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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.

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.
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.

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)
  - Robert Kleinburd, 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

IV. Examples of Specific Accomplishments

The first year of the grant has been devoted to establishing the theme of the center, developing the strategic plan and awarding the first projects. To identify the theme, structure and preliminary research directions of the UTC, a retreat was held on August 25, 2006. Participants included UD faculty and staff and our potential research partners from FHWA, Delaware Department of Transportation, First State DART (our transit agency), Wilmapco (our metropolitan planning organization), the City of Wilmington, and selected consultants who have been engaged with other transportation projects at the university. The ideas from the retreat were further refined for inclusion in the UDUTC strategic plan by a subcommittee including representatives from FHWA and DelDOT. All participants from the retreat were invited to comment on the strategic plan, and comments were incorporated into the draft prior to submission to RITA on January 9, 2007. Comments on the Strategic Plan were received from RITA on April 2, 2007, and a revised version of the plan submitted May 1, 2007. Final approval was received May 9, 2007.

To ensure that projects could begin with the 2007-2008 academic year grant guidelines, proposal review forms and submission procedures were developed, and the projection selection timetable was modified from the scheduled presented in the strategic plan as follows:

  - June 15 (target) – proposal announcement distributed.
  - August 1 – proposal deadline.
  - August 20 – external reviews completed.
  - August 24 – research selection committee reviews completed.
  - August 27 – principal investigators notified of outcomes.
  - September 1 – funding cycle begins.
  - Spring of the following year – PIs participate in the DCT Research Showcase.
  - September 1 of the following year – final reports submitted for review.
• October 1 of the following year – review comments returned to PI
• November 1 of the following year – final report submitted and posted to UTC website.

UDUTC received 12 proposals from 22 researchers representing five different colleges. Each proposal was reviewed by two or three external reviewers and the members of the review committee. We were able to fund six proposals from four different colleges. 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.

One researcher was unable to recruit a suitable graduate student and has deferred the project until Fall 2008. All other projects were initiated in September 2007. Each project included at least one graduate student. All graduate students were required to take the graduate-level transportation course CIEG 650 Urban Transportation Systems or an equivalent course.

CIEG 650 is a new course that was initiated in fall 2007. It is co-taught by Professors McNeil and Lee. The course provides an introduction to transportation systems. The objective is to provide an overview of transportation issues, both freight and passenger, and qualitative and quantitative tools for addressing these issues. Eighteen students from three different colleges are enrolled in the class.

Other activities have included:
• Development of the UDUTC website (http://www.ce.udel.edu/UTC/)
• Presentation of a poster describing the UDUTC at the DCT Showcase (May 2009)
• Participation of the Director in the CUTC summer meeting

Planning activities include:
• Participation of faculty and students in the forum Anticipating 2025 in Northeast Corridor Transportation: Aerial, Highway, Marine, and Rail Technologies & Linkages (October 2007)
• A UDUTC/ DCT Distinguished Lecture by Professor Alain L. Kornhauser, Princeton University (October 2007)
• Participation of faculty and students in Transportation Education, Research and Security Forum (November 2007)

V. Funding Sources

To date, very little of the grant has been expended. Illustrations of funding sources and expenditures are not meaningful, as current expenditures are not representative of anticipated expenditures, and funding sources to date have relied on the federal grant. The following charts represent the anticipated funding sources.
and expenditures based on the budget. Figure 3 shows anticipated funding by source – federal grant, Delaware Department of Transportation and the University of Delaware. Figure 4 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.

![Figure 3. Anticipated Funding Sources](image-url)
VI. Summary

The UDUTC has a cadre of active and engaged faculty and students. Administrative structures are in place to facilitate the exchange of information and to support the administration of grants. Our first-year projects have been selected and are just getting starting. Several events have been slated, and we look forward to an exciting year during which we will also initiate the graduate fellowship program and the undergraduate research program.