By Deborah Rosen, Ph.D.
URITC Executive Director

In the last six months the URITC has continued to strive towards excellence in research, education and outreach. Through all of our activities we have been able to further enact our theme: Connectivity through Sustainable Transportation Systems. This theme captures many facets of sustainability, including demand management, mobility/livability, environmental stewardship and workforce development. Merging connectivity with sustainability gives our Center an opportunity to address many of the major transportation issues facing our nation today.

In research, we have just about completed the merger between the URITC and RIDOT research programs. It has taken longer than expected, but we maintain that the results will create a more effective research program. Projects awarded in the 2010 round address current needs of RIDOT as well as several basic research projects which specifically address the URITC theme. Two of these are highlighted in this issue.

We have tied many of our outreach and educational activities to workforce development. Jeff Cathcart does an unbelievable job of delivering many of these programs. Our Local Technical Assistance Program (LTAP) is the envy of many states, and our summer academies continue to introduce middle school and high school students to the wide variety of opportunities in transportation. This year we also awarded several scholarships and internships which help support URI students who are committed to pursuing careers in transportation.

Despite our efforts, and those of other UTCs, the national transportation landscape looks somewhat bleak. Funding for transportation, like most government-sponsored programs, is under heavy scrutiny. As a result, the URITC has begun a new initiative to develop a Rhode Island Transportation Fact Book. It is our hope that the Fact Book provides the necessary information for a proactive discussion of our State’s transportation agenda.

Our staff, the URITC researchers, and our partners (FHWA, RIDOT, and Rhode Island Consulting Engineers) continue to help us provide excellence in all that we do. I want to thank everyone for their continued dedication to the URITC and look forward to working with them in 2011.
SELF-HEALING CONCRETE

Concrete, used in roads, bridges and buildings, is one of the largest commodity chemicals in use today. Worldwide, 2.35 billion metric tons of concrete is produced annually. This quantity has increased each year since the 1970’s and is projected to approach 5 billion metric tons by 2030.

The lifespan of a concrete structure is determined by its ability to withstand stress, which leads to cracks, compromises mechanical properties and allows pathways for corrosion.

This research project, lead by URI Chemical Engineering Professors Arijit Bose and Richard Brown, aims at increasing the lifespan of concrete by imparting self-healing properties to repair cracks that form during loading. If cracks aren’t repaired, water can make its way through the material, causing corrosion of steel reinforcement bars and adding stress to the concrete due to freeze-thaw cycles.

Besides the positive effect on the structural integrity and lifespan of the concrete, “smart” concrete could have a tremendous environmental impact.

The process of blasting, mining, transporting and producing concrete is an energy intensive process that releases a significant amount of carbon dioxide. Concrete production is responsible for almost 10 percent of the carbon dioxide emissions in the United States.

“We expect this ‘self-healing’ concrete to reduce consumption, which in turn will also reduce greenhouse gas emission,” stated Bose.

STUDY OF SETTLEMENTS DUE TO PILE DRIVING IN SILTS

The objective of this study is to predict the onset of significant movement of the ground due to pile driving activities in non-plastics silts that underlie much of Providence.

Dr. Christopher Baxter, Associate Professor in URI’s Department of Civil and Environmental Engineering and the Department of Ocean Engineering, has developed a numerical model that models the energy input into the soil from pile driving and compares that to the ability of the soil to absorb that energy without failing.

The energy capacity of the soil was determined from an advanced laboratory study involving cyclic triaxial tests on samples of the Providence silts.

The model is complete and field data is being collected from 1-3 cases in Rhode Island where pile driving induced movements were significant. The plan is to calibrate the model with these case studies in the spring.

Ultimately, the results of this modeling effort will provide practical recommendations to engineers about conditions where pile driving will cause significant ground movements and how to mitigate these movements.
URITC 2010 Scholarship Recipients

Maria L. Beltre

Through its educational initiatives, the URITC promotes transportation-related careers to students from middle school to graduate school.

Nobody represents this mission better than Maria L. Beltre. Maria attended the Center’s first Summer Transportation Institute (STI) in 2004 as an eighth grader in Providence. While at Mount Pleasant High School, where she graduated as the valedictorian in 2008, Maria attended the URITC’s first Engineering Career Day.

As a junior in the Civil and Environmental Engineering program at URI, the URITC decided to support Maria’s educational pursuits by granting her a scholarship.

“The scholarship has allowed me to not have to work as much and focus on my studies,” said Maria.

This past semester, Maria was able to combine her work with her studies. For 20 hours a week, Maria worked closely with Professor Vinka Craver, researching the effects silver nano particles have in different salt solutions.

As her college career has unfolded, Maria has emerged as a student leader. She is the president of the URI Chapter of the Society of Hispanic Professional Engineers (SHPE).

“With this position, I have to lead by example,” explained Maria. “Being a leader is not just about leading other people, it’s also about knowing how to follow and learn from your mistakes.”

Maria was able to put her leadership skills and experience to good use this past summer as a Summer Transportation Institute counselor.

“It was rewarding because this was my chance to make an impact on young people by talking to them about my journey in college so far,” recalled Maria. “Being in the STI program as a mentor made me realize that there is a lot of things one can do to expose young students to engineering and transportation.”

Having gone through the STI program a few years earlier, Maria was able to lend the students some helpful advice.

“I told the students to consider engineering, but to follow their passion and choose a field that they will enjoy,” recalled Maria.

Maria L. Beltre

Ailton Vicente

Ailton Vicente’s relationship with URI began in high school as a participant in the Guaranteed Admission Program (GAP). While in the program, the Tolman High School graduate learned about the URITC’s Summer Business Academy for high school students.

“The academy was one of the best things that I’ve done in my life because it really opened my mind to a whole other aspect of business,” said Ailton. “I learned a lot about how the products we use everyday reach consumers.”

Ailton’s involvement in the Business Academy in 2008 partially influenced his decision to declare supply chain management as a major this year.

“As a freshman, I was interested in accounting, marketing, and supply chain management,” said the sophomore. “Now that I’ve chosen supply chain as my major, I really look forward to the next two years at URI.”
Driving Simulator Used for Safety Trainings

By Jessica Buffi
URITC Intern

The University of Rhode Island Transportation Center’s driving simulator has been put to good use in 2010. The first of many trainings this year was led by Jim McLeroy, former director of training at UPS, for the South Kingstown Department of Public Works in April. McLeroy also conducted one for the Pawtucket Water Works Department in June.

The purpose of the sessions is to reinforce good driving skills and enhance awareness on the road in a safe, controlled environment.

McLeroy conducts a portion of each session in the classroom, and then trainees take turns driving the simulator through a route set up by the instructor. McLeroy reminds the drivers of tips they learned in the classroom as they perform exercises using the machine.

Trainings in South Kingston were held at the Union Fire District House. Representatives from the Highway Department, Waste Water Division and Recreation Department were present, as well as members of the Narragansett Highway Division.

“The guys were enthusiastic and the experience was extremely worthwhile,” said Paul Ferrandi, Highway Superintendent of South Kingstown.

The simulator can be programmed to replicate various types of trucks, such as dump trucks with sanders and plows, small pick-ups, and a vacuum truck that is used to clean stormwater drains.

Trainings focus on skills such as the stopping distance for a truck, proper backing techniques, and how much room the driver should leave between the truck and the vehicle in front of it.

Thomas Andre, a town mechanic, said the simulator training was a beneficial experience. “It was a real challenge and made you aware of several things on the roadway,” Andre stated.

From rookies to veterans, Ferrandi said everyone learned something from the training.

“We all picked up on different things. Young people experienced eye-openers that exposed them to what is really going on on the road, and veterans had the chance to enhance their skills,” Ferrandi said.

Trainings sessions using the simulator are offered at no cost for municipalities.

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