



2002

Semi-Annual Report

January 1, 2002 through June 30, 2002

URI Transportation Center
85 Briar Lane
Kingston, RI 02881
Phone (401) 874-7075
Fax (401) 874-2297
<http://www.uritc.uri.edu>



TABLE OF CONTENTS

Table of Contents	2
Director's Report	3
Part A Success Stories	4
Part B Research Projects Status	10
1. New Projects	10
2. Ongoing Projects	11
3. Completed Projects	13
4. Papers & Publications	14

From the Executive Director



The first six months of 2002 saw the URI Transportation Center actively pursuing opportunities to advance transportation awareness in each of the three major activity areas for the Center.

In terms of education, the Center began offering the first set of courses under the partnership agreement with the National Highway Institute, the only such agreement in the nation. The courses are one to four day sessions aimed at transportation professionals in the New England region. We also expanded the course offerings on campus for students interested in transportation policy.

The Center's research program matured to the point that the majority of the initial research projects funded in Year One were completed just as the selection cycle for new projects was identifying the 13 new awards. It is particularly gratifying to observe third party participation from local communities in the research projects selected for awards.

The Transportation Center sponsored or cosponsored several major outreach events in the first two quarters. The Center cosponsored a Model Ports Conference, along with the US Coast Guard, the Rhode Island and Connecticut Sea Grant programs, and Roger Williams University.

The Transportation Center and the Brookings Institution began assessing the opportunities for multi jurisdictional transportation planning with a workshop cosponsored by the Slater Institute. We also sponsored a session on "Listening to our Customers" at the Northeast Association of State Transportation Officials (NASTO) meeting, held in Newport.

Finally, we sponsored our Second Annual National Transportation Week Breakfast, with a speaker addressing transportation security awareness.

Richard Horn, Executive Director

RESEARCH

Part A: Success Stories

"It's really that the brain can only do so much at one time...In a demanding traffic situation, to have a complicated conversation, is just taking a chance."

-URITC Researcher Manbir Sodhi



It has long been suspected that cell phones distract drivers and can lead to traffic accidents. URITC research attempts to define how much distraction takes place.



Dr. Sodhi is using eye-monitoring equipment to measure driver distraction.

URITC Cell Phone Research profiled on *ABC Evening News with Peter Jennings* and *Good Morning America*

Although once considered a luxury item, cellular telephones have become commonplace in American cars. And if Americans have a love-affair with cellular phones, their first love was with the automobile. According to the National Highway Traffic Safety Administration, (NHTSA), U.S. drivers spend an average of 541 hours a year in the cars, and 54 percent of these drivers carry and use cell phones while they drive. Put these two loves together and some say it is an accident waiting to happen.

And cellular phones are not the only source of distraction. Electronic devices in cars are becoming more and more advanced. Eventually most cars will be equipped with such marvels as electronic navigation systems, email, games, internet - all potential distractions.

Although common sense tells us that a distracted driver is more likely to have a traffic accident, Dr. Manbir Sodhi in his URITC funded project "Multimodal Vehicle Display Design and Analysis" is using test equipment to monitor eye movement to quantify precisely how much and what kinds of distraction lead to traffic accidents.

Using eye and head movement sensors and cameras to collect data, Sodhi was able to track eyeball movement during test distractions.

In recent interviews with ABC News with Peter Jennings and on Good Morning America, Dr. Sodhi described his use of eye movement sensors and cameras that show just how distracted drivers become while talking on the phone or playing with the radio.

Along with the national television news exposure, Dr. Sodhi's research has also appeared recently in *BusinessWeek*, *Science Daily* and the *Providence Journal*.

•120.1 Million Cell Phones are in use in the United States

•By 2005 there will be 1.26 Billion cell phones in use around the world

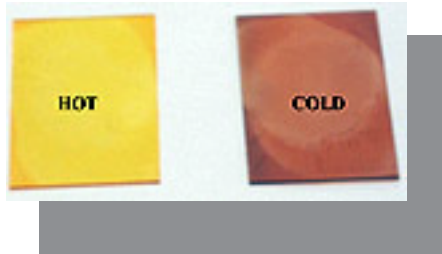
•Nearly 118,000 wireless calls are made each day to 911 and other emergency numbers from cell phones; more than 43 million annually.

•54 percent of drivers have wireless phones in their vehicles at all times

Source: National Highway Traffic Safety Administration (NHTSA)

TECHNOLOGY TRANSFER

Part A: Success Stories



Thermochromic paints might someday give us tires that change color when overheating or even bridges that turn red warning of frost.



URITC researchers are looking at how salt usage can be minimized by using a high-pressure spray to break up ice and snow on roadways.

From Ideas to Patents:

Three URITC researchers apply for patents on their ideas.

Paints Change Color, Warn of Danger

Imagine driving over a bridge which could actually change color when the air temperature were to reach freezing. What about rubber tires which turn red when they are under-inflated? They're not such crazy thoughts says URI professor and URITC researcher Dr. Brett Lucht, who along with his project team, has created an additive which when mixed with a paint or other composite displays changes in temperature by changing color.

In effect, the thermochromic coatings, plastics, or rubbers are thermal sensors that detect a change in temperature with optical or visual transformation. The thermochromic polymers can be incorporated into commercially available paints, plastics, and rubbers. The thermochromic paints can be applied in various manners including brush, sponge, roller, and airbrush and adhere strongly to paper, plastic, and painted metal surfaces.

It's a highly practical application of chemistry, and it's no surprise that such a novel and practical idea would invite commercial interest. Lucht and KM Scientific, the project's external partner, recently submitted and signed a patent application and licensing agreement for the technology.

URITC 2001 - 536152

Development of Thermochromic Paints, Plastics, and Rubbers for Rapid Visual Assessment of Temperature

Water jets for snow and ice removal Searching for the Perfect Mix

Another URITC researcher has developed an innovative way of removing snow and ice from road surfaces using high-pressure jetting technology and de-icing chemicals.

Dr. Taggart's research is looking at the combined use of jetting technologies and reduced use of de-icing agents. Because these chemicals are known to be hazardous to the environment, their use should be minimized. The researchers are exploring such variables as jet pressure, nozzle type, distance and chemical mix in hopes of finding the perfect mix where chemical use is at its minimum and ice-breaking power is maximized.

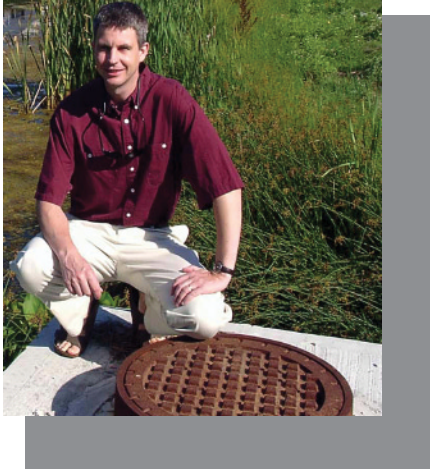
The device is being tested this Fall.

URITC 2001-536156

Development of an Advanced Pavement Deicing System

TECHNOLOGY TRANSFER

Part A: Success Stories



Dr. Boving is using wood chip filters to help clean roadway runoff.

Innovative Water Treatment Could Wood Chips Clean Roadway Runoff?

Vehicle exhaust, tire disintegration and brake dust are all products of surface transportation.

Although drivers seldom wonder where the water from roadway drains go, environmental scientists have long traced the combination of heavy metal particulates and petroleum hydrocarbons that often end up poisoning surface and ground water supplies.

Unlike other dirty water that is normally treated by a sewage treatment plant, the unique particulates found in urban and highway storm water runoff are both difficult and costly to remove from the water.

In an innovative approach, URITC Researcher Dr. Thomas Boving is studying how the use of wood filters can help remove these contaminants from the water.

Contaminated water is routed through the filters while in a retention pond, passing through several stages of filtration.

Initial laboratory research shows that the wood chips found in the filters are an effective means of filtering out the harmful contaminants, and the team is now experimenting with several wood species trying to maximize the effectiveness.

Dr. Boving filed a patent application in June.

A testing site is planned for the Gano Street retention pond at the on-ramp of Route 195 in Providence.

URITC 2001-536181

Wood Filters as an Innovative Treatment Method for Roadway Runoff Pollutants

EDUCATION & OUTREACH

Part A: Success Stories



Tad Widby of Parsons Brinckerhoff spoke on May 13, 2002 on "Homeland Security & Transportation" at the URITC Transportation Week Breakfast.

"Homeland Security & Transportation" **Tad Widby, Parsons Brinckerhoff**

May 13, 2002
Transportation Week Breakfast

As part of the 2002 National Transportation Week URITC invited Mr. Tad Widby of Parsons Brinckerhoff to speak on the topic of Homeland Security.

Mr. Widby reminded the audience that transportation systems make prime targets for attacks. The presentation highlighted how increased vigilance and coordination between agencies and information is critical in the unfortunate event of terrorism.

Along with better communications, Mr. Widby also spoke about increasing surveillance, increasing emergency response capabilities, and the isolation of key bridge and tunnel access.

The speaker also stressed the reality that no system is perfect, and decision-making must be strategic, systematic, and built on probabilities of attack and degree of likely impact.

National Transportation Week provides an opportunity for the transportation community to join together for greater awareness about the importance of transportation. National Transportation Week also focuses on making youth aware of transportation-related careers.



"The United States will become increasingly vulnerable to attack on the American homeland, and the US military superiority will not completely protect us ..."
Hart-Rudman Commission--February 2001

More than 85 attendees from private & public agencies attended, including representatives from the RI State Police, Governor's Office, RI Department of Transportation, RI Airport Corporation, and the RI Public Transit Authority.

EDUCATION & OUTREACH

Part A: Success Stories



Courses Educate Transportation Practitioners

The University of Rhode Island and the National Highway Institute (NHI) of the Federal Highway Administration (FHWA) will offer joint training and educational sessions to transportation practitioners in the Northeastern United States.

The mission of the National Highway Institute (NHI) is to provide proactive leadership, expertise, resources, and information to improve the quality of the U.S. highway system in order to enhance economic growth, quality of life, and the environment. The NHI develops and delivers training and education in cooperation with its partners to sustain and expand the transportation community's professional capacity in technologies and strategies thereby accelerating the implementation of the state-of-the-art and continuing to advance the state-of-the-practice.

The first URITC / NHI course took place in the Spring, and additional courses are scheduled for this Fall.

EDUCATION & OUTREACH

Part A: Success Stories



The URITC website provides information on current research projects, research highlights, news, and seminars and events.

A new project portal allows URITC researchers to access project information, and fill out reporting forms online.

Improvements to the URITC Website

To respond to the need to provide better information to our stakeholders and the general public, the Center expanded and improved its website in a variety of ways.

The new URITC website features full descriptions of ongoing research projects, news, seminars and research opportunities, pulling information directly from a central, internal project management system.

The site also allows Center staff to update and maintain a calendar of events, frequently asked questions, news releases, email lists and project information and management, directly from the website itself.

Project investigators will soon be able to log in to check financial information for their projects directly, through an online administrative portal.

Increased Visibility for the Center

The URITC website now reports more than 200 unique visitors per week.

Connecting with Stakeholders

Subscribers to our email list receive notifications of awards, new projects, seminars and events.

Online Project Reporting

URITC Researchers log in to the URITC "Project Portal" where they can fill out various required project reports, including semi-annual report information.

Vist our website at <http://www.uritc.uri.edu>

RESEARCH

Part B: Project Status

NEW PROJECTS FOR 2002

Stretching Ability of Chip Seal Membranes

2002-536175 Dr. Milton Huston (URI Civil Engineering)

Harnessing the Power of Relational Databases for Management of Geotechnical and Geologic Data

2002-536176 Professor Daniel Murray (URI Geosciences)

Determining the Effectiveness of New Technology Data Collection Devices for Real-Time Transportation System Management

2002-536177 Dr. Christopher Hunter (URI Civil Engineering)

Developing and Applying a Transportation Model for Aquidneck Island

2002-536178 Professor Farhad Atash (URI Community Planning)

Integrated Transportation Pricing Strategy for Newport

2002-536179 Professor Timothy Tyrrell (URI Environmental and Natural Resource Economics)

Development of Course on Bridge Management

2002-536180 Professor George Tsiatas (URI Civil Engineering)

Wood Filters as an Innovative Treatment Method for Roadway Runoff Pollutants

2002-536181 Dr. Thomas Boving (URI Geosciences)

RI DOT 2001 Bicycle Transportation User Survey Developing Intermodal Connections for the 21st Century

2002-536182 Professor R. Choudary Hanumara

Development of Thermochromic Paints, Plastics, and Rubbers for Rapid Visual Assessment of Temperature

2002-536183 Dr. Brett Lucht (URI Chemistry)

Dredging in a Changing Scientific and Regulatory Environment - Year 2

2002-536184 Professor Richard Burroughs (URI Environmental and Natural Resource Economics)

Replacement of Chromate in Paints and Corrosion Protection Systems

2002-536XXX Dr. Mercedes Rivero-Hudec (URI Chemistry)

Mechanical Behavior of Recycled Asphalt Material Under Dynamic Loading Conditions

2002-536XXX Professor Martin Sadd (URI Mechanical Engineering)

Application of a Multimodal Demand Simulation Model to Assess Container Transportation Policy Issues in the Northeast

2002-536XXX Professor Thomas Grigalunas (URI Environmental and Natural Resource Economics)

RESEARCH

Part B: Project Status

ONGOING PROJECTS

Dredging in a Changing Scientific and Regulatory Environment

2001-536151 Professor Richard Burroughs

Development of Thermochromic Paints, Plastics, and Rubbers for Rapid Visual Assessment of Temperature

2001-536152 Dr. Brett Lucht

Field Study of Composite Piles in the Marine Environment

2001-536153 Dr. Christopher Baxter

Development of a Customer Satisfaction and Service Quality Measurement Method and Tool for the Rhode Island Public Transit Authority

2001-536154 Professor Albert Della Bitta

Contamination of Urban Lakes by Storm Runoff from Highway and Railway Drainage Systems

2001-536155 Professor John King

Development of an Advanced Pavement Deicing System

2001-536156 Dr. David Taggart

Investigation of Potential for Intermodalizing Paratransit in Rhode Island

2001-536157 Dr. Christopher Hunter

Replacement of Chromates in Paints and Corrosion Protection Systems

2001-536158 Dr. Mercedes Rivero-Hudec

Intelligent Traffic Anomaly Diagnosis Through the Integration of Diverse Information Sources

2001-536159 Dr. Joan Peckham

Processing of Cenosphere-Cement/Asphalt Composite Materials and Evaluation of their Mechanical and Acoustic Properties

2001-539160 Professor Arijit Bose

Driver Distraction and Detection

2001-536161 Dr. Manbir Sodhi

Creating Safe Transportation Options for College Students

2001-536162 Professor Norbert Mundorf

Comprehensive Framework for Sustainable Container Ports Development of US East Coast in the 21st Century

2001-536163 Professor Thomas Grigalunas

Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Material

2001-536164 Professor Martin Sadd

RESEARCH

Part B: Project Status

Re-Thinking the Region: Transportation Networks and Regional Competitiveness

2001-536168 Professor Maureen Moakley

Exploring Ways of Influencing Transport Behaviors by Using Telecommunications Technologies

2000-536131 Professor Nikhilesh Dholakia

Chemical Retention Capacity of a Newly Constructed Roadway Runoff Detention Pond System

2000-536132 Dr. Thomas Boving

Intermodal Transport of Petroleum Products - Smart Terminals

2000-536133 Dr. Winston Knight

High Order GPS Base Station and Web Delivery System

2000-536134 Professor Peter August

Replacement of Chromates in Paints and Corrosion Protection Systems

2000-536135 Dr. Mercedes Rivero-Hudec

Fiber Reinforcement of Concrete

2000-536136 Professor Richard Brown

A Web-based Core Library for Rhode Island

2000-536137 Dr. O. Don Hermes

Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials

2000-536138 Professor Martin Sadd

TRANSMAP: An Integrated, Real Time Environmental Monitoring and Forecasting System for Highways and Waterways in RI

2000-536139 Dr. Malcolm Spaulding

Comprehensive Framework for Sustainable Container Ports Development of US East Coast in the 21st Century

2000-536140 Dr. Thomas Grigalunas

Implementation of a Highway Monitoring Program Utilizing Intelligent Transportation Systems (ITS)

2000-536141 Dr. Milton Huston

Moving Smart in Rhode Island

2000-536142 Dr. Joan Peckham

Inorganic and Organic Characterization of Dredged Sediments from the Proposed Quonset Point Channel in Narragansett Bay

2000-536143 Professor Raymond Wright

Performance Improvement And Measurement of Open-Graded Asphalt Mixes

2000-536144 Dr. Mohammad Faghri

Magnet and Induced Impacts of Quonset Container Port

2000-536145 Professor Ed Mazzi

RESEARCH

Part B: Project Status

Red Light Running in Rhode Island

2000-536146 Dr. Christopher Hunter

Fiber Reinforcement of Concrete

1999-536101 Professor Richard Brown

Multi Modal Vehicle Display Design and Analysis

1999-536103 Professor Manbir Sodhi

Beneficial Uses of Dredge Material from the QPD Intermodal Port Terminal

1999-536104 Dr. Armand Silva

Development of an Advanced Bridge, Highway and Runway De-Icing System

1999-536107 Dr. David Taggart

Interactions of Transportation and Telecommunications Behaviors in relation to RIIR:

Modeling the User Perspective

1999-536111 Dr. Nikhilesh Dholakia

Study of the Human/ITS Interface Issues on the Design of Traffic Information Bulletin Board and Traffic Control Signal Displays

1999-536113 Dr. David Shao

Smart Speed Bumps

1999-536114 Professor William Ohley

COMPLETED PROJECTS

TRANSMAP: An Integrated, Real Time Environmental Monitoring and Forecasting System for Highways and Waterways in RI

1999-536100 Professor Malcolm Spaulding COMPLETE

Geologic Transportation Maps for the 21st Century

1999-536102 Professor O.Don Hermes COMPLETE

The Design & Development of Information & Computer Systems for URITC

1999-536105 Dr. Joan Peckham COMPLETE

Comprehensive Framework for Sustainable Container Ports Development of US East Coast in the 21st Century

1999-536106 Dr. Thomas Grigalunas COMPLETE

Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Material

1999-536108 Professor Martin Sadd COMPLETE

Modeling for Real-Time Traffic Control in the Rhode Island Intelligent Road

1999-536109 Professor William Palm COMPLETE

Using Cenospheres to Develop New Asphalt and Cement Based Concrete Materials

1999-536110 Professor Arun Shukla COMPLETE

Data Analysis and Detection Methods for Online Health Monitoring of Bridge Structures

1999-536112 Professor Sau-Lon Hu COMPLETE

RESEARCH Papers & Publications

FY 2001 URITC 536151 Prof. Richard Burroughs
Dredging in a Changing Scientific and Regulatory Environment

Papers & Publications from January 1, 2002 to June 30, 2002

5/02 **Presentation** "Uncertainty in Dredging Decisions: Diagnosis and Alternatives" at a meeting of the Coastal Society

FY 2001 URITC 536152 Dr. Brett Lucht
Development of Thermochromic Paints, Plastics, and Rubbers for Rapid Visual Assessment of Temperature

Papers & Publications from January 1, 2002 to June 30, 2002

1/02 **Success Story** Submitted PCT patent application on thermochromic polymers.

3/02 **Presentation** "Investigation of the Thermochromic Properties of Polythiophenes Dispersed in Host Polymers" at National American Chemical Society Meeting.

FY 2001 URITC 536156 Dr. David Taggart
Development of an Advanced Pavement Deicing System

Papers & Publications from January 1, 2002 to June 30, 2002

1/02 **Presentation** "Application of Jetting Technology to Pavement Deicing" at the Annual Meeting of the Transportation Research Board, Washington, DC, January 2002.

FY 2001 URITC 536159 Dr. Joan Peckham, Dr. Christopher Hunter
Intelligent Traffic Anomaly Diagnosis Through the Integration of Diverse Information Sources

Papers & Publications from January 1, 2002 to June 30, 2002

2/02 **Presentation** "Rhode Island Intelligent Traffic Anomaly Diagnosis System.(RIITADS)" at URITC.

4/02 **Presentation** "Strategies for Diagnosing Traffic Anomalies and Incidents & Predicting Travel Time in Rhode Island" at the RIDOT's regular "Lunch and Learn" series.

FY 2000 URITC 536131 Dr. Nikhilesh Dholakia, Prof. Norbert Mundorf
Exploring Ways of Influencing Transport Behaviors by Using Telecommunications Technologies

Papers & Publications from January 1, 2002 to June 30, 2002

1/2002 **Presentation** of preliminary findings to external match partner, Fraunhofer-ISI in Karlsruhe, Germany

5/2002 **Publication** "Effects of the Internet and other Interactive Technologies" in the journal Perspectives of Media Effect. The article discusses the impact of information technology on virtual mobility and other aspects of daily life.

6/2002 **Publication** of a book by Fraunhofer (the external sponsor of this project) that demonstrates partial transport substitution effects of online activities.

6/2002 **Success Story** An invitation was extended to Dr. Dholakia and Dr. Mundorf to present findings to the BMW Foundation in Berlin, Germany for November 2002.

RESEARCH Papers & Publications

FY 2000 URITC 536132 Dr. Thomas Boving
Chemical Retention Capacity of a Newly Constructed Roadway Runoff Detention Pond

Papers & Publications from January 1, 2002 to June 30, 2002

- 3/2002 **Presentation** "Removing Organic Contaminants from Roadway Runoff Using Wood Fibers" at GeoProc 2002, Bremen, Germany by Boving, T and Zhang, W
- 3/2002 **Presentation** "Chemical Retention Capacity of a Newly Constructed Roadway Runoff Detention Pond System" at NE Geological Society of America Meeting, Springfield, MA, March 24-27, 2002 by Krohn, J and Boving, T
- 3/2002 **Presentation** "Potential Remediation of Heavy Metals Found in the Environment Using Wood: Rate of Absorption of Copper and Zinc on Aspen Wood" at NE Geological Society of America Meeting, Springfield, MA, March 24-27, 2002 by Thienel, B and Boving, T

FY 2000 URITC 536137 Prof. Daniel Murray
A Web-based Core Library for Rhode Island

Papers & Publications from January 1, 2002 to June 30, 2002

- 3/02 **Presentation** "A Web-based Core Library for Rhode Island" at Geological Society of America Meeting (Northeast Section)
- 5/02 **Success Story** Received funding from 1) the URI Transportation Center and 2) the RI Department of Transportation for a continuation of our work. The new project is titled "Harnessing the Power of Relational Databases."

FY 2000 URITC 536138 Prof. Martin Sadd
Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials

Papers & Publications from January 1, 2002 to June 30, 2002

- 6/02 **Presentation** entitled "Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification" at 15th Annual ASCE Engineering Mechanics Conference.

FY 2000 URITC 536140 Prof. Thomas Grigalunas
Comprehensive Framework for Sustainable Container Ports Development of US East Coast in the 21st Century

Papers & Publications from January 1, 2002 to June 30, 2002

- 1/02 **Presentation** at the Transportation Research Board Annual Meeting, Washington, DC.

RESEARCH Papers & Publications

FY 2000 URITC 536142 Dr. Joan Peckham
Moving Smart in Rhode Island

Papers & Publications from January 1, 2002 to June 30, 2002

3/02 **Publication** entitled "Moving Smart in Rhode Island" is presented and published in the Proceedings of the 31st Annual Meeting of the Northeast Decision Sciences Institute. Peckham, J., Hunter, C., DiPippo, L and Herve, J.

FY 1999 URITC 536107 Dr. David Taggart
Development of an Advanced Bridge, Highway and Runway De-icing System

Papers & Publications from January 1, 2002 to June 30, 2002

01/02 **Publication** "Application of Jetting Technology to Pavement Deicing" Paper presented at Annual Meeting of the Transportation Research Board and published in conference proceedings.

01/02 **Publication** "Application of Jetting Technology to Pavement Deicing," accepted for publication in the Transportation Research Record.