UNIVERSITY TRANSPORTATION CENTER (UTC) 
ANNUAL REPORT 
for 
University of Delaware 
University Transportation Center (UDUTC) 
Year 2 
October 2007 – September 2008 

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I. Overview

The University of Delaware was designated a Tier II University Transportation Center in the August 2005 Transportation Reauthorization - Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Strategically located astride major national transportation corridors, Delaware is a critical part of the national transportation network in terms of both freight and passenger transportation. Specifically, the I-95 corridor, the Northeast Rail corridor, and the Port of Wilmington are facilities of national significance. This strategic location also serves as a rich source of examples for classes, as well as for applied research problems that are consistent with the interests and our expertise of our faculty in transportation and land use planning, infrastructure, environmental quality and freight transportation. For these reasons, the University of Delaware University Transportation Center (UDUTC) selected as our theme resiliency of transportation corridors.

We draw on our strategic location in a region with all transportation modes that support economic development and improved quality of life and on corridors that are of national significance as a testbed for our work. Our region is representative of many others with significant issues related to congestion, safety, aging infrastructure, and the competing demands of transporting individual travelers and freight while protecting the environment.

The center’s strategic plan was approved in May 2007 and projects were initiated in September 2007. In March 2007, UD UTC hosted a site visit from RITA administrators Curt Tompkins, Lydia Mercado, and Amy Stearns. The two day meeting focused on current projects, procedures and processes. We appreciated the input from the RITA staff and have followed through on many of the comments and suggestions.

This report describes the structure of the center and then highlights some of the years activities before summarizing the funding sources. Lists of projects, products and students are reproduced on the centers website (http://www.ce.udel.edu/UTC/index.html).

II. Center Theme and Goals

Our theme is resiliency of transportation corridors. The overall goal of the UDUTC is to support research, education, and technology transfer that will improve our ability to plan, design, construct, manage, and maintain an advanced transportation infrastructure. To date, our work focuses on all surface modes

Resiliency is defined as a system’s ability to absorb, respond to, and recover from internal and external pressures and disturbances that impact the performance of the system in both the short and long term. That is, resiliency is a measure of the persistence and sustainability of systems and their ability to maintain the same
relationships among populations or changing state variables, including land use patterns, environmental changes, unexpected events, and the ecology of transportation corridors.

Our concept of a corridor is evolving from Gottman’s 1961 seminal work *Megalopolis*. Consistent with Gottman’s work, we view a corridor as a network of transportation functions connecting activity centers.

Located centrally in the BOSWASH corridor, which now extends to Norfolk, Virginia, the UDUTC uses the megapolitan regional transportation corridor as the organizing concept for our research.

Our research concentrates on four areas:

- **Planning**—Understanding and anticipating the relationships among transportation, land use, and economic development in corridors is essential to resiliency. We need to develop planning approaches that are based on understanding the dynamics of transportation systems and corridors in terms of a model of resiliency. In short, the concept of resiliency makes special demands on the conventional planning processes, and we must recognize and accommodate this. Also, the long history of transportation systems in the BOSTFOLK corridor offers an opportunity to study the historic resiliency of systems with long functional/engineering lives as a basis for understanding and modeling contemporary and future behavior and resiliency.

- **Ecology and the Environment**—Corridors not only transport people and goods but also facilitate the spread of invasive species, concentrate air quality issues, and impose external pressures on the environment. Also, corridors not only break up ecological zones and habitats but create their own linear ecological environments, which are poorly understood. Linking planning, design, operating, and maintenance strategies to enhance the ecological and environmental quality of transportation corridors is a challenging problem.

- **Infrastructure Renewal**—Planning for and executing infrastructure renewal projects and strategies are key to the proper functioning of transportation corridors. Asset management strategies, innovative repair and replacement techniques, and new materials and contracting practices require additional research to be effective for corridor applications.

- **Operations and Management**—Intelligent Transportation Systems (ITS) have had a significant impact on the operation and management of our transportation systems, particularly corridors. However, in the areas of congestion mitigation and management and emergency preparedness and response, corridors play a unique role as critical links and bottlenecks to mobility and accessibility. Research on how to better leverage our knowledge of the corridor is key to preparedness and response to unanticipated events.
III. Management Structure and Principal Center Staff

The UTC is an operational unit under the Delaware Center for Transportation (DCT), which in turn is an operational unit under the Department of Civil and Environmental Engineering (CEE) at the University of Delaware. The relationship between UTC and DCT is shown in Figure 1.

![Figure 1. DCT Organizational Structure](image)

The structure of the UDUTC is shown in Figure 2. Sue McNeil, Professor of Civil and Environmental Engineering at the University of Delaware, serves as the Director of the UDUTC. Diane Kukich provides writing and web assistance to the Center. Debbie Whitesel serves as the account manager for the UD-UTC. She manages and reconciles the accounts. Marikka Beach provides clerical and administrative assistance, including event and meeting scheduling. Daiksuke Mizusawa, a post doctoral researcher in Civil and Environmental Engineering also provided some support setting up advisory committees.

![Figure 2. UTC Organizational Chart](image)
In addition, two committees support the center’s operation:

- The UDUTC Project Selection Committee, which consists of representatives from the University and various transportation-related agencies, evaluates and selects research projects for the annual UDUTC. Members are
  - Sue McNeil, UTC Director
  - Dennis R. Mertz, Dept. of Civil & Environmental Engineering
  - Jerome Lewis, School of Urban Affairs & Public Policy
  - James Corbett College of Marine and Earth Studies
  - Dan Sanayi, FHWA (Division Office)
  - Tashia Clemons, FHWA (Division Office)
  - Henry Nejako, Federal Transit Administration
  - Ralph Reeb Director of Planning, DelDOT
  - Reza Taromi UD-CEE graduate student

- The UDUTC Advisory Committee advises Center administration on research direction, curriculum, and technology transfer activities. Members are
  - Arde Faghri, Director Delaware Center for Transportation
  - Dennis R. Mertz, Director of the Center for Innovative Bridge Research
  - Jerome Lewis, Director of the Institute for Public Administration
  - James J. Corbett, Associate Professor, College of Marine and Earth Studies
  - Larry Klepner, Director Technology Transfer Center
  - Sue McNeil, UTC Director
  - Reza Taromi, Graduate Assistant, Civil and Environmental Engineering

The Advisory Committee meets on an “as needed” basis. This is usually two to three times per semester. The committee selects students for undergraduate research, select the students of the year, select fellowship recipients, suggest distinguished lectures and discuss budget revisions.

IV. Examples of Specific Accomplishments

The second year of the grant is our first full year of operations. While the research programs were awarded in 2006-2007, research reports are still being developed, graduate fellowships were not awarded until March 2008 and the students did not begin in their respective academic programs until September 2008. The deadline for our first nomination for the student of the year was September 15, 2008 as one criterion for eligibility is that the student has received a year of funding from the UTC.

UDUTC received 10 proposals from 21 researchers representing four different colleges. Each proposal was reviewed by two or three external reviewers and the
members of the review committee. Four proposals from four different colleges were funded. Two proposals received partial support in the form of shared graduate student support to develop the proposal for next year’s funding. Each researcher received copies of all external reviews and selection committee reviews for their proposal, as well as a summary of the comments from the selection meeting.

Figure 3. Brown Bag Attendees

All five of the projects initiated with year one funding requested no-cost extensions to complete reports and papers. The project deferred from 2007 was also initiated in Fall 2008. All the new projects were initiated in September 2008. All projects except one include at least one graduate student. All graduate students, unless they had previously done so, were required to take the graduate-level transportation course CIEG 650 Urban Transportation Systems or an equivalent course. Two of the structures students opted to take CIEG 655 Civil Infrastructure Systems in lieu of CIEG 650.

Undergraduate Research projects were also launched during the summer of 2008. Charles Mitchell III (a rising senior) and Sarah Dalton (a rising junior), both in Civil and Environmental Engineering, spent the summer working with in conjunction with DRC’s Research Experiences for Undergraduates (REU) program, which is sponsored by the National Science Foundation. They worked on understanding and disseminating information in disaster plans in Delaware including evacuation routes and their impact on the Route 1 corridor. Through their nine-week immersion in the program, the two civil engineering students had the opportunity to learn from the participating sociology, psychology, and business students, while also raising awareness of the engineering perspective among their social science colleagues.

CIEG 650 Urban Transportation Systems was again co-taught Professors McNeil and Lee. Sixteen students from three different colleges were enrolled in the class. These students included three undergraduates. The class again featured several guest lecturers including:
• Alain Kornhauser, Princeton University
• Wolfgang Scherr, PTV
The center also sponsored or co-sponsored several events as shown in Table 1. Three distinguished lectures and four brown bag discussions provided opportunities for researchers and practitioners to get together to learn about new developments and discuss ongoing research. Students attended the Transportation Research Board Annual Meeting in Washington DC in January 2008 and presented posters at the Research Showcase in Dover, DE in May 2008.

Particular highlights include two forums. “Anticipating 2025 in Northeast Corridor Transportation: Aerial, Highway, Marine, and Rail Technologies & Linkages” was co-sponsored with the Institute for Public Administration and the Delaware Center for Transportation. The topic was particularly timely and relevant. Keynote speakers were:
• Kaan Ozbay and Ozlem Yanmaz-Tuzel (Center for Advanced Infrastructure and Transportation, Rutgers University) “NEC Auto and Truck Transportation with Emphasis on New Technology.”
• William P. Anderson (Center for Transportation Studies, Boston University) “Air Transportation in the Northeast Corridor: Challenges for the Future.”
• T.H. Wakeman III (Center for Maritime Systems, Stevens Institute of Technology) “Marine Transportation of International Freight for the Northeast Corridor.”
• Jean-Paul Rodrigue (Department of Economics & Geography, Hofstra University) “The Insertion of BostWash Corridor Within the Global and National Dimensions.”

A report including papers is available online (http://www.ipa.udel.edu/publications/NECorridorLinkagesPapers.pdf) and podcasts are also posted.

The Delaware Center for Transportation initiated and the UTC supported the Transportation Education, Research and Security Forum. The Forum brought together faculty, staff, students and transportation stakeholders to develop research ideas in planning, administration, transit, maintenance, traffic, bridge, construction, local issues, design, environment, and transportation security. Following plenary sessions, working groups generated approximately 200 different research needs statements that have been assembled into a booklet “The 2007 Transportation Education, Research & Security Forum: Identifying Important Issues Related to the Transportation System in Delaware and the North-East Corridor”. Co-sponsors included Delaware Department of Transportation; the Federal Highway Administration; the Delaware River and Bay Authority; the Enterprise Flasher Company; Rummel, Klepper and Kahl, LLP; the Signal Services, Inc.; the Center for Innovative Bridge Engineering; and the Institute for Public Administration.

Three students who have worked on UTC related projects have graduated this year. Matt Hayes and David Adams have completed an MS in Civil Engineering and Yukun Dong a PhD in Civil Engineering. There theses are posted on the UTC website (http://www.ce.udel.edu/UTC/Publications.html).
Several students have also received awards:

- Michelle Oswald (Civil Engineering) - Best Poster – Transportation Research Board Access Management Conference and Best Presentation - Annual Interuniversity Symposium on Infrastructure Management - Austin, TX
- Timothy Soper (Public Administration) – Legislative Fellow
- Sarah Dalton (Civil Engineering) – Science and Engineering Scholar
- Rebekah Gayley (Urban Affairs and Public Policy) - School of Urban Affairs and Public Policy Director’s Citation

Three graduate students were also awarded UTC fellowships:

- Houston Brown, a second year MS student in Civil and Environmental Engineering focusing on structural engineering,
- Todd Franzen, a second year MPA student in the School of Urban Affairs and Public Policy, and
- Michelle Oswald, a second year MS student in Civil and Environmental Engineering focusing on transportation planning.
<table>
<thead>
<tr>
<th>Event/ Location</th>
<th>Date</th>
<th>Speaker/ Organizer</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinguished Lecture/ UD</td>
<td>10/4/2007</td>
<td>Alain Kornhauser, Princeton University</td>
<td>Towards Ubiquitous Dynamic Minimum ETA Route Guidance and Experiences with the DARPA Autonomous Vehicle Challenges</td>
</tr>
<tr>
<td>Forum/ UD</td>
<td>10/19/2007</td>
<td>Jerome Lewis, UD</td>
<td>Anticipating 2025 in Northeast Corridor Transportation: Aerial, Highway, Marine, and Rail Technologies &amp; Linkages</td>
</tr>
<tr>
<td>TRB Annual Meeting / Washington DC</td>
<td>1/14/2008</td>
<td>All students</td>
<td>Participation of all transportation students in Transportation Research Board Annual Meeting</td>
</tr>
<tr>
<td>Brown Bag/ UD</td>
<td>2/6/2008</td>
<td>Michelle Oswald and Rebekah Gayley, UD</td>
<td>Megalopolis and Transportation Corridors: What it Means for our UDUTC</td>
</tr>
<tr>
<td>Seminar/ UD</td>
<td>2/15/2008</td>
<td>James Corbett, UD</td>
<td>Sustainable Intermodal Freight Transportation to Meet National Goals</td>
</tr>
<tr>
<td>Distinguished Lecture/ UD</td>
<td>3/21/2008</td>
<td>David Boyce, Northwestern University,</td>
<td>The Role of Computing in Urban Travel Forecasting: How Transportation Planning Practice Shaped Software and Software Impacted Transportation Planning Practice</td>
</tr>
<tr>
<td>Distinguished Lecture/ UD</td>
<td>4/18/2008</td>
<td>Jose Holguin-Veras, Rensselaer Polytechnic Institute</td>
<td>The Logistical Debacle Post-Katrina - Synthesis and Recommendations</td>
</tr>
<tr>
<td>Poster Session/ Dover, DE</td>
<td>5/6/2008</td>
<td>All Projects</td>
<td>Transportation Showcase</td>
</tr>
<tr>
<td>Workshop/ UD</td>
<td>5/13/2008</td>
<td>Michelle Oswald and Rebekah Gayley, UD</td>
<td>Current State and Resiliency of the BOSFOLK Corridor: Definitions, Data, Preliminary Analysis, and Next Steps</td>
</tr>
<tr>
<td>Conference/ Baltimore</td>
<td>7/13/2008</td>
<td>Michelle Oswald</td>
<td>8th Conference on Access Management (Transportation Research Board)</td>
</tr>
<tr>
<td>Brown Bag/ UD</td>
<td>9/18/2008</td>
<td>James Corbett and Amit Mokashi, UD</td>
<td>Regional Freight Data for Delaware</td>
</tr>
</tbody>
</table>
V. Funding Sources

Between 10/1/07 and 09/30/08, $276,519 of the UTC grant was expended. The grant is matched by University and Delaware Department of Transportation funds that are tracked using a matching identification numbers. While the rate of spending has increased dramatically from the first few months of operation, delays in hiring graduate students, instituting new programs (for example, the student of the year program) are reflected in the spending levels below budget.

The sources of funds are shown in Figure 6, which shows a smaller proportion of funds (10% versus 20%) coming from the state DOT than originally projected in the budget. The discrepancy largely occurs because no projects have been completed that involve technology transfer.

![UD UTC FUNDING SOURCES 10/1/07 - 9/30/08](image)

**Figure 6. Funding Sources**

Figure 7 shows anticipated expenditures in terms of administration, research, education and technology transfer. Anticipated expenditures for education appear low, but in reality these have been integrated into existing faculty roles.
A larger proportion of funds have been devoted to administration than originally budgeted due to the high cost of start-up involved in putting administrative structures in place, designing and populating the website, and setting up project review processes. Considerably fewer resources have been developed to education and technology transfer given the stage of the grant.

**VI. Summary**

The 2007-2008 grant year has been a productive and busy year for the UD UTC. The center has a core group of researchers and the students and research interact on a regular basis, not just in the classroom but also at informal events and conferences.

The distinguished lecturers generated considerable interest and discussions have addressed a variety of topics. We look forward to another exciting year.