Annual Report

This report covers the Center’s activities from August 23, 2010 - August 22, 2011.

The Center for Transportation and Livable Systems (CTLS) is the University of Connecticut’s University Transportation Center. Our research activities, educational programs and outreach activities focus on Sustainable and Livable Transportation Systems for Smart Growth.

University of Connecticut
Longley Building
270 Middle Turnpike Unit 5202
Storrs, CT 06278-5202
Telephone: (860) 486-6446
Fax: (860) 486-2399
Web: www.ctls.uconn.edu

The preparation of this report was funded by a grant from the Research and Innovative Technology Administration of the U.S. Department of Transportation. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.
Director's Message

This past year marked my second as director of CTLS. It was a year filled with new programs, opportunities and challenges. As a young center, CTLS faces the final year of SAFETEA-LU and the new transportation bill from a perspective of uncertainty, excitement and potential growth. The next year will find us transitioning from our current structure as a Tier II center under SAFETEA-LU to what we hope and anticipate will be a larger, more regional and collaborative partner in the new federal UTC (University Transportation Center) competition and subsequent transportation bill.

“Growth” is the byword that best characterizes CTLS during the last year.

The academic program in transportation and urban engineering at the University of Connecticut has blossomed: we now support over 20 full-time graduate students. We have increased our collaborations with industry, non-governmental organizations, and Connecticut’s DOT. We have expanded our partnerships with other universities in both research and technology transfer activities. While the UTC program and CTLS face an uncertain future, our strategy will change little. We will continue to deliver relevant and timely research and quality educational programs to train the 21st century transportation professional. Our strategy will change little. We will continue to deliver relevant and timely research and quality educational programs to train the 21st century transportation professional. Our growth and success are due in no small part to the active participation and efforts of our research advisory panel, the UConn School of Engineering, and the long list of faculty, staff and supporters who have generously committed time and energy to the CTLS program. Our sincere thanks go out to them all.

I would like to highlight one facet of our growth, a new program initiated over the past year – the Transportation Undergraduate Research Fellowship (TURF) [page 5], a summer research fellowship program created to introduce undergraduate students to the full spectrum of the research process: writing, scheduling, implementing and communicating results. This summer program partnered undergraduate students with CTLS researchers to conduct independent research projects related and complementary to ongoing CTLS research. Students proposed a research project, conducted the research and presented the results of their work at the end of the summer to an audience of their peers, advisors and other transportation professionals.

Details of the program can be found at www.ctls.uconn.edu, but I’d like to present some feedback we received from the five inaugural TURF students from UConn and Northeastern University:

- “I thought it was very beneficial and was an excellent way to get some solid experience in my field of interest as an undergrad.”
- “…I learned a lot of hands on research and leadership skills in the process.”
- “Overall, I thought the experience was a great one. I feel much more prepared for a job [in transportation] than I ever did before.”
- “I would definitely do this program again; it was a completely new experience for me.”

I am proud of all we have accomplished this past year and I look forward to continuing to grow our local, regional and national impact through a variety of partnerships and collaborations in the coming year.

Nicholas E. Lownes, Ph.D., P.E.

Center Theme

The CTLS theme of Sustainable and Livable Transportation Systems for Smart Growth engages multi-disciplinary engineering and planning activities that promote a sustainable transportation system and livable communities connected by this system. The following Sustainability and Livability Principles jointly developed by USDOT, EPA and HUD are represented in the research activities of CTLS:

1. Provide more transportation choices.
2. Promote equitable, affordable housing.
3. Increase economic competitiveness.
4. Support existing communities.
5. Leverage federal investment.

CTLS pursues an innovative, integrative, and multi-disciplinary vision of sustainable transportation systems. We see sustainable transportation systems harnessing and integrating advanced technology for communications, sensing and monitoring. Sustainable transportation systems will be less dependent on fossil fuels, and as such will utilize alternative fuels and will require supportive infrastructure and policy—all guided by cutting-edge research and outreach.
Fall 2010

Nathaniel Merriman joins CTLS as the successful candidate for the Center’s competitive Undergraduate Student Internship. Nate’s primary responsibilities include maintaining the Center’s web site and assisting researchers on CTLS-funded projects.

The October 2010 issue of UTC Spotlight features CTLS research performed by Dr. Nicholas Lownes “The Value of Livable Communities” provides an overview of the Dr. Lownes’ study of Public Transit Design for Smart Growth: Using Choice Experiments to Quantify Tradeoffs, Values and Funding Implications (CTLS 08-04). UTC Spotlight is a monthly newsletter of the U.S. Department of Transportation’s Research and Innovative Technology Administration that highlights accomplishments and products from the nation's University Transportation Centers.

Center researchers showcase their work at the October TRB conference on Transportation for Livable Communities in Washington, D.C. Poster presentations include Green Modes of Transportation for the Delivery of Fast Food in Connecticut’s Mixed-Use Developments (CTLS 08-02), Reversing Urban Sprawl: A Reclaimability Approach to Reviving Downtown Brownfields (CTLS 08-03), Value of Transit: Paying for Place-Making (CTLS 08-04), and Developing a Metric for Transportation Sustainability to Support Livable Communities (CTLS 10-04).

Winter 2010-2011

Transportation and urban engineering master’s degree student Jason Zheng is recognized as the 2010 CTLS Outstanding Student of the Year. Jason’s research focuses on creating and testing the Transportation Index for Sustainable Places, designed to gauge the nation’s transportation systems in terms of broad sustainable goals and outcomes and identifies twelve key elements to assess the impacts transportation has on the environment, society, and economy. The Index will ultimately be used to measure each state’s performance for transportation sustainability.

At the 90th Annual Meeting of the Transportation Research Board in January, Center researchers present on Prioritizing Brownfields for Development: A GIS Tool and Indexing Scheme for Environmental, and Smart-Growth Factors (CTLS 08-03), Contingent Valuation of Built Environment Elements Using Personalized Scenarios (CTLS 08-04), Quantifying the Economic Domain of Transportation Sustainability (CTLS 10-04), and National and International Case Studies on Livability.

Upgrades to the Transportation Systems Laboratory are completed. The Lab is used for teaching undergraduate and graduate courses and houses a powerful computing cluster for research applications, including traffic simulation, pedestrian simulation, network modeling and finite element analysis.
Spring 2011

The UConn student chapter of the Institute of Transportation Engineers (ITE) is named winner of the 2nd Annual Northeastern District Collegiate ITE Traffic Bowl held at the University of Massachusetts (UMass) at Amherst in March. Abigail Osei-Asamoah, Alex Bernier, Kelly Bertolaccini, and Jorge Simbaqueba who represent the UConn ITE student chapter compete in the tournament that includes teams from UMass Lowell, Northeastern University, and reigning champions UMass Amherst.

In April, representatives from the U.S. DOT’s Research and Innovative Technology Administration (RITA), Federal Transit Administration (FTA), and Volpe Center visit CTLS. An article highlighting the meeting’s day-long dialogue of collaboration between government, private industry, and the Center appears in the May issue of The Chronicle newsletter published by the New England section of the Institute of Transportation Engineers (www.neite.org/chronicle).

Summer 2011

Five students are awarded summer research fellowships through the Center’s new Transportation Undergraduate Research Fellowship (TURF) program to conduct studies of their choice that support the CTLS theme of Sustainable and Livable Transportation Systems. At the close of their research, students present on their activities and efforts:

- Bryan Blanc, How Parking Affects Sustainable Transportation Decision Making
- Nathan Bruce, Spatio-Temporal Analysis of Land Cover Change and Its Impact on Flooding Upstream of Hartford, CT
- Corey Hollman, Locating and Evaluating Locations with Certain Roadway Characteristics
- Nicholas Rizner, How Mode Choice Has Affected the Sustainability of the World We Live In: A Case Study of Lowell, MA
- Jonathan Seery, Transit System Information Flow and Distribution to Ridership.

In July, the Center is a contributing partner to the World Symposium on Transport and Land Use Research (WSTLUR) in Whistler, British Columbia. CTLS Director Nicholas Lownes moderates a session and project researchers present on How Did Rising Gasoline Prices Contribute to the Foreclosure Crisis? An Examination of the Housing Market Foreclosures in Metropolitan Phoenix, Arizona, 2007-2009 (CTLS 08-01) and Urban and Suburban Perception of Transit Stop Built Environment (CTLS 08-04).

Transition of the Digital Highway Photolog files and service to a server purchased with funding provided through the Faculty and Staff Equipment Competition is completed in August. The new server installed in the Transportation Systems Lab holds and manages the vast Photolog libraries, collected annually since the 1970s by the CT Department of Transportation. The libraries provide virtual access to the entire state highway system and contain front and pavement images as well as geometric data and other measurements.
Current Projects

CTLS 08-01: Assessing the Impact of Light Rail Transit on Land Values and Tax Revenues

This project examines the early returns to proposed and under-construction Light Rail Transit (LRT) investment and how these vary across neighborhoods. The research team is building a series of models to estimate the effects of LRT on the land markets. Detailed Geographic Information Systems-based data on land-use, new construction, market foreclosures, and residential transactions is being analyzed for the LRT system in Phoenix, AZ. Innovative independent variables include dynamic measures of accessibility at the metropolitan scale derived from GIS-T models, and a proxy for neighborhood change derived from data on new construction.

Principal Investigator: Carol Atkinson-Palombo, Ph.D., Assistant Professor of Geography
Research Team: John Clapp, Ph.D., Professor of Finance, Nicholas Lownes, Ph.D., Assistant Professor of Civil & Environmental Engineering and Robert Cromley, Ph.D., Professor of Geography


This project involves a comprehensive and compact study of the built environment in light rail transit station areas in Denver, CO and travel behaviors in both transit-oriented development (TOD) and non-TOD areas in the region. The principal objectives are to provide insight into how different types of transit-oriented development affect travel behavior patterns—specifically reductions in vehicle miles travelled—and to understand what prevents people from living in TOD areas.

Principal Investigator: Carol Atkinson-Palombo, Ph.D., Assistant Professor of Geography
Research Team: Robert Cromley, Ph.D., Professor of Geography and Wesley Marshall, Ph.D., Assistant Professor of Civil Engineering, University of Colorado Denver

CTLS 10-02: Effect of Low-Impact Sustainable Transportation Design as a Strategy for Alleviating Stormwater Runoff and Reducing GHG Emissions

The objectives of this research are to examine the potential for low impact transportation design as an option to reduce sewage system costs and environmental greenhouse gas (GHG) and nitrogen releases, and to assess green design alternatives to reduce transportation impacts on combined sewer loading and GHG emissions.

Principal Investigator: Joseph Bushey, Ph.D., Assistant Professor of Civil & Environmental Engineering
Research Team: Carol Atkinson-Palombo, Ph.D., Assistant Professor of Geography, Adam Zofka, Ph.D., Assistant Professor of Civil & Environmental Engineering and Eric Jackson, Ph.D., Assistant Research Professor, Connecticut Transportation Institute

CTLS 10-03: Assessing the Relationship between Transportation Mode Choice and Transportation Land Consumption

The goal of this study is to develop models relating mode choice to the amount of land used for transportation in a city. With the increased emphasis being placed on building transit oriented developments in Connecticut and across the country, there is an immediate need to improve our knowledge relating to the efficient use of land in dense urban places and how this land allocation is affected by mode choice in our transportation system.

Principal Investigator: Norman Garrick, Ph.D., Associate Professor of Civil & Environmental Engineering
CTLS 10-04: Developing an Index for Comparing Sustainability of Statewide Transportation Systems

This research investigates how the concept of sustainability relates to the transportation enterprise and use the knowledge about transportation and sustainability to create an index that measures sustainable transportation for states. The index will contain economic, environmental, and social components of transportation that reflect the changing priorities of US policymakers.

Principal Investigator: Norman Garrick, Ph.D., Associate Professor of Civil & Environmental Engineering
Co-Researcher: Carol Atkinson-Palombo, Ph.D., Assistant Professor of Geography

CTLS 10-05: Transportation System Sustainability and Adaptation Using Physarum Polycephalum

Recently, researchers in Japan and the U.K. have discovered that a particular species of mold, Physarum polycephalum, or “Slime Mold” has the unique ability to replicate transportation networks. The objectives of this project are to investigate, quantify and model the network adaptation of P. polycephalum and to apply the information to an analysis of the Connecticut interstate highway and rail network. Further, an outreach experiment for middle school students will be developed and a website will be created to disseminate results and provide materials for educators to conduct the activity.

Principal Investigator: Nicholas Lownes, Ph.D., Assistant Professor of Civil & Environmental Engineering

Pilot Projects

CTLS 11-01: Critical Technologies for Grid Integration of Electric Vehicles—Moving Towards Sustainable Transportation and Smart Grid

The objective of this project is to provide preliminary theoretical and practical solutions that eliminate the negative impact of high electric vehicle (EV) penetration and explore optimized uses of EVs for the grid, including base load generation, peak demand supply, spinning reserves, and grid security & power quality improvements.

Principal Investigator: Peng Zhang, Ph.D., Assistant Professor of Electrical and Computer Engineering
Co-Researcher: Bing Wang, Ph.D., Assistant Professor of Computer Science and Engineering

CTLS 11-02: Sustainable and Livable Transportation Systems for Smart Growth: Linking Electric Vehicles to Adoption of Off-Peak Electricity Rates

This project looks to evaluate the economic and environment benefits that would accrue to Connecticut if utilization of all-electricity vehicles is linked to charging them during off-peak periods. The study proceeds on the basis of a proof of thesis that early adaptors of electric will have vested interests in switching to peak and off-peak rates; this switch will contribute to cleaner generation of electricity while curbing automotive emissions.

Principal Investigator: Fred Carstensen, Ph.D., Professor of Economics and Director, Connecticut Center for Economic Analysis
Co-Researcher: Peter Gunther, Senior Research Fellow, Connecticut Center for Economic Analysis
New Projects

Based on recommendations provided by the CTLS Research Advisory Panel in March 2011, three new projects were funded for the 2011-2012 year.

**CTLS 11-03: The Impact of Infrastructure and Mobility Patterns on the Variation of Traffic Fatality Rates in Industrialized Countries**

Even after the notable decrease in fatalities in recent years, the US still has a per capita fatality rate three times that of the safest countries. The rate of decrease in fatalities in countries like the Netherlands shows no sign of slowing down and continues to outpace that in the US. Many observers, including the Federal Highway Administration, have noted these results and are seeking to learn how the experiences in these countries can be applied to improving traffic safety in this country. This project is designed to address a part of the issue by focusing on the role that differences in transportation infrastructure and mobility patterns might play in affecting traffic safety. The goal will be to assess the extent to which differences in infrastructure, land use and mobility patterns affect the observed differences between the states and between the countries themselves.

**Principal Investigator:** Norman Garrick, Ph.D., Associate Professor of Civil & Environmental Engineering  
**Co-Researcher:** Carol Atkinson-Palombo, Ph.D., Assistant Professor of Geography

**CTLS 11-04: Evaluation of Surrogate Measure for Pedestrian Safety in Various Road and Roadside Environments**

Most analyses of pedestrian traffic safety measure safety in terms of police-reported traffic accidents. For pedestrian safety, it may be more useful to observe surrogate measures of safety, such as a "severe conflict" between a pedestrian and a motor vehicle in order to offer a broader picture of the safety at a particular road location than just considering police-reported accidents. This could help planners and designers learn how to select road and roadside elements to make pedestrians feel safer and thus increase the effectiveness of strategies or development patterns aimed at increasing the livability of communities. The objective of this project is thus to investigate the relationship between roadway and roadside design elements and traffic incidents involving pedestrians. Specifically, the researchers will select a set of intersections known to have substantial pedestrian volumes and with targeted roadway and roadside characteristics.

**Principal Investigator:** John Ivan, Ph.D., Professor of Civil & Environmental Engineering

**CTLS 11-05: Investigation of Curb Management Strategies to Minimize Freight/Cyclist Conflicts in the Urban Core**

The interaction between freight vehicles and bicycles in an urban environment is an increasingly common problem in urban environments undertaking green design initiatives. Like many urban areas, New York City is currently undergoing a massive expansion...
of its bicycle network, and among the many problems that are emerging is the need for freight vehicles to park in bike lanes to make deliveries. This is likely to be an increasing problem in New York and other urban areas across the country as green design initiatives are implemented with little or no analysis of freight vehicle-specific operations—leading to unexpected problems for both bicycles and freight vehicles. The purpose of this research is to develop an analysis framework and construct simulation models to quantify the impacts of curb control strategies on curbside freight vehicle operations, and explicitly examine the impacts on freight vehicle interactions with bicycles. The results of this analysis can be used to identify effective policy options for management of shared curb space.

**Principal Investigator:** Nicholas Lownes, Ph.D., Assistant Professor of Civil & Environmental Engineering

---

**Completed Projects**

**CTLS 08-02: Green Modes of Transportation for Connecticut’s Mixed Use Developments**
Principal Investigator: Peter Miniutti

**CTLS 08-03: Reversing Urban Sprawl: A Reclaimability Index Approach for Reviving Downtown Brownfields**
Principal Investigator: Maria Chrysochoou

**CTLS 08-04: Public Transit Design for Smart Growth: Using Choice Experiments to Quantify Tradeoffs, Values & Funding Implications**
Principal Investigator: Nicholas Lownes

**CTLS 10-06: A Vision Plan to Re-connect Downtown New London to the North End**
Principal Investigator: Peter Miniutti

*Please visit [www.ctls.uconn.edu](http://www.ctls.uconn.edu) for additional information and full copies of project reports.*
Selected Journal Papers, Conference Proceedings and Presentations


Organization

The Center for Transportation and Livable Systems is part of the University of Connecticut Consortium of Transportation Centers (UCTC). Formed in 2010, the UCTC seeks to promote collaboration, cooperation and communications between the three transportation centers housed at UConn. UCTC comprises CTLS, the Connecticut Transportation Institute (CTI) and the Center for Resilient Transportation Infrastructure (CRTI) – a Department of Homeland Security National Transportation Security Center of Excellence. UCTC is housed within the School of Engineering.

The leadership and administrative staff of CTLS includes Director Nicholas Lownes, Program Coordinator Stephanie Merrall, Financial Assistant Lori Judd, Program Aide Chandra Lownes, and CTLS Undergraduate Intern Nathaniel Merriman.
Contact Us

**Director**  
Nicholas E. Lownes, Ph.D., P.E.  
Assistant Professor  
Department of Civil & Environmental Engineering  
261 Glenbrook Road Unit 2037  
Storrs, CT 06269-2037  
Phone: 860-486-2717  
Fax: 860-486-2298  
Email: nlownes@engr.uconn.edu  
Web: http://engr.uconn.edu/~nlownes

**Program Coordinator**  
Stephanie G. Merrall  
Connecticut Transportation Institute  
University of Connecticut  
270 Middle Turnpike Unit 5205  
Storrs, CT 06269-5202  
Phone: 860-486-6446  
Fax: 860-486-2399  
Email: smerrall@engr.uconn.edu

www.ctls.uconn.edu