

# TranSearch

## DELAWARE CENTER FOR TRANSPORTATION

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RESEARCH & TECHNOLOGY TRANSFER

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UNIVERSITY OF  
DELAWARE

Delaware Center  
for Transportation

Department of Civil and  
Environmental Engineering

355 DuPont Hall  
Newark, DE 19716

P: 302.831.1446  
F: 302.831.0674  
www.ce.udel.edu/dct

## UD Researchers to Monitor New Indian River Inlet Bridge

BY DIANE KUKICH

Three researchers at the University of Delaware have received a \$1.1 million grant from the Delaware Department of Transportation (DelDOT) to design and install a structural monitoring system on the new Indian River Inlet Bridge (IRIB) in Sussex County, Del.

The interdisciplinary team includes Michael Chajes and Harry (Tripp) Shenton, professors in the Department of Civil and Environmental Engineering, and Robert Hunsperger, professor in the Department of Electrical and Computer Engineering. The work is being carried out through UD's Center for Innovative Bridge Engineering (CIBrE).

"The concept of a structural health monitoring system for a bridge is similar to the computer-controlled sensing and diagnostic systems installed in modern cars," Shenton says. "Just as various lights on your dashboard show you when the car is low on oil or the trunk is open, the sensing system on the bridge will provide feedback about how the structure is performing."

According to Jim Zammataro, applications specialist with Cleveland Electric Labs, industrial partner on the project, fiber-optic structural health monitoring systems have been used widely across Europe and Asia for years but have been slow to catch on in the U.S. [\[See Bridge, continued on page 3\]](#)

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## Message from the Director

In these challenging economic times, “doing more with less” is the prevailing theme and the guiding principle for many industries including transportation.

Public and private transportation agencies of different sizes and levels are trying to adjust to the new financial realities and prioritize their programs accordingly. History shows that public agencies--while valuing research, education and technology transfer--have not always been able to give high priority to these areas. Over the years, they have discovered how important quality research and technical training is in their daily professional work. I firmly believe these programs should remain among the highest priorities for public transportation agencies. Additionally, the private sector should consider and play a more active and integral role in shaping research, education, and technology transfer programs.

Local, regional, and national competition has been and will remain important for the private sector. Ultimately, companies that have a strong grasp of what is taking place around the world and successfully integrate the latest research into their projects are the ones that will survive. The Delaware Center for Transportation has always been cognizant of the role that the private sector can play in ongoing programs and has welcomed the participation of industry.

Active projects at DCT include two dealing with signal optimization and congestion reduction. Both have participation from researchers at the University of Delaware, DelDOT personnel, and engineering and planning staff from private companies. This combination of government, private sector, and academia working together on research projects is a growing trend that will increase in the future. Not only will we be able to produce final products that will be of use to a broader audience, but even more importantly, our undergraduate and graduate students involved in these projects will have the necessary tools for future success.

Another one of our current projects deals with the effect of various de-icing chemicals on the transportation infrastructure. This project is led by UD Civil & Environmental Engineering Professor Chin-Pao Huang. Professor Huang is one of the most respected international researchers in his field, and he brings to the center many years of experience in teaching and conducting research in chemical aspects of environmental engineering. He also brings an international component to this particular project through his collaboration with colleagues from some of the highest caliber technical institutions in Taiwan.

In total, the center is conducting fourteen new projects for DelDOT dealing with the environmental, land-use, planning, engineering, optimization, construction, and economic aspects of transportation. All of these projects were presented and discussed during our Principal Investigator/ Project Manager meeting last October. Our research showcase, generally scheduled in May, will present the progress reports and some of the final products for these projects.

Also, during the next few months we will be hosting guest speakers to present some of the most interesting, timely and important aspects of transportation. We have invited Tom Vanderbilt, the author of the bestselling book *Traffic: Why We Drive the Way We Do (and What It Says About Us)* to visit the University of Delaware. We will distribute information fliers when the time and place of his presentation are confirmed.

For all information regarding the Delaware Center for Transportation, please contact us at 302-831-1446, and/or visit our web page ([www.ce.udel.edu/dct](http://www.ce.udel.edu/dct)). ■



**Ardeshir Faghri,  
Director**



Artist's rendering of the new Indian River Inlet Bridge in Sussex County, Delaware [courtesy of DelDOT].

[Bridge, continued from page 1]

"Until now," he says, "much of the health monitoring of bridges in the U.S. has been short term and usually covers only parts of the structure. Short-term monitoring is a great way to get a snapshot of what is happening, but a long-term monitoring system with fiber-optic sensors provides a continuous real-time picture of how the structure is performing.

"We believe Indian River is the first significant bridge built in the U.S. to have an all-fiber-optic monitoring system designed into it from the beginning," he adds. "It is significant that DelDOT and FHWA chose to go with this optical system because it signals a shift in the way structural health monitoring is viewed here in the U.S."

According to DelDOT project manager Doug Robb, the bridge has a 100-year design life, and inspection and maintenance over that period will require a substantial investment in time and resources. "The monitoring system will enhance our ability to manage this significant resource for years to come," he says.

The UD-Cleveland Electric team will design and install a computer-controlled fiber-optic system consisting of some 120 sensors to measure a variety of conditions, from temperature and wind speed and direction to strain, deck inclination and expansion joint movement.

Data will be collected at prescribed intervals as well as during extreme events such as high winds or the passage of overweight vehicles requiring a special permit.

"The data gathered will allow us to understand the short- and long-term performance of this long-span cable-stayed bridge," says Chajes. "We anticipate that the lessons learned both in instrumenting the bridge and in analyzing the data will expand our fundamental knowledge about bridge behavior and maintenance."

Sensors will be placed in the deck and pylons, on selected stay cables, at deck level and at the top of the pylons. Some will be embedded, while others will be surface mounted. According to Hunsperger, fiber-optic systems have a number of benefits, including immunity to noise, ease of installation, redundancy and long-term durability. "We hope to learn more about not only bridge behavior but also about structural health monitoring systems from this project," he says.

"Everyone has heard about bridge failures of the past, including the Tacoma Narrows Bridge, the Silver River Bridge and the I-35W Bridge in Minneapolis," says Dennis Mertz, director of CIBrE. "Health monitoring systems can provide a wealth of information that has the potential to prevent such catastrophic collapses in the future." ■

## Wilmington, Del.



### Scoping Out Delaware's Role in Facilitating Business Travel as it Relates to the Wilmington Redevelopment Area, Wilmington Train Station, and New Castle County Airport

A Working Paper—September 2009

BY MARK DESHON

**A** According to an economic-impact study released in June 2007 by the University of Delaware's Center for Applied Demography and Survey Research (CADSR), the Wilmington Riverfront has generated \$67 million in fiscal revenues for the state, New Castle County, and City of Wilmington since 1996. The report cites projects that transformed the Riverfront into a thriving center of employment, recreation, and residential life. If the Wilmington Redevelopment Area is to continue as an economic engine for job growth, a growing source of tax revenue, and a marketable residential area, then travel access must be improved.

In response to this developing need for better travel access, the Institute for Public Administration (IPA) completed a study in cooperation with DeDOT as part of the "State Support for Infrastructure Policy Forum and Research FY2009" program. The purpose of the study was to produce recommendations on how to

## PROJECT FINDINGS/ RECOMMENDATIONS

*Several common themes emerged from the interviews and the working group. Of particular interest are the following:*

- Updated online and GPS maps are necessary to reflect the new street grid in the Riverfront area. Accessibility to the Riverfront needs to be improved through better signage.
- Taxi service serving the Riverfront area and the airport needs to be improved. Regulations should be created to establish uniformity with taxi vehicle cleanliness, vehicle standardization, taxi dispatch, and rates. A passenger bill of rights would be helpful. The state of Delaware should create either a statewide taxi dispatch or statewide regulations with an overlay specific to Wilmington.
- For pedestrians, the area around the train station is not pleasant and security issues are a concern, especially at night. Outdoor lighting is poor, walkways are not well maintained, and there are many homeless in the area. Intersections in the area could be improved for pedestrians by adding crossing-signal countdowns, and pathfinders around the train station would be helpful.
- Rental cars need to be more accessible at the train station.
- DART and commercial buses contribute to congestion around the train station.
- The current service provided by SEPTA is not well marketed; better marketing might improve ridership. Adding SEPTA train routes from Wilmington to the Philadelphia airport and other points in the Philadelphia region was suggested.
- Amtrak should do more to promote its reduced fares for large groups and businesses.
- The New Castle County Airport is about to undergo projects to upgrade facilities and provide additional service. Currently, the airport is not frequently used for travel due to a lack of flight offerings and, in part, due to the convenience of the train station. The DART buses that currently serve the airport are not convenient for passenger pick-up.

## OPPORTUNITIES FOR FUTURE STUDY

*During the course of the project, several issues came up that merit additional study and consideration.*

1. Consider another phase to this project, studying the area north of the Riverfront area to determine travel needs to and from Wilmington's central business district.
2. Provide greater emphasis on how to improve the quality and quantity of taxi service in the Wilmington area.
3. Talk to the Wilmington legal community to determine their travel needs, since many of the bigger law firms frequently bring people in for bankruptcy cases.
4. Contact other big businesses in the area such as AstraZeneca. AstraZeneca currently runs a contract bus service to Great Valley and would be a good business to interview for the project.

best facilitate business travel access to and from the Wilmington Redevelopment Area, specifically via the Wilmington Train Station and the New Castle County Airport. In addition, the project aimed to identify how to facilitate travel within the Wilmington Redevelopment Area and to/from the area travel modes.

To obtain background information for the project, in spring 2009 Edward J. O'Donnell, AICP, IPA Policy Scientist, and Sebastian Anderka, IPA Graduate Research Assistant, conducted interviews of businesses, developers, and organizations in the Wilmington Riverfront area to determine the transportation issues facing the area. Those organizations participating in the interviews included Barclays, Buccini/Pollin Group, Chase Card Services, Pettinaro, the Wilmington Riverfront Development Corporation, the Wilmington Renaissance Corporation, and the Wilmington Train Station.

In July 2009, IPA hosted a working-group briefing session to discuss the information gathered through the initial interviews and

gather reactions and additional recommendations. In attendance at the briefing session were representatives from the following agencies: Chase Bank, Delaware River and Bay Authority, Delaware Transit Corporation, Wilmington Train Station/Amtrak, Wilmington Renaissance Corporation, Pettinaro, Wilmington Planning Department, Wilmington Riverfront Development Corporation, and IPA. Additional information for the final report came from Chase Bank, which conducted an independent employee survey in relation to the project, and from a Wilmington Renaissance Corporation transportation study. The final project working paper, written by UD graduate student Todd Franzen, is based on feedback from the interviews, the additional studies, and the information gathered during the working-group briefing session.

The final working paper can be downloaded from the website ([www.ipa.udel.edu/publications/transportation.html](http://www.ipa.udel.edu/publications/transportation.html)). ■

## UD's Second Hydrogen Fuel Cell Bus Carries Special Guests

BY ANDREA BOYLE

The University of Delaware's newest bus, a 22-foot, 22-seat vehicle that runs on hydrogen, tooled around downtown Wilmington on Monday, Nov. 16, carrying some very important riders. U.S. Sen. Thomas R. Carper (D-Del.), U.S. Rep. Michael N. Castle (R-Del.) and Wilmington Mayor James Baker sat inside chatting about various options for transport in the region.

The ride was part of a briefing session to update Delaware's congressional delegation about the progress of UD's fuel cell research, research for which they secured \$1.7 million in funding in 2007.

The paint job on the bus illustrates its place in the progression of fuel cell research at UD. It reads "Zero Emission Fuel Cell Hybrid Bus x2," as the bus is the second in the hydrogen fleet; the first rolled out in 2007 and currently runs as a shuttle on UD's Newark campus.

Additionally, the "x2" relates to the fuel cell capacity of the bus. Where the first bus contained just one fuel cell stack, this bus houses two, making it more powerful and capable of reaching higher speeds.

The bus, like its predecessor, does not require diesel like traditional buses; instead its fuel cells combine hydrogen and oxygen to directly produce electricity to run the bus. The reaction produces no greenhouse gas emissions and its exhaust consists only of water and water vapor.

"There are only about a dozen fuel cell buses in service across our entire country and two of these buses are on UD's campus. I think we can be rightfully proud of that achievement," said Ajay Prasad, professor of mechanical engineering, director of the UD Center for Fuel Cell Research and host of the event.

"These two fuel cell buses are a tremendous step forward," said Castle. "The University has been a leader in this. We have pulled hard to try to help with the funding of it. We hope this expands exponentially from here on."

Carper commented that the buses and the green economy they represent are where the country needs to be headed.

"It will be reduce our dependence on foreign oil, cleaning up our environment, providing not only safe and affordable transportation but also a lot of jobs to drive them and a lot of jobs to build them, and that's a great combination," he said.



The delegation prepares to board the UD hydrogen fuel cell bus [Photo by Evan Krape]

U.S. Sen. Ted Kaufman (D-Del.) is traveling out of the country and could not make it to the event, but sent a representative and his best wishes.

"This is just another example of Delaware setting an example for all states. This fuel cell bus highlights the fantastic work that University of Delaware's Fuel Cell Research Lab is doing," Kaufman said in a statement. "Developing this technology in Delaware will be a boon to our state's economy and reaffirm our position as a leader in cutting edge technology."

Mark Barteau, senior vice provost for research and strategic initiatives at UD, noted this and other projects undertaken by researchers working within the University of Delaware Energy Institute aim to be solutions to the world's complex energy problems.

"When we launched the Energy Institute, one of the things we said we wanted to do was to take research out of the laboratory and into public demonstration, and I think that's a critical component of our fuel cell bus program," Barteau said. "This is very much out there on the street where our students can use it and the public can see it."

While the buses are visible all around campus, what might be hidden is all the work that goes into making them possible.

"We have about 20 people currently working on these projects," said Michael Chajes, dean of the UD College of Engineering. "It's critical for our nation to both do the research but also educate the people who will carry this forward."

Chajes remarked that in order to do that important work, UD needs more facilities, stating the planned Interdisciplinary Science and Engineering building will allow for more of this sort of innovation. ■

## Research Pays Off

BY STEPHEN MENSAH &  
GREG OLIVER

The Commercial Vehicle Information Systems and Networks (CVISN) emerged from the Federal Motor Carrier Safety Administration's quest to enhance commercial motor vehicle safety. Efficient freight movement is critical to a healthy economy: manufacturers will receive their raw materials on time for production, and goods will be delivered on time. This cannot be achieved without safe, productive commercial vehicles and drivers.

Keeping commercial vehicles moving without unnecessary delays is important, but overweight trucks do significant damage to our roadways and cause them to fail prematurely. Therefore, the importance of identifying and keeping unsafe trucks off the roads while allowing unhindered movement of trucks in compliance is critical. This is the crux of the CVISN program in Delaware. The key components to in achieving these goals are focusing enforcement on high-risk operators, integrating systems to improve the accuracy, integrity, and verifiability of credentials, improving efficiency through electronic screening of commercial vehicles, and enabling online application and issuance of credentials.

DelDOT awarded research funds to DCT in 2003 to assess CVISN as a viable method for facilitating the flow of commercial vehicles through the state. The principal investigator for this project was Bernard Dworsky of the Institute for Public Administration, and the project manager was Gregory Oliver of DelDOT. The final report from this research was the basis for a business plan to get CVISN implemented in Delaware. First, the CVISN research was used to secure the necessary approval from DelDOT and State Budget Office for its implementation. Second, the report helped to leverage funds from the federal government to implement the



Electronic screening: A PrePass reader over the highway can verify the safety, credentials and weight of commercial vehicles equipped with a transponder. Trucks in compliance bypass designated weigh stations proceeding at highway speed. This means savings in time, money, and fuel, as well as reduced emissions into the environment.

project as laid out by the Federal Highway Administration (FHWA).

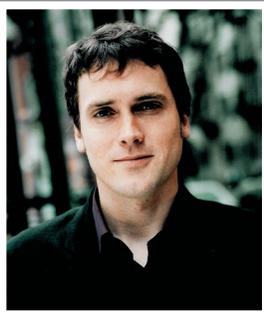
The various components of the CVISN project include weigh stations, electronic screening, and roadside credentialing to make it easy for state police to check the credentials of drivers and trucking companies. In September 2009, E-screening went live in the state. Trucks coming down U.S. 301 are monitored via weigh-in-motion (WIM) technology, which is capable of weighing trucks at highway speed. Trucks are also electronically monitored by PrePass. PrePass is available only to trucking companies that maintain good safety records. Trucks that are in weight and credential compliance are given the green light to continue rolling without having to stop. Trucks that are overweight are signaled to pull over into the weigh station where static recessed



scales are used to measure the axle weight more accurately. State police can then issue citations and remove any excess weight from trucks. Delaware is also planning to build virtual WIMs at six locations throughout the state, which generally are not staffed, but monitored electronically. The virtual WIM locations provide the State Police with an additional tool for safety and weight enforcement at a much lower cost than the traditional fixed scale house. ■

## Author Tom Vanderbilt to Speak at UD

BY LARRY KLEPNER



Tom Vanderbilt, New York Times bestselling author of *Traffic: Why We Drive the Way We Do (And What It Says About Us)*, will speak at the University on March 19, 2010. The New York Times and the Washington Post both included "Traffic" in their lists of the most notable books of 2008.

Based on extensive research and interviews with traffic engineers and driving experts, Vanderbilt offers sometimes surprising findings on the causes of congestion, crashes, and aggressive driving. He also offers iconoclastic ideas to improve traffic safety and traffic flow that will greatly interest those who work to improve these problems in Delaware and surrounding states.

Please visit our web page at [www.ce.udel.edu/dct/](http://www.ce.udel.edu/dct/) for information on the specific time and room location for Mr. Vanderbilt's lecture. This program is supported by grants from the Federal Highway Administration, the Research and Innovative Technology Administration, and the Delaware Department of Transportation. ■

## ASHE Student Chapter at University of Delaware New Professional Student Organization Off to Great Start

BY MATHEU CARTER

The First State Section of the American Society of Highway Engineers (ASHE) officially recognized the University of Delaware at their September 3, 2009, Board of Directors meeting as only the second student chapter of ASHE in the country. That same week, the University recognized ASHE at UD as a Registered Student Organization (RSO).

Since the organizational meeting in March, the students have increased their ranks from 8 to 29. With at least several representatives of each class (freshmen to seniors, as well as some auxiliary graduate students), the students are helping to ensure continuity and sustainability beyond their limited time at UD.



ASHE at UD students, together with DeIDOT personnel, tour the rehabilitation of the historic Gilpin Falls Covered Bridge in Cecil County, Maryland. [Photo by Matheu Carter]

Since March, nearly three dozen students have attended First State Section's (FSS) monthly dinner meetings, where they have had the opportunity to meet and engage with DeIDOT personnel, contractors, consultants, and material vendors. Already, they have participated in or directly hosted several field trips: the Indian River Inlet Bridge, the Gilpin Falls Covered Bridge (Maryland), a full-depth pavement reclamation, and a DeIDOT bridge inspection (including use of the Under Bridge Inspection Vehicle (UBIV)). And they have attended several of FSS's Board of Directors meetings to better understand how such a professional organization runs. Their first scheduled speaker at their own campus meeting will be Rudolph "Rod" Pieretti, P.E., a consummate construction professional and a champion of young engineers.

These diverse opportunities enable students to make great professional contacts; gain insight into the diverse opportunities of transportation engineering, planning, and construction; and develop an appreciation for the role of integrity and professionalism among practitioners.

ASHE at UD has quickly become a great complement to other student professional organizations, such as the American Society of Civil Engineers, the Institute of Transportation Engineers, and Engineers Without Borders. Kudos to the students and professionals at ASHE FSS and UD that have provided this great new venue to help students transition from their academic studies to become tomorrow's engineering leaders. ■

UTC NEWS  
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# RESILIENCY OF TRANSPORTATION CORRIDORS

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Newark, DE 19716**

**P: 302.831.1446**

**F: 302.831.0674**

**[www.ce.udel.edu/dct](http://www.ce.udel.edu/dct)**

**Director and Managing Editor**  
Sue McNeil

**Copywriter and Technical Editor**  
Diane Kukich

**Layout, Design and Printing**  
University of Delaware:  
• UD Office of Communications &  
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• University Printing

## Director's Message

This winter I will be teaching CIEG351 Transportation Engineering in Melbourne, Australia. The 34 University of Delaware students are civil and mechanical engineering juniors. UTC graduate student Charlie Mitchell and CE senior Kelly Ambrose will serve as TAs for the class. While in Melbourne, the students will also take CIEG315 Fluid Mechanics with Prof. Len Schwartz from ME. Apart from the opportunity to return to my native Australia for more than just a "quick visit," study abroad provides me with the opportunity to teach Transportation Engineering in Melbourne, a multi-modal city where students regularly use public transportation to get from the campus where we stay to the beaches and city. Furthermore, they can choose to take the bus, the train or the tram to get to many destinations, providing a very different experience from the one they get in Newark, Del. Two of the students I taught on this same study abroad program in 2008, Laura Black and Charlie Mitchell, are now graduate students working with the UTC. I like to think that this experience positively influenced their interests and choice of graduate school.

While we can't take all of our students on study abroad, we do strive to provide a diverse range of opportunities and experiences. Over the summer civil engineers Lauren Lobo and Chance Malkin worked on undergraduate research as part of the Disaster Research Center's Research Experience for Undergraduates. Lauren investigated "Landslide Hazard Mapping of Earthquake Prone Transportation Areas - Case study: Oat Mountain Area along Route 5 in the State of California," and Chance's work addressed "Climate Change and Rising Sea Levels: A Geographic Information Systems Analysis of the Potential Impact on Railroad Corridors in New Castle County, Delaware." They worked alongside social scientists from all around the U.S., as well as Sweden and India. In particular, three social scientists looked at specific issues related to vulnerable populations in Delaware that will help to support the UTC- funded project on infrastructure security and preparedness in Delaware.

Also in the summer, five graduate students participated in the 5th Annual Interuniversity Symposium on Infrastructure Management (AISIM). The symposium was held in Iowa City in June, but storms and cancelled flights prevented us from physically getting to Iowa and we participated by conference call.

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[Continued from previous page] In July we welcomed Dr Qiang (Joshua) Li as a postdoctoral researcher. He is working with me on ongoing projects and assisting with the project management for some of the UTC projects. Joshua completed his Ph.D. at University of Arkansas in the spring.

This past semester also provided a dizzying array of opportunities including brown bags and distinguished lectures. For those staying in Delaware for winter break to work on research or classes, UTC and the Delaware Center for Transportation are joining forces to enable more than 25 students to attend the Transportation Research Board Annual meeting in Washington, D.C. in mid-January. See our web site for a list of the participants and their presentations. Next semester we begin with a brown bag seminar on transportation and dance; then we have four DCT/UTC distinguished lectures covering an array of topics and end the semester with the research showcase.

In the summer, we will host a short course on Advanced Infrastructure Management and the 6th Annual AISIM. These events are described in this newsletter, and specific details are posted on the UTC website.

Our website contains information about our current projects and fellowship recipients as well as the products of our research in the form of papers, presentations and theses. We also continue to offer graduate and undergraduate courses. CIEG 650 Urban Transportation Systems – revised to meet the needs of our UTC – has now been taught three times. This past semester we had 13 students (10 graduate and 3 undergraduate). These students came from civil engineering, energy and environmental policy, urban affairs and energy policy. Rusty Lee also recruited some outstanding guest lecturers – Jim Corbett (Marine Policy), Dan Blevins (WILMAPCO), Wolfgang Scherr (PTV) and Alain Kornhauser (Princeton University). The different perspectives of the students in the class and the guest lecturers also adds to diversity of experiences.

This newsletter provides us with an opportunity to document our accomplishments, celebrate our achievements, and promote our activities. Please join us for events and visit our website to learn more about the UDUTC.

## Edwards Chosen UDUTC Student of the Year



Geoff Edwards, a second-year Ph.D. student in the School of Urban Affairs and Public Policy at UD, has been chosen as the UDUTC Student of the Year (SOY). He

will join selected students from other UTCs at a special ceremony held during the Transportation Research Board (TRB) Annual Meeting in Washington, D.C. on Saturday, January 10, 2009. Each student receives \$1,000 and the cost of attendance at TRB.

Selection is based on an essay submission, the technical merit of the student's research, the student's academic record, and the

student's professionalism and leadership capabilities and activities.

Edwards holds a B.A. in philosophy from Furman University and an M.S. in Urban Policy Studies and Public Policy Analysis from Georgia State. Prof. Robert Warren, Edwards's doctoral advisor, describes him as "a gifted researcher with a diverse academic and professional background." Edwards served in the U.S. Army from 2001 to 2005, and he has a graduate certificate in Geographic Information Systems.

Edwards, who organized UDUTC's three Distinguished Lectures for this spring, was also awarded a UDUTC fellowship for the 2009-2010 academic year.

## AISIM

The 5th Annual Interuniversity Symposium on Infrastructure Management (AISIM) was held in June 2009 at the University of Iowa. Run by students for students, AISIM allows graduate students to share their current research work related to infrastructure management, gain experience in organizing a conference, and begin to build a network of peers. The following participated from UD:

- **LESLIE N.O. MILLS** — Using MCMC in Pavement Roughness Estimation
- **Y.O. ADU-GYAMFI** — Empirical Mode Decomposition for Pavement Profile Analysis – Some New Developments
- **SIZHENG LI** — Comparison of a New Physics-based Simulation Model and the Hamada Equations in Determining Post-Earthquake Fire Spread
- **KELLY M. HANNUM** — Sustainable Air Bases: Linking Asset Management, Sustainability, and Agile Combat Support
- **MICHELLE OSWALD** — Evaluating the Current State of the BOSWASH Transportation Corridor and Indicators of Resiliency

Each year presentations are selected for inclusion at a special session during the TRB Annual Meeting as "Best Presentations from AISIM." Hannum and Oswald were selected to participate in the 2010 session.

The 6th AISIM will be held at UD from June 11-12, 2010. Abstracts are due March 15. Watch the UTC website for announcements.



Kel Hannum delivers his presentation in Iowa from the Civil Engineering Conference Room.

## Program Uses Dance to Demonstrate Transportation Concepts

A unique project led by Lynnette Overby, UD professor of theatre, is aimed at introducing elementary school students and their teachers to transportation through the lens of dance. Working with UD students and Artsbridge Scholars Carrie Winiker, Pamela Oppenheimer and Sarah Kim Vennard, Overby is developing modules based on Delaware education standards and benchmarks in social studies and in dance that provide opportunities for second graders to demonstrate transportation concepts through dance. Piloted in Newark, Del., schools, the program includes modules covering forms of transportation, rules of the road, transportation through the ages, and transportation in different locations. The Artsbridge Scholars also developed an annotated bibliography and conducted a literature review of arts-integrated research and practice. "The elementary school students, the Artsbridge Scholars and teachers all benefit from this engaging teaching/learning strategy," Overby says.

## Distinguished Lecture Addresses Motorcoach Transportation and Accident Analysis

One of the country's foremost experts in accident analysis, Dr. Robert Kadlec, gave faculty, graduate students, and staff an opportunity to explore the anatomy of a motor coach accident during his DCT/UTC Distinguished Lecture on October 30, 2009. His company delves into what he terms "detective engineering" by incorporating fundamental principles of physics, biomechanics, structural analysis, materials science, and the logical sequence of tying events together.

Kadlec gave an overview of the motor coach, which is a large motor vehicle for conveying 40 to 50 passengers. Its semi-monocoque design, whereby the wheels are tied to the frame and manufactured like that of an airplane fuselage, incorporates both comfort and safety features and is used by tour companies, sport teams, and touring bands.

He then described his accident analysis methods. Was the accident caused by a rollover, a frontal, side or rear impact? What tools are at his disposal to investigate the nature of the accident such as videos, witness accounts or physical evidence at the scene? What forces were in play at the point of impact, or were there several systems at work? He and his associates gather as much site information as possible, much like an archeologist at a dig.

During the last part of the lecture, Kadlec set the stage for detailing an actual motorcoach accident his company investigated near Waco, Texas, on a busy, hilly four-lane highway. Due to the rainy weather and slick roads, another accident had occurred earlier on the same stretch of highway. Kadlec took the audience through the steps of his investigation and ultimately shared a video reenactment with the findings.

## Undergraduates Participate in Summer Research

Two undergraduate civil engineering students, Chance Malkin and Lauren Lobo, participated in the Disaster Research Center's Research Experience for Undergraduates (REU) this past summer. This program is funded by the National Science Foundation, University of Delaware and the University Transportation Center. Working alongside social scientists from the U.S., India and Sweden, Malkin and Lobo learned about the social science of disasters and quantitative and qualitative research methods through a series of lectures. They also participated in field trips to the Disasters Roundtable sponsored by the National Academy and the Natural Hazards Workshop in Colorado.

They also completed independent research projects. Malkin explored the possible impact of sea-level rise on rail infrastructure in northern Delaware using GIS. Lobo used GIS to show threat levels and potential earthquake-induced displacements that would occur in the Oat Mountain area along route 5 in California for a single earthquake event.

"The program provided me with many tools and techniques involved in hands-on research training that are very applicable in graduate school," Malkin said. "My experience included presentations of my own research proposal, as well as my findings at the end of the summer, to a panel of peers. I was able to strengthen my oral communication skills as well as enhance my writing skills. After my experience through this beneficial program I decided I wanted to continue my education and pursue a master's degree. I believe research is the key to advancement in all fields of study and is vital in furthering knowledge."

Laura Black (3rd from left), Sue McNeil (5th from left), Lauren Lobo (7th from left, back row) and Chance Malkin (2nd from right) with other DRC REU Students and Staff at the Natural Hazards Workshop.





## Distinguished Lecturer Addresses Movement of Hazardous Materials

On any given day, one in five trucks on our highways may be carrying hazardous material, and it is critical that plans be developed for routing and scheduling carriers to minimize the public risk from hazmat shipments. As the threat of terrorism has increased, so has the need to incorporate shipment options that take into account the different stakeholders, the number of travelers on the road, and the routing criteria. On October 23, 2009, Professor Linda Nozick of Cornell University described a game-theoretic model for these interactions to graduate students, post-docs, and faculty members as part of the DCT/UTC distinguished lecture series.

According to Nozick, models provide an approach for handling the diverse motivations and perspectives of the various parties involved in the transportation and logistics systems. For example, shippers are interested in determining the shortest route to maximize profit, the government needs to develop regulations that safeguard the public, and terrorists are interested in maximizing destruction without getting caught.

"Typically shippers take the shortest path between origin and destination no matter what type of commodity they carry, Nozick says. "This is a fixed path that can help shippers to minimize their transportation costs. But when you consider a terrorist threat, it seems that having a fixed path to transport hazardous material is not a good idea. This situation demands a model that takes into account the probability of terrorist attack at each link of the network to find the 'safest' path between each origin and destination. On the other hand, the model should minimize shipper's additional cost to take the safest path instead of the shortest path."

Nozick has developed a probabilistic and dynamic model based on game theory to address this problem. The model not only considers the probability of a terrorist attack at each link, but also takes into account the probability of shippers choosing each path between an origin-destination pair. It is also expandable for use in multi-commodity situations.

Adjustments that can be made to reduce the probability of any terrorist action include changing the shipper/carrier schedule, varying the materials that are hauled on specific routes, or extending the transportation of hazardous materials to rail and intermodal means.

Nozick was awarded a Ph.D. in Systems Engineering from the University of Pennsylvania in 1992. Her primary research interest is the development of mathematical models for use in the management of complex systems.

## Contact Us

Visit our website ([www.ce.udel.edu/UTC/index.html](http://www.ce.udel.edu/UTC/index.html)).

Join the email list by emailing Marikka Beach ([marikka@udel.edu](mailto:marikka@udel.edu))

## Infrastructure Management Boot Camp Announced

In conjunction with AISIM 2010, we will host a two-week-long intensive Advanced Civil Infrastructure Systems course. Affectionately referred to as "boot camp," the course will be held from June 14 – June 25, 2010. The three-credit class will bring together students and instructors from UD and other schools with infrastructure management programs. Our objective is to provide an opportunity for students to gain in-depth knowledge, develop a mini-project and network with other students with similar interests. The boot camp provides an opportunity for students and practitioners to have an immersion experience in an advanced infrastructure management course, focused on physical assets. For more information, contact Sue McNeil ([smcneil@udel.edu](mailto:smcneil@udel.edu)).

## Three Receive UTC Fellowships

The UTC fellows for 2009-2010 are Trevor Booz, Charles Mitchell, and Geoff Edwards. Booz and Mitchell are both first-year M.S. students in Civil and Environmental Engineering. Booz, who graduated with a B.S. in architectural engineering from Drexel in 2009, is particularly interested in the design of transit, bicycling and pedestrian facilities. Mitchell earned his bachelor's degree in civil engineering from UD in 2009. He participated as a UTC researcher in the Disaster Research Center Research Experience for Undergraduates (REU) program during the summer of 2008 and became interested in civil infrastructure and disasters. Edwards is a second-year Ph.D. student in urban affairs. His research will bring together his interests in planning, decision making, cartography and geographic information systems.

## Fall Events

UD-UTC hosted two brown bags (with the Disaster Research Center), a TRB webinar (with the Disaster Research Center and Delaware Department of Transportation) and two distinguished lectures (with the Delaware Center for Transportation).

For the first brown bag, "Infrastructure Security and Preparedness," Laura Black, Sarah Dalton, Rachel Davidson, Rusty Lee, Sue McNeil, Charles Mitchell, Joseph Trainor, Tricia Wachtendorf, and Gabriella Wasileski reviewed the current state of preparedness. For the second brown bag, "Resiliency of Transportation Corridors During Disasters," Tricia Wachtendorf and Ben Johnson reviewed their work on the cooperation of organizations during disasters.

The webinar, "Costing Asset Protection: An All Hazards Guide for Transportation Agencies," was hosted by TRB and provided an introduction to the tool CAPTA.

## New Research Projects Selected

The following are the projects approved by the DCT Policy Council for our FY'10 Annual Research Program beginning on September 1, 2009 and ending August 31, 2010.

### **IMPACTS OF BIRD DROPPINGS AND DEICING SALTS ON HIGHWAY STRUCTURES: MONITORING, DIAGNOSIS AND PREVENTION**

This research project will develop decision-making criteria and tools useful to DelDOT in monitoring, diagnosis and corrosion prevention brought about by bird droppings and deicing salts. The information to be established in this research will be valuable to life-cycle cost modeling of transportation structures.

#### **Principal Investigator**

Chin-Pao Huang, Department of Civil and Environmental Engineering

#### **Project Manager**

Jiten Soneji, Bridge Design

### **ENHANCED PEDESTRIAN CROSSINGS**

This research will focus on two issues: 1) experimenting with alternatives to MUTCD standards for crossing signals and 2) determining best practices for installing accessible pedestrian signals.

#### **Principal Investigator**

Earl "Rusty" Lee, Department of Civil and Environmental Engineering

#### **Project Manager**

Mark Luszc, Traffic Engineering

### **A META-ANALYSIS OF STUDIES, PROJECTS AND PRACTICES ON PLANNING FOR A SUSTAINABLE ENVIRONMENT WITH SPECIAL EMPHASIS ON THE STATES OF VERMONT AND DELAWARE-PHASE III**

This is a continuation of last year's project.

#### **Principal Investigator**

Chandra Aleong, Delaware State University

#### **Project Manager**

Ralph Reeb, Division of Planning

### **USING ELECTRICAL DENSITY GAUGES FOR FIELD COMPACTION CONTROL**

This project will allow DelDOT to assess the accuracy and repeatability of the Electrical Density Gauge (EDG) for quality control of soil compaction. It will also allow DelDOT to make a smooth transition towards adoption of the EDG as the primary quality control tool for soil compaction, should

this outcome be desired by DelDOT upon completion of this research.

#### **Principal Investigator**

Chris Meehan, Department of Civil and Environmental Engineering

#### **Project Manager**

Jim Pappas, Materials and Research

### **TRANSIT-ORIENTED DEVELOPMENT (TOD): IDENTIFICATION OF OPTIMAL CHARACTERISTICS IN DELAWARE**

The concept of TOD is being more widely implemented by communities throughout the U.S. as a tool to promote smart growth, enhance mobility, curb sprawl, foster multi-modal transportation options, and boost transit ridership. This project will identify optimum site characteristics, and if these optimum characteristics apply to potential sites in Delaware. Additionally, strategies will be developed on how to apply these to our state.

#### **Principal Investigator**

Ed O'Donnell, Institute for Public Administration

#### **Project Manager**

Cathy Smith, Delaware Transit Corporation

### **DEVELOPMENT AND EVALUATION OF A RESIDENTIAL ALLOCATION MODEL USING TIME-SERIES TAX PARCEL DATA IN GIS**

The product of this research will be a GIS model allowing interactive analysis of growth management problems using tax parcels at the community level while at the same time accounting for countywide growth allocation forecasts. The project will greatly support travel demand forecasting responsibilities and initiatives at DelDOT and will support comment and analysis of development proposals at a more detailed level of geography.

#### **Principal Investigator**

David Racca, Center for Applied Demography and Survey Research

#### **Project Manager**

Mike DuRoss, Division of Planning

### **IN-SERVICE MONITORING FOR IMPROVED MAINTENANCE AND MANAGEMENT OF DELDOT BRIDGES**

The goal of this project is to continue enhancement of DelDOT's bridge management efforts through the collection and utilization of in-service strain response data for bridges. This is a continuation of earlier projects which initiated the effort to collect in-service data on a series of bridges in Delaware.

#### **Principal Investigator**

Tripp Shenton, Department of Civil and Environmental Engineering

#### **Project Manager**

Jiten Soneji, Bridge Design

### **IN-DEPTH EVALUATION OF DTC FUEL EFFICIENCY AND EMISSIONS**

This project will 1) analyze the DTC fleet for its fuel efficiency and emissions, 2) research the latest world-wide technological developments for buses with new alternative fuels, and 3) identify the technologies most suited for Delaware.

#### **Principal Investigator**

Arde Faghri, Department of Civil and Environmental Engineering

#### **Project Manager**

Mark Glaze, Division of Planning

### **DELAWARE SIGNAL TIMING ENHANCEMENT PARTNERSHIP (DSTEP)**

The goals of the DSTEP project are to involve students in traffic engineering services for DelDOT, to develop a continuous research program that addresses DelDOT's needs while minimizing the use of DelDOT's resources, and to maintain a high level of quality so that DelDOT may apply the results to improve intersection operations across the state.

#### **Principal Investigator**

Earl "Rusty" Lee, Department of Civil and Environmental Engineering

#### **Project Manager**

Gene Donaldson, Transportation Management Center

## CONTINUING ACTIVE RESEARCH PROJECTS SPONSORED BY DELDOT

As each project is completed, an abstract will be available on the DCT website ([www.ce.udel.edu/dct](http://www.ce.udel.edu/dct)).

### **INSTRUMENTATION AND MONITORING OF THE INDIAN RIVER INLET BRIDGE**

This project involves installing a long-term structural health monitoring (SHM) system on the Indian River Inlet Bridge during its construction and monitoring the bridge through the first bi-annual inspection. Following this installation, DeIDOT will be able to understand how the as-built bridge is functioning and, through long-term monitoring, will be in a better position to efficiently and effectively manage this significant resource.

#### **Principal Investigators**

Tripp Shenton and Michael Chajes, Department of Civil and Environmental Engineering and College of Engineering respectively; Robert Hunsperger, Electrical and Computer Engineering

#### **Project Manager**

Doug Robb, Bridge Design

### **NEAR REAL-TIME MONITORING OF INDIAN RIVER INLET SCOUR HOLE EDGE EVOLUTION SEAWARD OF THE BRIDGE PIERS: PHASE I**

Bridge pier scour is a problem that occurs in riverine and tidal environments. Funding for this project will be used to install a monitoring system that will image the sea bed adjacent to the bridge piers. Additionally, current meter data will yield critical forcing conditions that can be related to scour hole variability. The resulting data can be used to make informed management decisions and develop appropriate plans of action.

#### **Principal Investigator**

Jack Puleo, Center for Applied Coastal Research

#### **Project Manager**

Doug Robb, Bridge Design

### **ESTABLISHMENT OF A GEOTECHNICAL INFORMATION DATABASE**

DeIDOT currently has numerous subsurface investigation test results and pile driving analyzer test results for foundation studies

located through the state. This information is on paper, tape, and disks. This project will develop a geotechnical database that can be used by DeIDOT for storing, organizing, and easily accessing this data.

#### **Principal Investigator**

Chris Meehan, Department of Civil and Environmental Engineering

#### **Project Manager**

Jim Pappas, Materials and Research

### **PAVEMENT PERFORMANCE MODELS**

DeIDOT collects Pavement Condition data from all the pavements in their network, and uses this data to develop Annual Paving Programs that address the roads requiring work for each year. This condition data, collected over several years, could be analyzed to predict future condition, predict when maintenance should be applied, and predict the end of a pavement's useful life. Combined with data from initial construction quality records and maintenance activity records, one could develop performance prediction models for similar pavements in the DeIDOT network. With these models, DeIDOT could better anticipate future needs of each pavement, and could better target the appropriate rehabilitation techniques to pavements at the opportune time.

#### **Principal Investigator**

Sue McNeil and Nii Attoh-Okine, Department of Civil and Environmental Engineering

#### **Project Manager**

Jennifer Pinkerton, Materials and Research

### **INFRASTRUCTURE SECURITY AND EMERGENCY PREPAREDNESS**

Delaware is in need of an emergency notification plan. This project will evaluate the ripple effect of evacuating, the need to monitor bridges and tunnels, a plan for rapid construction of roads and bridges, and gas supply during emergencies to prevent vehicles from stalling during

evacuation. Additionally, security issues will be investigated if there is a bottleneck for travel along I-95 from Washington to New York.

#### **Principal Investigator**

Sue McNeil, Department of Civil and Environmental Engineering

#### **Project Manager**

Dwayne Day, Transportation Management Center

### **ADVANCING ASSET MANAGEMENT IN DELDOT**

Asset management provides an opportunity to respond proactively to land use changes, growing demands, aging infrastructure, and safety and security challenges. Many asset management activities are ongoing, however, there is a need to link these various activities, begin to fill the gaps in data and procedures, and explore new tools to support the integration of existing tools to decision-making tools.

#### **Principal Investigator**

Sue McNeil, Department of Civil and Environmental Engineering

#### **Project Manager**

Curt Cole, Maintenance and Operations

### **INVESTIGATION OF INTELLIGENT COMPACTION TECHNOLOGY: PHASE 2-A FIELD STUDY**

Successful adoption of intelligent compaction technology requires careful demonstration and validation with local soils. There is a need to calibrate this technology for local soils in Delaware, to demonstrate the utility of this technology to local contractors to ensure that is successfully adopted, and to demonstrate to DeIDOT the improvements in compaction monitoring and construction quality that can result when this technology is used.

#### **Principal Investigator**

Chris Meehan, Department of Civil and Environmental Engineering

**Project Manager**

Jim Pappas, Materials and Research

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**ITS LAB BASELINE SERVICE**

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The objective of this project is to establish the Delaware Center for Transportation ITS Lab as a state-of-the-art facility with three main focus areas: 1) service to DelDOT; 2) training for DelDOT and support classroom instruction; and 3) research for faculty and students.

**Principal Investigator**

Earl "Rusty" Lee, Department of Civil and Environmental Engineering

**Project Manager**

Gene Donaldson, Transportation Management Center

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**TESTING AND OPERATION OF DELAWARE'S FIRST "SMART BRIDGE"—CONTINUATION**

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Funding for this project will support diagnostic tests, analysis, and interpretation of data from Bridge 1-821 located on Interstate 495 in New Castle County. Additionally, guidelines for maintenance of the SB system and integration of new sensor systems will be developed.

**Principal Investigator**

Tripp Shenton, Department of Civil and Environmental Engineering

**Project Manager**

Jiten Soneji, Bridge Design

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**LONG-TERM PERFORMANCE MONITORING OF A RECYCLED TIRE EMBANKMENT IN WILMINGTON, DELAWARE**

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This is a continuation of a one-year project requiring additional data analysis. This project will determine the environmental and engineering properties that should be monitored during the construction of shredded tire embankments including instrumentation, installation, monitoring and an analysis plan. The project will investigate what instruments are needed and how to construct and monitor them.

**Principal Investigators**

Nii Attoh-Okine, Paul Imhoff, Victor Kaliakin and Chris Meehan, Department of Civil and Environmental Engineering

**Project Manager**

Jim Pappas, Materials and Research

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**SAFE ROUTES TO SCHOOLS FOR CHILDREN – MODE SHARE DATA ANALYSIS**

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The consequences of children not walking or biking to school include environmental impacts, increased traffic in the vicinity of schools, increased rates of obesity in children and other associated health problems, and often a decrease in the social health of communities. The purpose of this project is to provide mode share data for a sampling of elementary school students for the Delaware SRTS program. Federal funding is now available specifically for SRTS initiatives, and the need for data on transportation modes of K-8 grade children to and from school is more urgent. Having baseline data and trend analysis for Delaware would enable comparison and evaluation of the progress and success of the program once data is collected after projects and local programs have been implemented.

**Principal Investigator**

William DeCoursey, Institute of Public Administration

**Project Manager**

Sara Coakley, Division of Planning

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**2009-2010 GPS TRAVEL TIME AND DELAY DATA COLLECTION AND ANALYSIS**

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This project entails data collection during peak travel times on roadway segments throughout the state. Each segment will be traveled at least four times for maximum accuracy. Once data collection is completed, data will be transformed into the GIS database and transported to the ARCGIS software.

**Principal Investigator**

Arde Faghri, Department of Civil and Environmental Engineering

**Project Manager**

Mark Eastburn, Division of Planning

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**LETTING SCENIC AND HISTORIC ROADS IN DELAWARE TELL THEIR STORY**

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A web-based manual to facilitate the identification, designation and management of scenic and historic highways

**Principal Investigator**

David Ames, Center for Historical Architecture and Design

**Project Manager**

Maria Andaya, Roadside Environment

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**ENHANCING DELAWARE'S HIGHWAYS: A NATURAL VEGETATION PROJECT**

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This project will investigate vegetation models conceived to restore Delaware's roadside landscapes to a more natural state reflecting the regional flora.

**Principal Investigator**

Sue Barton, Department of Plant and Soil Sciences

**Project Manager**

Chip Rosan, Roadside Environment

# T<sup>2</sup> CENTER UPDATES

## Upcoming Events

**Date TBA** • *National Highway Institute*  
Course 133078: Access Management Location and Design

**Date TBA** • *Location TBA*  
Course 142047: Water Quality Management for Highway Runoff

**January 20 & 21** • *Kent Polytech Adult Education Center*  
Concrete Workshop

**January 27** • *Kent Polytech Adult Education Center*  
Cementitious Mixtures for Concrete

**January 28** • *Kent Polytech Adult Education Center*  
Chemical Additives for Concrete

**January 28** • *Kent Polytech Adult Education Center*  
Updated Techniques for Holding Public Meetings

**Date TBA** • *Location TBA*  
Sign Retroreflectivity (MUTCD)

**February 3** • *Rehoboth Beach*  
Sidewalks and the Americans with Disabilities Act (ADA)

**February 26** • *UD Center for Composite Materials  
Conference Room 106*  
Guest Speaker James Mwape, Business Manager, EZ Pass IAG

**March 19** • *UD Trabant Center Theater*  
Distinguished Speaker Series:  
Tom Vanderbilt, author of *Traffic*

**April 16** • *Location TBA*  
Guest Speaker Doug Hill

**Check our website for up to the  
minute details and registration  
([www.ce.udel.edu/dct/t2/t2.htm](http://www.ce.udel.edu/dct/t2/t2.htm))**

## *Delaware and Maryland T<sup>2</sup> Centers Hold Asset Management Conference*

BY LARRY KLEPNER

Every government agency that has responsibilities for streets and highways is struggling to maintain its facilities in this recession. Funds are scarce and workforces are shrinking, but no town, county, or state can take shortcuts when it comes to public's safety or mobility. To use resources most effectively, transportation agencies should adopt sound asset management systems.

To learn more about these systems and to hear success stories from those who have already adopted them, 60 municipal, county, state, and federal officials from Delaware and Maryland met on November 5, 2009, at the University of Delaware for an Asset Management Conference. The Maryland and Delaware T<sup>2</sup> Centers sponsored this event.

The conference opened with a general introduction to asset management systems. Discussions on more specific systems for pavements, signs, drainage facilities, and data collection techniques followed. The conference concluded with a series of success stories from Pinellas County, FL; Montgomery County, MD; and Fenwick Island, DE.

The conference proceedings and presentations are posted on our web page ([www.ce.udel.edu/dct/t2/t2.htm](http://www.ce.udel.edu/dct/t2/t2.htm)). Then click on "Asset Management Conference" at the bottom of the page. ■

## *Larry Klepner, Delaware T<sup>2</sup> Center Program Coordinator to Retire*

With a forty year career working with the Delaware Department of Transportation and the University of Delaware, Larry Klepner will be retiring on January 31, 2010. The entire DCT staff will certainly miss working with Larry on a daily basis, but understand that he wants to spend more time with his family, enjoy his hobbies, and travel to places yet unseen.

Be sure to look for an article from his retirement celebration in our next issue! ■

## *T<sup>2</sup> Center Presents Its First Transportation Elements Assessment to the Town of Milton*

BY LARRY KLEPNER

At their November 2, 2009, town meeting, Milton mayor Donald Post, town manager George Dickerson, members of the town council, town officials, and approximately 30 town residents received the T<sup>2</sup> Center's first municipal transportation assessment elements report. Matt Carter, T<sup>2</sup> Engineer, and his two student assistants, Bob McGurk and Kate Smagala, made the presentation.

The report was completed after several months of visiting the town, consulting with its employees and residents, and collecting and analyzing copious amounts of data. The final report consists of a printed document and additional electronic data that the town can load onto its computers. Should the town choose to do so, it can update the electronic data periodically to track changing conditions and improvements based upon them.

The T<sup>2</sup> Center's objective was to review the inventory of street pavements, sidewalks, storm drainage, and traffic signs by assessing current conditions and indicating where the town should make improvements. The team compared local conditions to contemporary civil and traffic engineering standards, and state and federal laws and regulations. It paid particular attention to compliance with the needs of disabled citizens covered by the Americans with Disabilities Act.

The T<sup>2</sup> Center recognized that the town has limited funds available during any given year to make the recommended improvements. Thus, the report contains methodologies to prioritize its decision making over several years while making steady progress in safety, pavement smoothness and durability, sign readability, and pedestrian circulation.

The T<sup>2</sup> Center found that in general, the town had a good transportation infrastructure. It is not surprising that the teams found, for example, that some pavements need rehabilitation and that some signs need replacing. In order to retain this quality, the town can implement a transportation asset management program that could foresee upcoming needs and meet them at a reasonable cost. ■

## PI/PM Meeting

BY ELLEN PLETZ

The annual Principal Investigator/Project Manager meeting was held on the University of Delaware campus on October 2, 2009. During this meeting UD investigators had an opportunity to give an overview of the newly funded projects for the coming academic year and meet with the DeLDOT project managers who will coordinate the research. The projects this year include research in the environmental, planning, bridge, transit, and traffic areas.

We extend our thanks to those from DeLDOT, the Federal Highway Administration, the Transportation Management Center, and the Delaware Transit Corporation who attended the meeting. ■

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## ITE Chapter Holds Election, Hosts Activities

BY PROFESSOR RUSTY LEE

The student chapter of the Institute of Transportation Engineers (ITE) had a busy and very successful fall semester. In September, the chapter elected officers, with Dave Specht serving as President, Laura Black as Vice President, Lauren Lobo as Secretary, and Megan Mikrut as Treasurer. The chapter currently has 22 members.

In October, ITE co-hosted a trip to the Indian River Inlet Bridge with the ASCE and ASHE student chapters. The November meeting was highlighted by a presentation from chapter advisor Kate Russo from McCormick-Taylor, Inc. on resumes and job searching. On November 20, the group had its annual DeLDOT tour and visited the Traffic Management Center.

Plans for the spring include visiting the Amtrak Training Facility in Wilmington and the Turner Fairbanks Research Center in Virginia. The chapter has also invited Mark Luszcz, Assistant Chief Traffic Engineer from DeLDOT, to speak at a future meeting about ongoing projects at DeLDOT. ■

# Northeast Corridor Projects at the Institute for Public Administration

The Following IPA Projects are funded by UTC, DCT and DelDOT  
SUBMITTED BY THE INSTITUTE FOR PUBLIC ADMINISTRATION

*For the past several years the University of Delaware's Institute for Public Administration (IPA) has researched the current nature and future prospects of transportation in the Northeast Corridor. This document summarizes research concerning corridor governance and transportation policy. IPA projects address topics ranging in scale from visions of Northeast Corridor transportation in 2025 to the characteristics and prospects of transit-oriented design (TOD) in Delaware.*

*For more information on IPA transportation research contact Institute Director Dr. Jerome Lewis (302-831-8971 or [jlewis@udel.edu](mailto:jlewis@udel.edu)), call or email the individual project contacts listed below, or visit IPA's website ([www.ipa.udel.edu/transportation](http://www.ipa.udel.edu/transportation)).*

October 2009

## **Delaware's Transportation Agenda in the Northeast Corridor**

This report highlights the major policy issues impacting transportation in the Philadelphia-Baltimore sub-region of the Northeast Corridor. Research focused on analyzing transportation studies relevant to this area and soliciting information from regional transportation professionals through semi-structured interviews and work sessions. Transportation modes addressed include freight and passenger rail, roadways, and ports and airports.

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Geoffrey Edwards • 302-831-6372 • [gedwards@udel.edu](mailto:gedwards@udel.edu)

August 2009

## **Transportation Policy and Governance in the Northeast Corridor: An Overview of Major Public Agencies**

This report catalogues the numerous agencies that play roles in setting transportation policy in the Boston-Washington Corridor and documents the various players who set policy or otherwise govern the Corridor. Modes covered include ports, commuter rail, and air travel.

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Dr. Robert Warren • 302-831-1686 • [warren@udel.edu](mailto:warren@udel.edu)

June 2009

### **Feasibility of Bus Rapid Transit Within the Mid-Atlantic Region**

In this report, IPA researchers considered the viability of bus rapid transit (BRT) as a mode of public transportation in the Mid-Atlantic region. The report concludes that BRT has great potential in the region as one mode in a multi-modal transportation network.

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Bernard Dworsky • 302-831-8710 • bdworsky@udel.edu

June 2007

### **Assessing the Needs of Delaware's Older Drivers**

This report considers the mobility needs of Delaware's older drivers. The population of elderly drivers is increasing, raising unique public policy issues relative to transportation. IPA researchers made policy recommendations to better accommodate older drivers, including better signage and outreach to families to improve the mobility of seniors on the road.

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Bernard Dworsky • 302-831-8710 • bdworsky@udel.edu

October 2008

### **Anticipating 2025 in Northeast Corridor Transportation: Aerial, Highway, Marine, and Rail Technologies & Linkages**

This report is a compilation of papers presented at an IPA conference that focused on growth along the Northeast Corridor and its impact on transportation across modes, including passenger and freight. Papers considered domestic and international issues related to corridor transportation.

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Dr. Robert Warren • 302-831-1686 • warren@udel.edu

August 2006

### **Building Inter-Metropolitan Rail Corridors**

This report summarizes an IPA conference convened to discuss building inter-metropolitan rail corridors in the United States. Speakers included U.S. Senator Tom Carper (D-Del.) and experts in the field of rail-corridor development. Participants considered the future of domestic rail-corridor development and the policy roadblocks that are inhibiting such activities.

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Lisa Moreland • 302-831-4955 • lisamk@udel.edu

November 2007

### **Transit-Oriented Design: Illustration of TOD Characteristics**

This working-paper summarizes the main characteristics of transit-oriented design (TOD) by documenting the environmental, public health, and economic impacts of TOD. IPA researchers and Delaware transportation stakeholders examined existing developments in Virginia and Maryland and considered the prospects of a TOD approach in Wilmington, Delaware.

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William DeCoursey, AICP • 302-831-4925 • decourse@udel.edu

July 2005

### **Interurban Rail Transportation: Moving People and Goods in the 21st Century**

This report summarizes the proceedings of an IPA public policy forum addressing the future of interurban rail. Guest speakers included U.S. Senator Tom Carper (D-Del), a representative from Amtrak, state-level policy makers, and other stakeholders. Discussion covered issues of physical infrastructure, passenger service, and freight rail.

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Lisa Moreland • 302-831-4955 • lisamk@udel.edu

The mission of the Delaware Center for Transportation is to improve the movement of people, goods, and ideas, and be viewed as a valuable resource for transportation-related issues and challenges within the state, the mid-Atlantic region and beyond.

**Copywriter and Technical Editor**  
Diane Kukich

**Layout, Design and Printing**

University of Delaware:

- UD Office of Communications & Marketing
- University Printing

## Delaware Center for Transportation Staff

**Ardeshir Faghri,**  
**Director**  
faghri@udel.edu

**Jerome Lewis,**  
**Associate Director**  
jlewis@udel.edu

**Ellen Pletz,**  
**Assistant to the Director**  
ebourett@udel.edu

**Lawrence Klepner,**  
**T2 Program Coordinator**  
lklepner@udel.edu

**Matheu Carter,**  
**Program Coordinator**  
matheu@udel.edu

**Sue McNeil,**  
**Director UTC**  
smcneil@udel.edu

**Earl Rusty Lee,**  
**Coordinator of Advanced  
Traffic Operations**  
elee@udel.edu

**Stephen Mensah,**  
**Postdoctoral Research Fellow**  
samensah@udel.edu

**Sandra Wolfe,**  
**Senior Secretary**  
sandiw@udel.edu

AN EQUAL OPPORTUNITY EMPLOYER—To the extent permitted by applicable State and Federal laws, the University of Delaware is committed to assuring equal opportunity to all persons and does not discriminate on the basis of race, creed, color, sex, age, religion, national origin, veteran or handicapped status, or gender identity and expression, or sexual orientation in its educational programs, activities, admissions, or employment practices as required by Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes. The University of Delaware has designated Karen Mancini, Director of the Office of Disabilities Support Services, as its ADA/Section 504 Coordinator under Federal law. Inquiries concerning Americans with Disabilities Act compliance, Section 504 compliance, campus accessibility, and related issues should be referred to Karen Mancini (302-831-4643) in the Office of Disabilities Support Services. Inquiries concerning Title VII and Title IX compliance and related issues should be referred to the Director of the Office of Equity and Inclusion, Becki Fogerty (302-831-8063).



**Delaware Center for  
Transportation**

**Department of Civil and  
Environmental Engineering**

**355 DuPont Hall  
Newark, DE 19716**

**P: 302.831.1446**

**F: 302.831.0674**

**[www.ce.udel.edu/dct](http://www.ce.udel.edu/dct)**

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