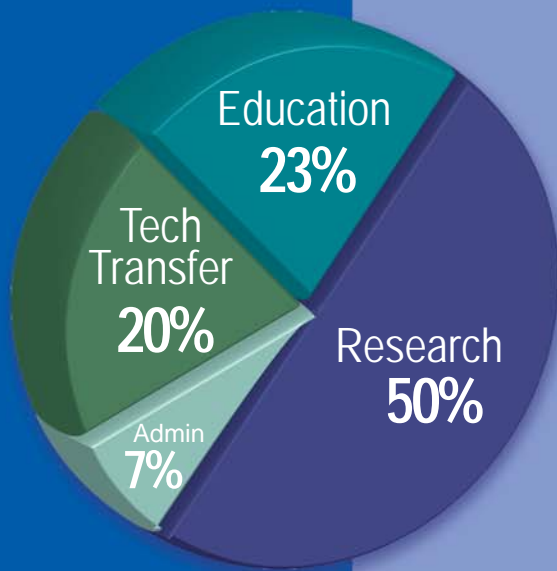
The Center for Transportation and the Environment is funded by the Research and Innovative Technology Administration of the US Department of Transportation, with matching support from the North Carolina Department of Transportation (NCDOT).

CTE's total annual operating budget for FY2009-2010 was \$926,800. USDOT provided \$463,400 through the University Transportation Centers Program. NCDOT provided the full state match requirement of \$463,400 through its funding of CTE / NCDOT joint research projects.

FY 2009-2010 Funding Sources



FY 2009-2010 Expenditures



Research Program

CTE's annual research activities include partnering with the North Carolina Department of Transportation (NCDOT) to conduct a joint environmental research program. The partnership was established in 1998 following the Center's reauthorization in the Transportation Equity Act for the 21st Century (TEA-21).

Each year the NCDOT Research and Development Unit requests research proposals addressing

transportation needs from across the state. Representatives from CTE, the Institute for Transportation Research and Education (ITRE), and the Federal Highway Administration's NC Division Office serve on a technical advisory committee responsible for reviewing and selecting the research projects. Contracts for all project awards are administered by ITRE. CTE's director serves on each environmental research project committee which provides overall guidance to the principal investigator(s) and monitors their progress through project completion.

The CTE / NCDOT partnership has generated significant research results in various environmental areas, including air quality, water quality, wetlands mitigation, vegetation management, wildlife management, highway construction materials, and new technologies. During 2009-2010 the research program involved the active participation of more than 41 students and 22 university faculty representing many academic disciplines.

For more information on the program and research projects, please visit the CTE website at www.cte.ncsu.edu/cte/research.

New Projects

The following new research projects were awarded during the 2009-2010 reporting period.

Claridge Nursery Stream Restoration Monitoring (HWY-2009-28)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. Greg Jennings

Period: July, 2009 – June, 2010

Monitoring of Prospective Bridge Deck Runoff BMPs: Bioretention and Bioswale (HWY-2009-29)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. William F. Hunt III

Period: July, 2009 – June, 2010

Completed Projects

The following research projects were completed, and final reports issued, during this reporting period. Reports and other project details are available through the CTE website at www.cte.ncsu.edu/cte/research.

Innovative & Environmentally Responsible Methods for Controlling Invasive Woody Plant Species in NC Right of Ways (HWY-2006-05)

Performing Organization:

North Carolina State University

Principal Investigators: Dr. Joe C. Neal, Dr. Jim Burton

Period: July, 2005 – August, 2009

Platinum Markers as Indicators of Transportation Impact (HWY-2007-03)

Performing Organization:

North Carolina State University

Principal Investigators: Dr. W. Gregory Cope, Dr. Thomas J. Kwak, Dr. Damian Shea

Period: July, 2006 – June, 2009

Ongoing Projects

The following research projects were in progress or in the draft final report stage during the 2009-2010 reporting period.

Evaluation of Manufactured Stormwater Best Management Practices (HWY-2006-04)

Performing Organization:

University of North Carolina at Charlotte

Principal Investigators: Dr. Craig Allan, Dr. Jy Wu

Period: May, 2006 – December, 2008

Effectiveness of Bear Crossings on I-26 in Madison County, North Carolina (HWY-2006-14)

Performing Organization:

North Carolina State University

Principal Investigators:

Dr. Richard A. Lancia, Dr. Phillip D. Doerr

Period: July, 2005 – June, 2007

Evaluation of Nutrient Loading Rates and Effectiveness of Roadside Vegetative Connectivity for Managing Runoff from Secondary Roads (HWY-2007-04)

Performing Organization:

University of North Carolina at Charlotte

Principal Investigators: Dr. Jy Wu, Dr. Craig Allan

Period: July, 2006 – August, 2009

Ongoing Maintenance and Enhancement of Precipitation Alert and Visualization Tool in Support of NCDOT's Storm Water Quality Monitoring (HWY-2007-20)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. Sethu Raman

Period: July, 2006 – June, 2009

Research of Hydrologic and Water Quality Performance of Four Linear Wetlands in Eastern North Carolina and House Creek Watershed Interchange Retrofits (HWY-2007-21)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. William Hunt

Period: March, 2007 – June, 2010

Methodology to Assess Vegetation, Hydrologic & Soil Parameters that Affect Wetland Restoration Success (HWY-2008-16)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. Mike J. Vepraskas

Period: August, 2007 – June, 2008

Effects of Highway Construction in Sedgefield Lakes and King's Mill Continued (HWY-2008-17)

Performing Organization:

North Carolina State University

Principal Investigators:

Dr. Daniel E. Line, Dr. Jean Spooner

Period: July, 2007 – December, 2008

Propagation and Culture of Federally Listed Freshwater Mussel Species (HWY-2009-16)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. Jay F. Levine

Period: July, 2008 – December, 2010

Assessment of Bioenergy Crop Production along NC Highway Right of Ways (HWY-2009-19)

Performing Organization:

North Carolina State University

Principal Investigator: Matthew W. Veal

Period: March, 2009 – May, 2011

Shoreline Monitoring at Oregon Inlet Terminal Groin (HWY-2009-21)

Performing Organization:

North Carolina State University

Principal Investigator: Dr. Margery F. Overton

Period: July, 2008 – August, 2009

Effects of Highway Construction on Two Streams in Yancey County (HWY-2009-23)

Performing Organization:

North Carolina State University

Principal Investigator : Dr. Daniel E. Line

Period: August, 2008 – August, 2011

Innovative & Environmentally Responsible Methods for Controlling Invasive Woody Plant Species in NC Right of Ways

Dr. Joseph C. Neal, Professor, and Dr. Jim Burton, Associate Professor, in the Department of Horticulture Science at North Carolina State University, recently completed research comparing two types of an innovative mowing technology for controlling invasive woody plant species along North Carolina roads. From April 2005 to July 2008, Drs. Neal and Burton conducted studies on the effectiveness of herbicide application using the Diamond Wet Blade versus the Brown Brush Monitor mower/applicator systems.

Traditional methods for mowing right-of-ways and dispersing herbicides along the vegetation have been the solution that NCDOT utilizes, but neither method is cost efficient and has proven to spur environmental consequences. With Diamond Wet Blade technology, the herbicide is directly applied to the cutting blade, whereas the Brown Brush Monitor offers a one-pass mowing and herbicide application. One anticipated advantage of using these applicator systems on the mower is that it would help reduce herbicide use and environmental exposure.

Field experiments were conducted to test the applicability and efficiency of the Diamond Wet Blade and Brown Brush Monitor solutions. In April 2005, several studies on woody plants were conducted in Goldsboro, Chatham County, Greenville, and Guilford County, NC. Treatments were again applied to these plants in November. Drs. Neal and Burton reported that the studies still did not provide a definitive solution to the excessive vegetation along North Carolina roads. In Chatham County, for example, the Diamond Wet Blade herbicide application did not result in any reduction of the re-growth height.

“The mower and applicator systems evaluated were excellent mowers but did not cut larger woody plants with any precision (i.e. the ‘cut’ was more like a rough break or shatter),” Dr. Burton said. “The models tested did not consistently apply herbicides in a manner that provided long-term control of woody vegetation.”

While the application of herbicide using this mower technology did not garner a major effect, it did allow some progress to be made in finding a solution to suppressing vegetation. “Under some circumstances, good suppression of re-growth was achieved with the mower and applicator system,” Dr. Neal said. “Future experiments should address the environmental, physiological and mechanical factors that contribute to effective vegetation control utilizing Wet Blade technology.”



Dr. Joe Neal and Dr. Jim Burton of NC State University's Horticulture Science Department conducted research on using the Diamond Wet Blade (photo, left) and Brown Brush Monitor (photo, right) mower and herbicide applicator systems for more effectively controlling invasive woody plants along NCDOT right-of-ways.

CTE staff were invited to present research and to preside at workshops of the Transportation Research Board (TRB) at its Annual Meeting in January 2010. The following CTE research will also be considered for publication in upcoming issues of the Transportation Research Record.

National and State Research Activities

TRB Research Presentations and Publications

CSS National Dialog: Highlighting Connections between Transportation and Communities



Context Sensitive Solutions (CSS) is an approach to planning, designing, building and maintaining transportation projects and programs that recognizes the interactive nature between transportation systems and communities. As part of the Federal Highway Administration's ongoing CSS program, the agency partnered with CTE in 2009 to initiate the CSS National Dialog, including a website and series of regional workshops, to further extend CSS outreach efforts. CTE research associate **Ann Hartell** and associate director **James Martin** presented a report on the progress and content of the CSS National Dialog workshops and overall efforts of the Dialog in furthering CSS as an approach to better transportation solutions for communities.

TRB Workshop Facilitation: The Role of Integrated Planning in Developing Sustainable Transportation Strategies

While most transportation professionals intuitively understand that transportation is a means to many ends rather than an end in itself, transportation planning processes are often driven by a narrow perspective derived exclusively from within the transportation industry. CTE senior research associate **Leigh Lane** was invited by TRB to lead this workshop addressing the role of integrated planning in developing sustainable transportation strategies. Lane moderated presentations and discussions by industry experts representing federal, state, non-governmental, and private sector agencies focusing on various aspects of planning for sustainable development.

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

CTE research associate Ann Hartell presented a case study of the 'Art-On-The-Move' program in Raleigh, NC. 'Art-On-The-Move' is a partnership between the city bus transit provider, Capital Area Transit System (CAT), and the city of Raleigh Arts Commission. The program displays original artwork by local artists as vinyl wraps on city buses. Art selected for wraps must meet guidelines on content acceptable for the CAT advertising program, and are displayed on the vehicles for a six-month period. The arts commission pays the artist stipends and all wrap costs. Hartell's study demonstrates how a transit agency can leverage its existing advertising program to establish a public art-in-transit program, even under strict local and state regulations. The study also illustrates a successful interagency partnership on which an expanded public art-in-transit program can be built in the future. The paper of the case study is available at www.itre.ncsu.edu/ITRE/research/documents/cte/ArtOnTheMove.pdf.



Citizens and local media view city transit buses wrapped in original artwork during the 2009 Art-on-the-Move roll-out event in Raleigh, NC. CTE's research on this program demonstrates how a transit agency can leverage existing resources and form interagency partnerships to build a successful public art-in-transit program.

Title VI, Environmental Justice, and Limited-English Proficiency Effective Practices

This presentation by CTE senior research associate **Leigh Lane** and staff of prime contractor The Louis Berger Group Inc. addressed national effective practices that have placed considerations of Title VI of the Civil Rights Act, Environmental Justice, and Limited English Proficiency (LEP) at the center of transportation decision-making. Effective decision-making requires meaningful public involvement from many different socioeconomic groups to design transportation facilities that fit more harmoniously into communities. The involvement of people potentially affected by transportation projects including LEP, low-income and minority populations is not only required by numerous statutes and regulations but offers many benefits to developing and delivering transportation projects that meet the transportation needs of all people. Lane, working with Louis Berger Group staff, conducted a review of national effective practices to ensure that the promise, vision, and obligations created by Title VI and the Executive Orders on Environmental Justice and LEP were appropriately recognized with all agency activities at each stage of transportation decision-making.

NCHRP SHRP2 Visioning Research

The National Cooperative Highway Research Program (NCHRP), managed by the Transportation Research Board, conducts research in problem areas that affect highway planning, design, construction, operation, and maintenance nationwide. In 2009-2010 CTE researchers and staff contributed on project activities for the second NCHRP Strategic Highway Research Program (SHRP2) in the development of a web-based visioning resource for transportation practitioners.

Working with prime contractor Cambridge Systematics, the CTE team led by senior research associate **Leigh Lane** performed several project tasks to develop the web resource 'Transportation – Visioning for Communities.' Called 'T-VIZ' for short, the resource details an innovative planning process known as 'visioning' in which users are guided through a process of critical activities for preparing, creating and implementing a vision that reflects a community's transportation goals within regional socioeconomic and environmental considerations. The T-VIZ website includes an interactive 'vision guide' tool that links the outputs of visioning into a larger collaborative, strategic approach that engages the many stakeholders within a community. This collaborative approach, in turn, improves transportation planning and project development outcomes.

Lane, along with CTE research associate **Ann Hartell**, distance learning specialist **Eugene Murray**, and web development specialist **Nancy Bailey**, worked on several tasks including a literature review and collection of over 800 quality of life indicators; developing the visioning guide process and web tool design; preparing a chapter of the technical report titled 'Community Considerations'; and vetting the draft vision guide. Lane and Murray also assisted with the development of online training modules for practitioners to learn about visioning techniques and how to utilize the T-VIZ website in their work.

The 'Transportation – Visioning for Communities' web resource is one of several research projects under the SHRP2 program, established by Congress and administered by the Transportation Research Board. To learn more, visit the T-VZ website at <http://shrp2visionguide.camsys.com>.

FHWA Sustainability Peer Exchange

The Federal Highway Administration (FHWA) in June, 2010, conducted a peer exchange in Washington, DC, to help state and local transportation agencies understand and use sustainability criteria and tools in the planning, design, and construction of roads and highways. CTE senior research associate **Leigh Lane** was invited by FHWA to participate in the peer exchange to discuss principles and characteristics of sustainable roads and highways and the criteria that shape sustainable facilities. Sustainability principles are already being applied by many building and construction industries to achieve environmental goals and cost savings. These practices are not yet widely used in transportation project development, prompting FHWA to develop a sustainable highway initiative. Lane's considerable experience and CTE's involvement with the early integration of sustainability principles into project development are important in this discussion which is helping to direct national transportation policy.



CTE contributed to the development of the 'Transportation – Visioning for Communities' web resource which features an interactive 'Vision Guide' tool. The Vision Guide provides the outline of a model vision process to better enable practitioners to engage in visioning in support of transportation planning.



Support for NCDMV Process Improvement Program

The North Carolina Division of Motor Vehicles (NCDMV) has engaged CTE to provide documentation and support services for its program to implement enhanced security and identification verification in the driver license and identification card issuance process. CTE research associate **Ann Hartell**, working with fellow researchers from ITRE and the North Carolina State University Department of Civil, Construction and Environmental Engineering, is leading this effort. The scope of work includes a \$4 million suite of initiatives funded under a federal grants program. CTE is providing substantial assistance to NCDMV in developing grants applications and multi-year budgets under the federal program, and is facilitating the work of NCDOT information technology staff and NCDMV program managers to coordinate multiple projects. One project, slated for implementation in early 2011, will require a statewide training program to update NCDMV field office staff on a new process for verifying federally-issued identification documents. CTE is leading the development of the training manual and field office guide for the new process. Recognizing that the new process represents significant changes to field office responsibilities and workflow, CTE will also produce a post-implementation webinar allowing NCDMV central office staff to address questions and concerns from field office staff – a first for this state agency.

Supporting the North Carolina Ecosystem Enhancement Program

CTE support for the North Carolina Ecosystem Enhancement Program (EEP) continued in 2009-2010. Senior research associate **Dr. David Robinson** worked with EEP staff



to implement this nationally-recognized environmental mitigation program that also supports economic growth in the state. EEP is a unique partnership between the NCDOT, NC Department of Environment and Natural Resources, and the US Army Corps of Engineers. EEP provides mitigation for NCDOT's transportation infrastructure projects, and maintains hundreds of stream and wetland restoration, enhancement and conservation projects statewide. Since 2003 Robinson has supported EEP on its strategic planning and database development to track and forecast project costs and budgets. Robinson also forecasts the in-lieu fee programs for wetland, stream, nutrient offset and stream buffer mitigation. He provides analysis of proposed state and federal mitigation legislation, and determines the potential financial and organizational impacts on the program. CTE is proud to support EEP in its ongoing efforts to preserve and protect wetlands, streams and riparian areas throughout North Carolina. For more information, visit the EEP website at www.nceep.net.

Education Program

Context Sensitive Solutions (CSS), a collaborative process for transportation planning and design, is a central focus of CTE's education program activities. CSS is an interdisciplinary approach which partners transportation professionals with regulatory agencies, local governments, citizens and other stakeholders to consider the total context within which a transportation project will exist and to achieve solutions that integrate the project with the environment and community it serves. Since 2003 CTE has been a nationally

recognized expert and leader in CSS research and education. In 2009-2010 CTE assisted in launching two federal initiatives to further implement CSS principles into transportation planning across the country, and in developing CSS educational guides to aid practitioners and citizens in collaborative transportation decision-making. The Center also supported graduate student research through its Student of the Year award, and conducted outreach to middle and high school students learning about sustainable transportation. More information about CTE's education program can be found at www.cte.ncsu.edu/cte/education.

Context Sensitive Solutions National Dialog

CTE and the Federal Highway Administration (FHWA) in 2009-2010 convened the Context Sensitive Solutions (CSS) National Dialog. The goal of the Dialog is to facilitate an ongoing exchange of ideas and build momentum for wider implementation of CSS in the transportation industry. The project featured a series of one-day workshops held across the U.S., each focusing on a particular aspect of CSS and highlighting regional transportation projects and programs to illustrate CSS best practices and provide a springboard for further discussion and interaction.

From October 2009 to April 2010, CTE and FHWA conducted five workshops in Texas, Oregon, North Carolina, New Jersey, and Minnesota. Over 90 submissions of CSS case studies were collected from 30 states to be considered for presentation. The workshops also featured discussion panels drawn from each host region. Four of the workshops were webcast live to a national audience who participated in the discussions with questions by email. The Dialog brought together over 500 participants at the workshops and via webcasts, representing state DOTs; state, federal and local governments; and private companies as well as university affiliates and non-governmental organizations.

CTE and FHWA are planning a follow-up national webcast in August 2010, with updates to information presented at the regional workshops. CTE is also preparing a final report to FHWA about the project. The report, all workshop materials and webcast recordings are available on the CSS National Dialog website at www.cssnationaldialog.org.



Transportation professionals learn from a panel of experts during the CSS National Dialog workshop in Austin, TX. Conducted by CTE and FHWA, the Dialog brought together over 500 participants at five U.S. regional workshops and via webcasts to discuss how employing CSS principles can help improve transportation outcomes.

Technical Assistance for CSS Implementation

The Federal Highway Administration (FHWA) in 2008 initiated a project to develop a specialized technical assistance program for Context Sensitive Solutions (CSS), to be delivered to several state departments of transportation over a two-and-a-half-year period. Nine states selected by FHWA – California, Florida, Hawaii, Illinois, Maine, Massachusetts, New Hampshire, New Mexico, and Oregon – each received customized assistance with their specific needs related to CSS implementation from a core team of CSS experts. CTE senior research associate Leigh Lane, working with consultants from The Louis Berger Group, Inc., was one of the expert team members leading technical assistance efforts in six of the states.

The team conducted technical assistance workshops covering topics such as improving public outreach strategies for small scale projects, better linking of long range planning to project development, and developing a performance measurement framework to better integrate CSS principles through all phases of transportation decision-making. Lane performed follow-up assessments with staff from the six state DOTs to discuss outcomes of the technical assistance and to facilitate action planning on the ideas and momentum generated.

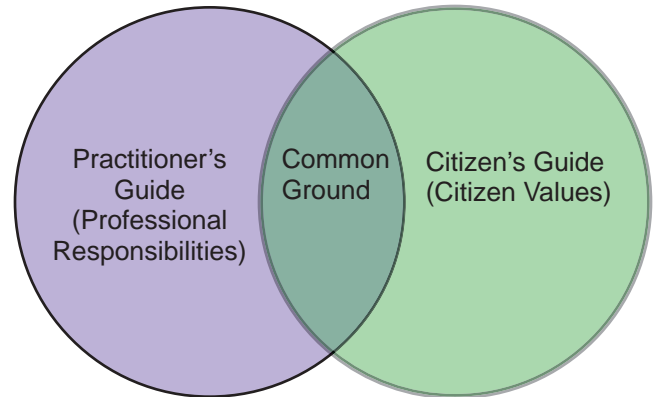
Each of the nine states receiving technical assistance was provided documentation including a summary of the challenges the state DOT faced in implementing CSS, how the technical assistance addressed those needs and contributed to the state's overall progress, and "lessons learned" from the process to serve as examples to other state DOTs that may be able to adapt these approaches to their own needs. The documentation materials and a project summary are available at http://contextsensitivesolutions.org/content/reading/specialized_technical_assistanc/?.

Citizen's and Practitioner's Guides for CSS in Transportation

Since 1998, federal and state DOTs have been striving to improve the quality of transportation decision-making and project development through the implementation of Context Sensitive Solutions (CSS). However, findings from recent surveys of state DOTs indicate that, in many states, misperceptions about CSS still exist. Transportation stakeholders do not yet have a clear understanding of what defines and constitutes CSS. State DOTs want more effective educational and training tools to improve their CSS implementation processes.

To help address this issue, the National Cooperative Highway Research Program (NCHRP) program implemented Project 08-68 and engaged CTE senior research associate **Leigh Lane**, working with consultants from The Louis Berger Group, Inc., to develop two CSS guides, one for citizens and one for discipline-specific professionals. These guides will help citizens and practitioners better understand the philosophy and principles of CSS, and to be more effectively engaged in transportation decision-making. The key message is that practitioners and citizens share responsibility for solving transportation problems, and each group must understand and embrace the other's perspective to create shared solutions.

Lane, co-principal investigator on the project, led the writing of the practitioner's guide. The guide speaks to all transportation professionals charged with providing mobility options to support a good quality of life for all citizens. The focus of the guide is to help the practitioner build collaborative relationships; understand citizen values, interests, and needs; and produce effective and efficient decisions. The project will be completed in fall 2010, with publication of both guides by the Transportation Research Board pending. More information about the project is available from the TRB website at <http://144.171.11.40/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=1618>.



CTE is assisting in the development of two educational guides for NCHRP Project 08-68 to help practitioners and citizens and build collaborative relationships and produce more effective transportation decisions. The overarching goal of the practitioner's guide is to help transportation professionals find common ground with citizens by listening to them and understanding how transportation affects their quality of life.

Introducing Students to Sustainable Transportation



CTE's Ann Hartell presents on sustainable transportation to eighth-graders in Raleigh, NC. The school invited Hartell and other transportation professionals to engage students to explore current and future technologies that are moving the U.S. toward a more sustainable future.

CTE research associate **Ann Hartell** in spring 2010 joined with a group of researchers from the Institute for Transportation Research and Education (ITRE) to speak with Raleigh, NC area middle school and high school students about sustainable transportation practices. Hartell and fellow ITRE staff visited with eighth-graders at Wake Forest-Rolesville Middle School to discuss their transportation work. The group presented on ways to make current transportation modes more sustainable, and discussed ideas for the future redesign of cities that better integrate land use and transportation systems. The school invited CTE and ITRE staff to speak as part of its 'Project Phoenix' program, which engages students working in cooperative math and science groups to explore what current and future technologies are moving the country toward a more sustainable future.

Later in the spring, high school seniors from the Carolina Friends School in Durham, NC, visited the offices of CTE and ITRE for a field trip to learn about sustainable transportation practices. Hartell guided the students' tour and introduced them to various researchers and their work. The tour was a part of the students' research project in which they visited various local organizations that are actively involved in 'green' sustainable practices. The

students talked in depth with researchers about their current projects. As part of their research project, the students also created a 'wiki' website which describes their many site visits and impressions, and offers others a chance to dialogue with the students about their work. The students' website can be found at <http://thegreentriangle.wikispaces.com>.

William Reynolds

William Reynolds was honored as CTE's Student of the Year for 2009. He is pursuing a master's degree in Civil Engineering at North Carolina State University, and holds a bachelor's degree in Environmental Science from Duke University.



William Reynolds

Reynolds is working as a graduate research student at the Institute for Transportation Research and Education (ITRE), which administers CTE, on the SHRP2 project titled "C-05: Understanding the Contribution of Operations, Technology, and Design to Meeting Highway Capacity Needs." While investigating various ways of improving the traffic planning tool DYNASMART-P, which is used for testing network capacity enhancement strategies for the project, Reynolds identified a need for estimating sustained service rates at signalized

intersections with short left turn pockets. His research topic has become the subject of Reynolds' master thesis.

In addition to traffic operations research, Reynolds is also very interested in transportation planning, and has worked with the Triangle Transit Authority in analyzing potential ways of estimating trip activity around planned light rail transit stops in North Carolina's Research Triangle region.

Each year CTE recognizes a graduate student within its Graduate Research Fellowship Program or Research Program whose academic work exemplifies outstanding research and leadership qualities in the transportation and environment field. Students of the Year are recognized at the annual UTC awards banquet, conducted in concert with the Transportation Research Board annual meeting. Each recipient receives \$1,000 plus registration and expenses for the TRB annual meeting.

Technology Transfer Program

CTE's technology transfer activities in 2009-2010 utilized both Web-based and traditional forums to connect students and practitioners with current information about transportation and environmental research and policy issues. Fostering communication and collaboration between transportation and environmental professionals is integral to the Center's mission. CTE is continually seeking technology transfer opportunities to increase and improve access to information on current research

applications, best practices, and policies. For more information on the CTE technology transfer program, please visit the website at www.cte.ncsu.edu/cte/techtransfer.

National Broadcast Series Webcasts

CTE produced two highly successful webcasts in 2009-2010. These marked the forty-fourth and forty-fifth programs in the Center's long running annual series of teleconferences addressing emerging policy issues, research innovations, and best practices in transportation and the environment. Video archives and transcripts of these and past programs are available on the CTE website at www.cte.ncsu.edu/CTE/TechTransfer/Teleconferences.

Webcast on Sustainable Communities Partnerships

Over 1100 participants from all fifty states and Puerto Rico registered to view CTE's November 2009 national webcast on the "DOT-HUD-EPA Interagency Partnership for Sustainable Communities." The live webcast focused on a new partnership and policy coordination efforts between the US Department of Transportation, US Department of Housing and Urban Development, and the US Environmental Protection Agency to help families gain better access to affordable housing, more transportation options, and lower transportation costs. Presented in cooperation with the Federal Highway Administration and Federal Transit Administration, the two-hour program featured presentations by federal policy and administrative officials followed by questions via email from participants representing federal, state, local, non-government and corporate agencies. Over 200 questions were submitted during the webcast.



Federal policy officials discuss the DOT-HUD-EPA Interagency Partnership for Sustainable Communities during CTE's November 2009 webcast. Panelists included (left to right) Elizabeth Wilkins, White House Policy Assistant for Urban Affairs and Mobility and Opportunity; Beth Osborne, US DOT Deputy Assistant Secretary for Transportation Policy; Shelley Poticha, HUD Senior Advisor for Sustainable Housing and Communities; and John Frece, EPA Smart Growth Program Director.

Webcast on Improving NPDES Compliance



Stormwater experts answer questions from viewers during CTE's webcast on addressing NPDES regulations. Panelists included (left to right) Matt Lauffer, North Carolina DOT; Rachel Herbert, US EPA Water Permits Division; Ken Pace, North Carolina DOT, and Karuna Pujara, Maryland State Highway Administration. Scott Taylor (far right) of RBF Consulting moderated the webcast.

In March 2010 CTE produced a three-hour live webcast on "Best Practices in Addressing NPDES and Other Water Quality Issues in Highway System Management." Presented in cooperation with the Federal Highway Administration (FHWA), the webcast convened a panel of federal, state, and consulting experts to discuss the results and highlights of a recent US domestic scan tour of stormwater programs in several states. The scan tour was undertaken by FHWA to determine actions that will help state DOTs increase their compliance with the US Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) regulations. Nearly 400 transportation and environmental practitioners from forty-eight states and Puerto Rico registered to view the webcast and participate via email-submitted questions. The program provided practitioners with the opportunity to discuss issues with a large panel of experts involved with the scan tour. Panelists reviewed program strategies including total maximum daily loads, innovative stormwater best-management practices, agency reporting practices, and permitting.

CTE annually co-sponsors and serves as lead organizer for professional development conferences and workshops that relate to the Center's mission of mitigating the impacts of surface transportation development on the environment. During 2009-2010 the Center engaged in these activities:

Conferences and Workshops

ICOET 2009 Conference

Adapting transportation systems and solutions to a changing environment – including global climate, political and economic challenges – was the focus of the fifth biennial International Conference on Ecology and Transportation (ICOET), held September 13-17, 2009 in Duluth, MN. CTE organized and co-sponsored the conference, bringing together over 400 participants from 16 countries to share current knowledge and showcase best practices in transportation and the ecological sciences. The Federal Highway Administration (FHWA), principal sponsor of ICOET, supported the conference along with more than 20 federal, state, university, non-governmental and corporate sponsors.

ICOET 2009 included over 120 technical and poster presentations by transportation and natural resources experts, and two field trips conducted by the Minnesota Department of Transportation, co-host of the conference. Plenary sessions featured remarks by administrators from FHWA, the Swedish National Road Administration, and The Conservation Fund Office, as well as presentations addressing sustainability in transportation planning. Technical sessions focused on a diverse range of issues including climate change; stakeholder involvement strategies; interagency partnerships; wildlife habitat connectivity, crossings design and prevention of wildlife-vehicle collisions; wetland mitigation and stormwater management, ecological considerations for bridges; and improving methods for data collection, modeling, and monitoring.

Rick Ridgeway, Vice President of Environmental Initiatives for Patagonia Inc., gave the keynote address on 'Freedom to Roam,' a public-private coalition to protect wildlife corridors that connect crucial animal habitats. Other conference highlights included presentation of the 2009 FHWA Environmental Excellence Awards. CTE has been an integral part of the continued success of ICOET since its inception. Proceedings of ICOET 2009, videos of presentations, and additional information are available on the conference website at www.icoet.net/ICOET2009.asp.



CTE organized the ICOET 2009 conference conducted in Duluth, MN. The conference brought together over 400 participants from 16 countries to share current knowledge and showcase best practices in transportation and the ecological sciences.

2010 TRB Environment and Energy Conference

The Transportation Research Board (TRB) invited CTE to organize its 2010 Environment and Energy Research Conference, held June 6-9 at the Raleigh Convention Center. The conference, titled "Better Delivery of Better Transportation Solutions," brought together members of more than a dozen TRB committees which focus on energy and environmental and research. The American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on the Environment met jointly with TRB at the event. Several organizations sponsored the conference including CTE, TRB, AASHTO, the Federal Highway Administration (FHWA), Federal Transit Administration (FTA) and the North Carolina DOT.

The theme of the conference was an interdisciplinary approach to transportation solutions for the future. The program featured speakers and presentations from a wide cross-section of the transportation, energy and environmental sustainability industries. Various concurrent technical sessions and business meetings made up the three and a half day event. Plenary sessions addressed sustainability and climate change, along with future roles and responsibilities of transportation agencies. The program also included an open public forum on FTA's proposed rulemaking for major transit projects where conference attendees and local Raleigh community members had the opportunity to share ideas.

Attendees were also encouraged to participate in a half-day pre-conference environmental research needs workshop. Facilitated by CTE and FHWA staff, the interactive workshop focused on cross-cutting environmental topics and discussed the development of a comprehensive agenda for environmental research needs to be used in coordinating future environmental and energy research. The final report synthesizing the workshop discussions and related current research is available on the conference website.

Overall, the conference was a great success. More than 500 people registered to attend, making it the largest TRB environmental research needs conference ever held. For more information on the conference, visit www.cte.ncsu.edu/cte/EEConference.



Attendees participate in 'dot voting' to prioritize future environmental research needs during the TRB 2010 Environment and Energy Research Conference held in Raleigh, NC. Organized by CTE, the conference drew more than 500 professionals from the transportation, energy and environmental sustainability industries to discuss interdisciplinary approaches to transportation solutions.

Research Committees and Conference Participation

CTE in 2009-2010 continued its successful tenure of participation on committees of the Transportation Research Board (TRB) and the American Association of State Highway and Transportation Officials (AASHTO) to contribute valued perspectives on current issues facing transportation and the environment.

CTE senior research associate **Leigh Lane** was appointed to serve as TRB Section Chair for Social, Economic, and Cultural Issues. In this role, Lane oversees the research efforts of five TRB standing committees: Transportation and Sustainability, Environmental Justice, Transportation and Land Development, Transportation and Economic Development, and Social and Economic Factors in Transportation. Lane ensures that the committees collaborate successfully and contribute their unique research to the larger TRB strategies for effective environmental transportation practices.

CTE staff **Downey Brill**, **James Martin**, and **Ann Hartell** also continued their service on several TRB and AASHTO committees as noted below. These committees facilitate the exchange of research information and results vital to improving the nation's transportation systems. To learn more, visit the TRB website at www.trb.org and the AASHTO website at www.transportation.org.

- TRB ADC10 Committee on Environmental Analysis and Transportation (D. Brill)
- TRB ADC30 Committee on Transportation and Ecology (J. Martin)
- TRB AD000 Planning and Environment Group (L. Lane)
- TRB ADD00 Section – Social, Economic, and Cultural Issues (L. Lane, section chair)
- TRB ADD20 Committee on Social and Economic Factors (A. Hartell)
- ADD20 Subcommittee on Community Impact Assessment (A. Hartell)
- TRB ADD40 Committee on Transportation and Sustainability (L. Lane)
- TRB ADD50 Committee on Environmental Justice (L. Lane; A. Hartell, friend)
- TRB AFB50T Task Force on Context Sensitive Design/Solutions (L. Lane)
- TRB Annual Meeting, Washington, DC, January 2010 (D. Brill, J. Martin, L. Lane, A. Hartell)
- AASHTO Standing Committee on the Environment (J. Martin)

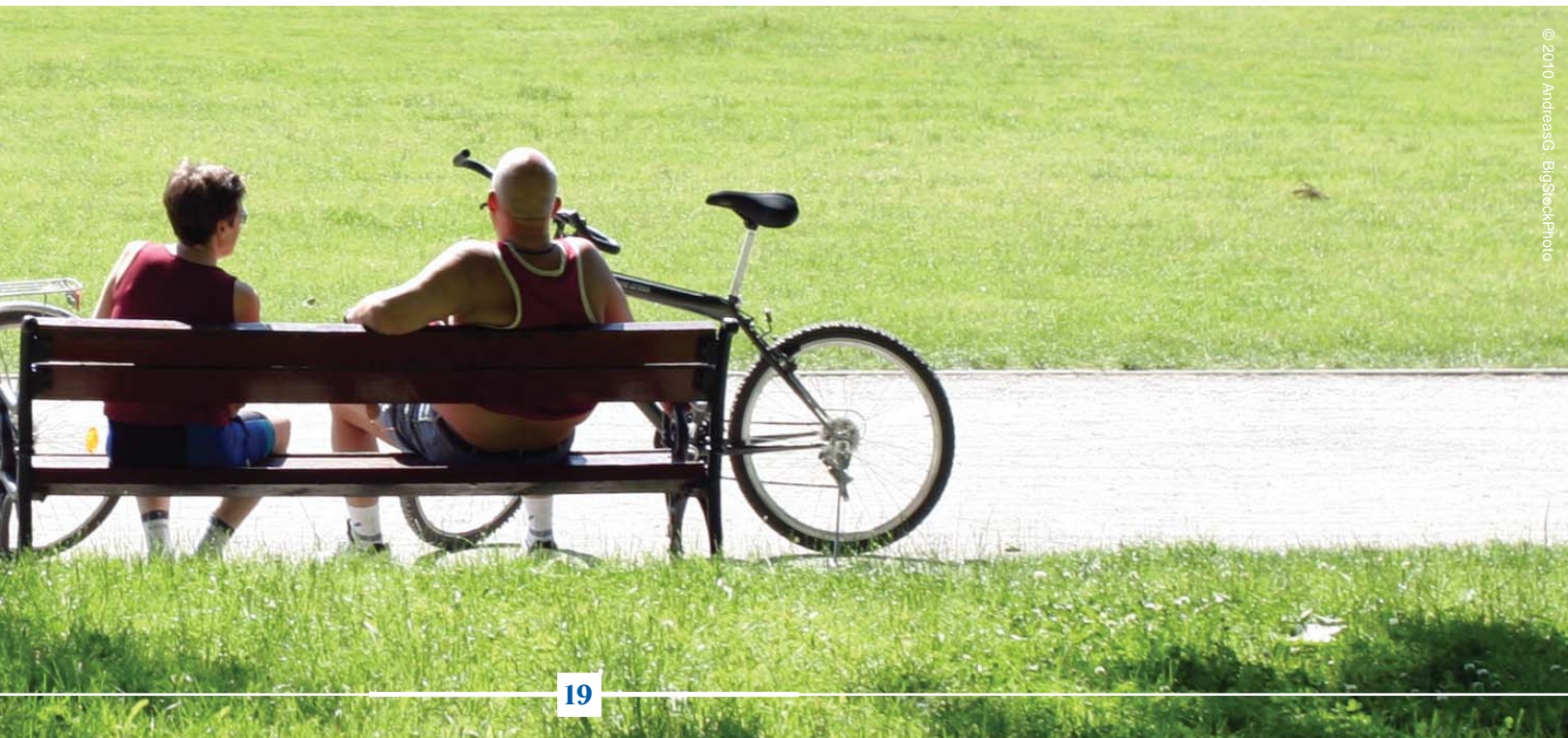


Environmental Communications Support

CTE provides on-going website hosting and maintenance for three environmental committees of the Transportation Research Board (TRB) to support their communications and planning activities. CTE also hosts and moderates several email listservs that facilitate information sharing among the committees, as well as provide support for FHWA program activities and targeted communications for practitioners. In 2009-2010 the Center managed these environmental communications activities:

- TRB ADC10 Environmental Analysis in Transportation website
- TRB ADC30 Ecology and Transportation website
- TRB ADC50 Historic and Archaeological Preservation in Transportation website
- TRANSEVIRO – listserv for government officials, transportation and environmental professionals, and the public to informally exchange news about current research, discussion of problems and solutions, requests for advice and assistance, and announcements of upcoming conferences and events.
- WFTLISTSERV – listserv for officials, professionals, and public interest groups working in wildlife, fisheries, and transportation fields to exchange of information and ideas regarding new research applications, policy issues, best practices, and upcoming events. The listserv includes subscribers who are active in the International Conference on Ecology and Transportation (ICOET).
- ROADSIDES – listserv for transportation officials, scientists, practitioners, and university researchers working in vegetation management along highway corridors. Subscribers include professionals working in landscape, maintenance, environmental services, erosion control and turf establishment, noxious weeds and native plants to increase information-sharing and networking. The listserv supports the Federal Highway Administration's Roadside Vegetation Program.
- TRANSARCH – listserv for cultural resource specialists, including archaeologists, historians, structural historians, and anthropologists, employed in transportation agencies. Subscribers share their individual knowledge, experience, and ideas on cultural resource problems with a nationwide audience of colleagues facing the same challenges. TransArch list members are restricted to staff of state, provincial, tribal, and county transportation agencies and to staff of the Federal Highway Administration.

More information and links to TRB committee websites can be found at www.cte.ncsu.edu/cte/trbpartners. For details on subscribing to the above listservs, visit www.cte.ncsu.edu/CTE/Lists/index.asp.



Contact CTE

For more information about CTE, or to inquire about partnership opportunities, contact:

James B. Martin
Associate Director
(919) 515-8620
jbm@ncsu.edu

The Center for Transportation
and the Environment
NCSU Centennial Campus
Research IV Building
909 Capability Drive, Suite 3600
Raleigh, NC 27606

Phone: (919) 515-8893
Fax: (919) 515-8898

www.cte.ncsu.edu



The Center for Transportation and the Environment is a university transportation center funded in part by the US Department of Transportation and North Carolina Department of Transportation. CTE is located at North Carolina State University within the offices of the Institute for Transportation Research and Education.

