HAMPTON UNIVERSITY
EASTERN SEABOARD INTERMODAL TRANSPORTATION APPLICATIONS CENTER (ESITAC) FINAL REPORT
2006 - 2013
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ESITAC Theme

The theme of this Center is to enhance regional intermodal transportation systems by improving safety and efficiency while minimizing environmental impacts.
It is with a great feeling of achievement that I present this Final Report documenting seven years of dedicated work in research, education, and technology transfer. As you read this report, you will perceive the growth of the Eastern Seaboard Intermodal Transportation Applications Center (ESITAC) from a modicum of transportation activities in 2006 to a substantial increase over the Strategic Plan’s baseline measures for research, education, and technology transfer performance. During this period, Hampton University acquired national and international visibility. In 2006, Hampton University was barely known among the transportation community. Today, with ESITAC researchers serving on international committees, presenting and publishing papers in North America, European Union, Australia, and Asia, it has earned itself a spot on the international transportation map. From the results of 13 completed projects, 32 papers have been presented at national and international conferences and 21 papers published in refereed journals and proceedings. ESITAC has put into operation advanced labs in the area of safety, infrastructural renewal, and pollution control. The Hampton University Accident Research Center (HUARC) has simulation facilities for studying the problems of driver distraction and texting-while-driving which are of national and international concerns.

Of all the ESITAC success stories, I am pleased to see the beginning of formal transportation education and workforce development curriculum made available to students. A framework consisting of modules which can be independently selected to match one’s career goals offers a blend of education and workforce development in intermodal transportation systems that will produce qualified professionals with techno-managerial skills. This modular framework developed for our consortia subaward project, has attracted more students and faculty to the field of transportation education and research, thus fulfilling the USDOT’s goal of advancing U.S. technology and expertise in transportation.

The ESITAC will remain operational and carry on the transportation activities which have evolved during the conduct of the project. Our extensive Web site: http://biz.hamptonu.edu/esitac/ will provide updated information on our transportation activities. I look forward to your continued interest and support of the ESITAC.

K. A. D’Souza
Kelwyn A. D’Souza
ESITAC Director
ESITAC MILESTONES (JUNE 2006 – DECEMBER 2013)

1. HU receives notification of Tier II UTC grant, award, June 2006.
2. Phase I of the project started, June 2006.
5. Transportation Steering Committee was finalized, March 2008.
10. HU receives notification of Phase II grant funding, September 2008.
11. ESITAC played a leading role at the 31st Annual Black Family Conference, March 2009.
14. HU receives notification of Phase III grant funding, June 2009.
15. RITA Site Visit, November 2009.
18. HU receives notification of Phase IV grant funding, September 2010.
19. ESITAC hosted the Symposium on Transportation Issues and Problems, October 2010.
20. Outstanding Student of the Year awarded to Mr. Shaun Harvell, January 2011.
21. HU’s Business students win 3rd Place in the ISM’s Logistics Case Competition February 11, 2011.
22. HU receives notification of Phase V grant funding, June 2011.
23. Outstanding Student of the Year awarded to Ms. Dionne West, January 2012.
24. ESITAC hosts Workshop on The Climate Change/Sea Level Rise and the Effects on Transportation Infrastructure, April 2012.
25. ESITAC hosted the National Conference on Intermodal Transportation, October, 2012.
26. Held Transportation Steering Committee meeting, October 2012.
27. Outstanding Student of the Year awarded to Ms. Alexa Hollinshead, January 2013.
28. Hampton University Accident Research Center (HUARC) was established, June 2013.
30. ESITAC last project completed December 2013.
31. ESITAC grant completed, December 2013.
32. Outstanding Student of the Year awarded to Ms. Lexis Phillips, January 2014.
**Performance Indicators for 2006-2013**

Strategic plan base line measure year 2006-2007 shown in ( )

### Research Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>2006-2007</th>
<th>2008-2009</th>
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<tbody>
<tr>
<td>Transportation Applied</td>
<td>13 (4)</td>
<td>13 (1)</td>
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<tr>
<td>Research Projects</td>
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<td></td>
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<tr>
<td>Reports Published</td>
<td>13 (1)</td>
<td>32 (3)</td>
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<td>Research Papers Presented</td>
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<tr>
<td>Published</td>
<td>21 (-)</td>
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### Education

<table>
<thead>
<tr>
<th>Category</th>
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<th>2008-2009</th>
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<tr>
<td>New Transportation Related Course</td>
<td>2 (53)</td>
<td>46 (7)</td>
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<tr>
<td>Transportation Related Projects</td>
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<td></td>
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<tr>
<td>Undergraduates In Transportation Related Projects</td>
<td>40 (7)</td>
<td>6 (-)</td>
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<tr>
<td>Graduates In Transportation Related Projects</td>
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### Technology Transfer

<table>
<thead>
<tr>
<th>Category</th>
<th>2006-2007</th>
<th>2008-2009</th>
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<tbody>
<tr>
<td>Transportation conferences, symposiums, workshops</td>
<td>5 (-)</td>
<td>249 (-)</td>
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<tr>
<td>professionals participated</td>
<td></td>
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## Final Research Reports on TRIS/TRID Databases

<table>
<thead>
<tr>
<th>SR. #</th>
<th>TRIS ID#</th>
<th>TITLE OF TRIS RESEARCH DOCUMENT</th>
<th>START DATE</th>
<th>END DATE</th>
<th>TRID ACCESSION#</th>
<th>PUBLISH DATE</th>
<th>TITLE OF FINAL TRID REPORT</th>
<th>ESITAC WEBSITE</th>
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<tr>
<td>1</td>
<td>28355</td>
<td>Short Term Evaluation of Bridge Cables Using Acoustic Emission Sensors.</td>
<td>01/01/2008</td>
<td>04/30/2009</td>
<td>01172513(^1)</td>
<td>07/12/2011</td>
<td>Short Term Evaluation of a Bridge Cable Using Acoustic Emission Sensors(^1).</td>
<td>YES</td>
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<tr>
<td>3</td>
<td>19747</td>
<td>Modeling Traffic Accidents at Signalized Intersections in the City of Norfolk, Virginia.</td>
<td>10/01/2008</td>
<td>12/31/2009</td>
<td>01341898</td>
<td>12/31/2010</td>
<td>Modeling Traffic Accidents at Signalized Intersections in the City of Norfolk, VA</td>
<td>YES</td>
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<tr>
<td>5</td>
<td>26205</td>
<td>Investigation of NOx and Tropospheric Ozone Transport around a Major Roadway.</td>
<td>03/01/2010</td>
<td>02/28/2011</td>
<td>01341899</td>
<td>02/28/2011</td>
<td>Effect of Ozone and Distance from a Major Roadway on Nitrogen Oxides Concentrations</td>
<td>YES</td>
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<td>7</td>
<td>26206</td>
<td>Modeling and Predicting Traffic Accidents at Signalized Intersections in the City of Norfolk, VA.</td>
<td>03/01/2010</td>
<td>02/28/2011</td>
<td>01365968</td>
<td>10/2011</td>
<td>Modeling and Predicting Traffic Accidents at Signalized Intersections in the City of Norfolk, VA.</td>
<td>YES</td>
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\(^1\)Funded by VDOT. Full report available at: [http://www.virginiadot.or...ine_reports/pdf/10-r24.pdf](http://www.virginiadot.or...ine_reports/pdf/10-r24.pdf)

CONTINUED……..
## FINAL RESEARCH REPORTS ON TRIS/TRID DATABASES

<table>
<thead>
<tr>
<th>SR. #</th>
<th>TRID ID#</th>
<th>TITLE OF TRIS RESEARCH DOCUMENT</th>
<th>START DATE</th>
<th>END DATE</th>
<th>TRID ACCESSION #</th>
<th>PUB/MOD DATE</th>
<th>TITLE OF FINAL TRID REPORT</th>
<th>ESITAC WEB SITE</th>
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<tr>
<td>8</td>
<td>28334</td>
<td>Impact of Education and Awareness Programs on the Usage and Attitude towards Texting while Driving among Young Drivers.</td>
<td>05/01/2011</td>
<td>05/30/2012</td>
<td>01467988</td>
<td>01/03/2013</td>
<td>Impact of Education and Awareness Programs on the Usage and Attitude towards Texting while Driving among Young Drivers.</td>
<td>YES</td>
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<td>9</td>
<td>28335</td>
<td>Acoustic Emission (AE) Sensor Technology: Utilization for Non-Destructive Bridge testing.</td>
<td>05/01/2011</td>
<td>04/30/2012</td>
<td>01446277</td>
<td>09/19/2012</td>
<td>Non-Destructive Bridge testing with Acoustic Emission (AE) Sensor Technology.</td>
<td>YES</td>
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<td>10</td>
<td>28140</td>
<td>Further Analysis of NOx and O3 data, and the Acquisition, Installation and Laboratory Testing of the PM Equipment</td>
<td>05/01/2011</td>
<td>05/31/2012</td>
<td>01446265</td>
<td>05/31/2012</td>
<td>Further Analysis of NOx and O3 data, and the Acquisition, Installation and Laboratory Testing of the PM Equipment</td>
<td>YES</td>
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<tr>
<td>11</td>
<td>32557</td>
<td>Investigation of Fine Particulate Matter, NOx and Tropospheric Ozone Transport around a Major Roadway.</td>
<td>06/20/2012</td>
<td>05/31/2013</td>
<td>01495387</td>
<td>07/31/2013</td>
<td>Investigation of Fine Particulate Matter, NOx and Tropospheric Ozone Transport around a Major Roadway.</td>
<td>YES</td>
</tr>
</tbody>
</table>
ESITAC ORGANIZATION

The School of Business

The School of Engineering and Technology
Transportation Steering Committee

Transportation Steering Committee: serves as an advisory body to govern the ESITAC. The Committee provides advice relative to project goals, implementation, and coordinating partnership activities and funding. The Committee is made up of the following leaders representing federal, state, city, academics, and private organizations whose expertise contributes positively to the theme and goals of ESITAC.

<table>
<thead>
<tr>
<th>Member</th>
<th>Title/Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Moges Ayele</td>
<td>Senior Liaison for Higher Education, FHWA, USDOT.</td>
</tr>
<tr>
<td>Mr. Michael Chapman</td>
<td>Assistant Deputy Director for Aerospace Testing, NASA Langley</td>
</tr>
<tr>
<td>Dr. Sid Credle</td>
<td>Dean, School of Business, Hampton University.</td>
</tr>
<tr>
<td>Dr. Michael Demetsky</td>
<td>Henry L. Kinnier Professor of Civil Engineering and Director of the Center for Transportation Studies, UVA.</td>
</tr>
<tr>
<td>Dr. Kelwyn D'Souza</td>
<td>ESITAC Director, Hampton University.</td>
</tr>
<tr>
<td>Mr. David Gehr</td>
<td>Senior Vice President, Parsons Brinkerhoff.</td>
</tr>
<tr>
<td>Dr. Asad J. Khattak</td>
<td>Frank Batten Endowed Chair Professor, Civil &amp; Environmental Engineering Department, Old Dominion University.</td>
</tr>
<tr>
<td>Dr. Eric Sheppard</td>
<td>Dean, School of Engineering and Technology, Hampton University.</td>
</tr>
<tr>
<td>Mr. Everett Skipper</td>
<td>Director, Department of Engineering, City of Newport News.</td>
</tr>
<tr>
<td>Mr. Michael Sprinkel</td>
<td>Associate Director, Virginia Center for Transportation Innovation and Research, (VCTIR), VDOT.</td>
</tr>
<tr>
<td>Dr. Roger Stough</td>
<td>Associate Dean for Research and NOVA Endowed Chair &amp; Professor of Public Policy, George Mason Univ.</td>
</tr>
<tr>
<td>Mr. Bill Thomas</td>
<td>Associate Vice President, Gov. Relations, Hampton University.</td>
</tr>
</tbody>
</table>
Research Selection Committee

Research Selection Committee: assists and advises the Center on selecting research projects that fit the theme, expertise of the University, and the regional needs. The Committee is made up of the following transportation experts representing federal, state, city, academics, and private organizations.

<table>
<thead>
<tr>
<th>Member</th>
<th>Title/Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Guzin Akan</td>
<td>City Transportation Engineer (Retired), City of Norfolk, Division of Transportation.</td>
</tr>
<tr>
<td>Dr. Jale Akyurtlu</td>
<td>Associate Director (Research), ESITAC, Hampton University.</td>
</tr>
<tr>
<td>Mr. Lynn Allsbrook</td>
<td>Acting Director of Public Work, Dept of Public Works, City of Hampton.</td>
</tr>
<tr>
<td>Mr. Thomas Ballou</td>
<td>Director, Air Data Analysis and Planning, Virginia Department of Environmental Quality (VDEQ).</td>
</tr>
<tr>
<td>Mr. Lorenzo Casanova</td>
<td>Senior LP and Research Engineer, FHWA, Virginia District Office.</td>
</tr>
<tr>
<td>Ms. Lisa Colbert</td>
<td>Project Manager, FTA, Washington D. C.</td>
</tr>
<tr>
<td>Mr. Stephany Hanshaw</td>
<td>Statewide Transportation Operations Center Project Manager, VDOT.</td>
</tr>
<tr>
<td>Mr. Jim Ponticello</td>
<td>Air Quality Program Manager, VDOT.</td>
</tr>
<tr>
<td>Dr. Camelia Ravanbakht</td>
<td>Deputy Executive Director, Hampton Roads Transportation Planning Organization.</td>
</tr>
<tr>
<td>Dr. Stephen Sharp</td>
<td>Research Scientist, Virginia Center for Transportation Innovation and Research, (VCTIR), VDOT.</td>
</tr>
<tr>
<td>Dr. John Sokolowski</td>
<td>Executive Director, Virginia Modeling and Simulation Center (VMASC), ODU.</td>
</tr>
</tbody>
</table>
Principal Staff

ATES AKYURTLU, Ph.D.
Professor
Chemical Engineering
Research Investigator
Specialization: Reacting flows, combustion and propulsion; modeling of chemical reactors; catalytic and noncatalytic gas-solid reactions; above topics related to coal, general energy and environmental research; application of general purpose and design software to perform chemical engineering calculations.

JALE AKYURTLU, Ph.D.
Endowed Professor
Chemical Engineering
Associate Director (Research) and Research Investigator
Specialization: Chemical reaction engineering; modeling of chemical reactors; catalytic and noncatalytic gas-solid reactions; above topics related to coal, general energy and environmental research; application of general purpose and design software to conduct chemical engineering calculations; undergraduate education in nanotechnology.

SID CREDLE, Ph.D.
Dean School of Business
Budget Executive
Specialization: Application of Social Cognitive Career Theory, Merger Acquisition Target Firm Valuation Methods, and Higher Education Administration.
Principal Staff (Cont.)

CAREY FREEMAN,
Chairperson Aviation
Associate Director (Education)
Specialization: A retired Air Force Officer, Pilot and Air Traffic Controller. Holds Federal Aviation Administration licenses and ratings in: Airline Transport Pilot; Gold Seal Certified Flight Instructor Airplanes and Instruments; Single and Multi-Engine; Commercial Pilot Single-Engine Sea; Advanced ground Instructor; and Control Tower Operator.

VADIVE JAGASIVAMANI, Ph.D.
Researcher
Electrical Engineering
Research Investigator
Specialization: Nondestructive testing, Aging aircraft NDE, Corrosion studies, Measurement & Instrumentation techniques, Electronic Circuits, Microcontrollers, Microscopy (TEM, SEM & Optical), Vacuum techniques, XRD, Reverse engineering and Prototyping.

SHARAD MAHESHWARI, Ph.D.
Associate Professor
Business Administration
Associate Director (Technology Transfer) and Research Investigator
<table>
<thead>
<tr>
<th>ORGANIZATION NAME</th>
<th>LOCATION</th>
<th>CONTRIBUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hampton Roads Transit (HRT)</td>
<td>Hampton, VA</td>
<td>Assisted ESITAC during driver distraction study, provided research internship positions and mentoring, and in-kind match.</td>
</tr>
<tr>
<td>Institute for Supply Management (ISM)</td>
<td>Phoenix, AZ</td>
<td>Provides free membership for faculty and students as in kind match. Organizes student case competitions and mentoring.</td>
</tr>
<tr>
<td>National Highway Institute (NHI)</td>
<td>Arlington, VA</td>
<td>Provided access to training and case study materials.</td>
</tr>
<tr>
<td>Parsons Brinckerhoff (PB)</td>
<td>Norfolk, VA</td>
<td>PB representatives teamed up with ESITAC in research/educational fields and provided in-kind match.</td>
</tr>
<tr>
<td>Potomac and Rappahannock Transit Commission (PRTC)</td>
<td>Woodbridge, VA</td>
<td>Provided data and conducted survey for the ESITAC driver distraction research project.</td>
</tr>
<tr>
<td>Virginia Department of Transportation (VDOT)</td>
<td>Richmond, VA</td>
<td>Provided full funding for the Short Term Evaluation of Bridge Cables Using Acoustic Emission Sensors project. Collaborates with ESITAC on Non-Destructive Testing of bridges research projects.</td>
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CONSORTIA PARTNERS

Hampton University is one of the five members of the consortium of universities led by Mississippi State University (MSU) that established the National Center for Intermodal Transportation for Economic Competitiveness (NCITEC) through a grant from RITA of the U.S. Department of Transportation. The other members of the consortium include the University of Denver, University of Mississippi, and Louisiana State University.

Hampton University is also one of the four members of the consortium of Universities led by Marshall University that established the Multimodal Transportation & Infrastructure Consortium (MTIC) through a grant from RITA of the U.S. Department of Transportation. The other members of the consortium include Rahall Transportation Institute (RTI) at Marshall University, Kentucky Transportation Center at the University of Kentucky, and Center for Transportation Innovation at the University of Louisville.

RITA Site Visit to Mississippi State University (L to R): Harold “Skip” Paul (LSU), Denise Dunn (RITA), Kelwyn D’Souza (HU), Patrick Sherry (DU), Burak Eksioglu (MSU), Caesar Singh (RITA), Amy Stearns (RITA) and Devendra Parmar (HU)
RESEARCH

Student Researchers
1) COMPLETED PROJECTS

Year 7 (2012 - 2013)

Investigation of Fine Particulate Matter, NOx and Tropospheric Ozone Transport around a Major Roadway.
Investigators: Drs. Ates Akyurtlu & Jale Akyurtlu.

Investigator: Dr. Vadivel Jagasivamani.

A Research Framework for Studying Transit Bus Driver Distraction
Investigators: Drs. Kelwyn D’Souza & Sharad Maheshwari.

Year 6 (2011 - 2012)

Further Analysis of NOx and O3 Data, Testing, and Calibration of Upgraded PM Equipment.
Investigators: Drs. Ates Akyurtlu & Jale Akyurtlu.

Non-destructive Bridge Testing with Acoustic Emission (AE) Sensor Technology.
Investigator: Dr. Devendra Parmar.

Impact of Education and Awareness Programs on the Usage and Attitude Towards Texting While Driving Among Young Driver.
Investigators: Drs. Sharad Maheshwari and Kelwyn D’Souza.

(Top) Concrete columns damages due to the corrosion of reinforcing steel rods and corrosion damages in steel structures. (Bottom) Denbigh Blvd. Bridge Crossing over CSX railway in Newport News, VA.
Year 5 (2010 – 2011)
Effect of Ozone and Distance from a Major Roadway on Nitrogen Oxides Concentrations.
Investigators: Drs. Ates Akyurtlu & Jale Akyurtlu.

Non-Destructive Bridge Testing With Advanced Micro-II Digital AE System.
Investigator: Dr. Devendra Parmar.

Modeling and Predicting Traffic Accidents at Signalized Intersections in the City of Norfolk, VA.
Investigators: Drs. Sharad Maheshwari and Kelwyn D’Souza.

Year 4 (2009 – 2010)
Investigation of Nitrogen Oxides Emissions from a Major Roadway.
Investigators: Drs. Ates Akyurtlu & Jale Akyurtlu.

Investigator: Dr. Devendra Parmar.

Modeling Traffic Accidents at Signalized Intersections in the City of Norfolk, VA.
Investigators: Drs. Sharad Maheshwari and Kelwyn D’Souza.
Year 3 (2008 - 2009)
Short term Evaluation of Bridge Cables Using Acoustic Emission Sensors.
Investigator: Dr. Devendra Parmar.

Year 1 & 2 (2006 – 2008)
Involved with grant startup activities, preparation of Strategic Plan, forming external committees, and selecting projects in Safety, Infrastructural Renewal and Environmental Stewardship.

2) DISCONTINUED PROJECTS: None

3) PROJECTS WITH SIGNIFICANT COST OVERRUNS: None.

Hampton Roads Bridge Tunnel (VDOT 1990)
1. Bus Driver Distraction Study Continued
Student researcher Ms. Alexa Hollinshead analyzed the HRT and PRTC accident database and conducted sample route observations. She participated in the NCIT conference and presented, and published a joint paper on driver distraction.

2. NDT and Safety Assurance Engineering Student researchers Mr. Joel Fernandez, Mr. Javier Martinez, Mr. Darrion Crenshaw, and Mr. Benjamin Pinda used NDT to evaluate the structural safety of bridges.

3. Pollution Research Engineering student researchers Travian Sampson, Courtney Watts, Courtney Dansby, and Darrion Crenshaw worked on “Investigation of Fine Particulate Matter, NOx and Tropospheric Ozone Transport around a Major Roadway” under the supervision of Dr. Ates Akyurtlu and Dr. Jale Akyurtlu.

4. Texting-While-Driving MBA student researchers Mr. Andrew Nguyen and Ms. Victoria Saunders, conducted experiments on the texting-while-driving using the DriveSquare simulator. The study was conducted on the campus of Hampton University. The experiments’ samples were drawn from Hampton University student volunteers who agreed to participate in the study.

Texting while driving studies in progress.
2011 - 2012

1. Bus Driver Distraction
Student research interns Ms. Alexa Hollinshead and Ms. Jessica Sims conducted the study on Transit Bus Driver Distraction at HRT through follow up surveys, route observations and data analysis.

2. Non-destructive Testing (NDT)
Engineering student researchers Mr. Terrell Robinson and Mr. Nigel Plumb, worked on the research project "Non-destructive Bridge Testing with Acoustic Emission (AE) Sensor Technology: Study on a Bridge Crossing Over Rail Road and a Highway" during the Spring 2012 semester.

3. Pollution Research
Chemical engineering student researchers, Mr. Albert George, Mr. Benjamin Pinda, and Mr. James Reid worked with ESITAC researchers Dr. Ates Akyurtlu and Dr. Jale Akyurtlu on setup, calibration, and operation of the PM analyzer. They also participated in the NOx and ozone measurements for longer time periods, and collected the traffic volume data on I-64 using cameras.
2010 - 2011

1. A Pilot Study on Bus Distraction at Hampton Roads Transit
Student research intern, Ms. Michelle Talley studied bus driver distraction at HRT and its impact on traffic accidents. An analysis of historical bus accident data for the past two years was conducted to identify causes of accidents in the City's Northside and Southside locations.

2. AE Investigation of Highway Bridges
Student research intern, Ms. Shelitta Sheffield, worked on the research project: Non-destructive bridge testing with Advanced Micro-II Digital AE system during the 2010-2011 academic years.

3. Pollution Research
Student research intern, Mr. Lamarr Hill, and Ms. Avian Lain, processed the data and assisted with the start-up of the new PM analyzer. They collected ozone, NOx, and PM data in the commuter parking lot across Hampton University Convocation Center, using a Thermo Scientific Model 49i ozone analyzer, a Thermo Scientific 42i chemiluminescence NO-NO2-NOx analyzer, and a Thermo Scientific Model 1405-DF Particulate Matter (PM) analyzer, respectively.

Air Pollution Laboratory at Hampton University

Mr. Terrell Robinson (L) and Mr. Nigel Plumb (R) inspecting the Pocket Digital UT system at the NDT Laboratory.
2009 - 2010

1. Driver Distraction Study
Student researcher Ms. Amber Griffith did a preliminary analysis of bus accident data at HRT to identify causes due to driver distraction.

She worked under the guidance of the HRT safety officer collecting accident data and conducting route observations in Hampton, Newport News, and Norfolk.

2. Students Serve as Research Assistants
Student researchers Ms. Courtney Mitchell, Ms. Dinah Holland, Mr. LaMarr Hill, and Mr. Tyler Hopkins assisted with the ESITAC’s environmental project. They were involved in collecting traffic data, making environmental measurements, doing literature search, and modeling air pollution.

2008 - 2009
Accident Analysis at the City of Norfolk
Mr. Parth Punjabi, assisted with data collection for the research project on traffic accident analysis in the City of Norfolk.

2006 - 2008
Modeling Transportation Pollutants:
Mr. Christopher Santiago, assisted with modeling of the dispersion of transportation pollutants on I-64.
National News

Evaluation of Highway Bridge Cables Using Acoustic Emission Sensors
This completed project was highlighted by RITA in UTCs Program Points of Pride 2009 as significantly aligned with the nation’s needs and with the Department of Transportation’s goal of economy and infrastructure investment. This is a tribute to ESITAC’s abilities to offer practical solutions to transportation problems and respond to new and continuing challenges.

Asset Management Listening Brief reported that acoustic emission specialist Physical Acoustics Corporation worked with Hampton University and the Virginia Transportation Research Council on a study to monitor the stay cables of a major bridge. The project on the Varina-Enon Bridge over the James River led by Hampton University in Virginia, involved the short term evaluation of bridge cables using acoustic emission sensors provided by Physical Acoustics Corporation.
EDUCATION AND WORKFORCE DEVELOPMENT

Library Resources

Lecture Auditorium
FIGURE 1. MODULAR FRAMEWORK FOR EDUCATION AND WORKFORCE DEVELOPMENT

- **Education**
  - Curriculum Redesign
    - MBA with Logistics Mgt
    - Major in Aviation Mgt
    - Minor in Aviation Mgt
    - Concentration in Transportation Mgt
  - Classroom/Other Strategies
    - Intermodal Transportation Components
    - Transportation Scholarships
    - Building of Transportation Labs
    - Classroom Upgrades
  - Internal Training
    - Distinguished Lecture Series
    - Research Internships
    - Evaluation of Internships
  - External Training
    - Eisenhower Fellowships and SoY Awards
    - NSTI Program
    - Field Interns/Field Trips
    - Workforce Dev. Workshop and Conf.
The modular framework (Figure 1) developed for the Mississippi State University Consortium sub-award has been adopted by the ESITAC project. It consists of education and workforce development modules that were formulated by introducing a few new courses, updating available multidisciplinary programs of course work, and including lecture series, research projects, fellowships, and experiential learning.

**EDUCATION**

The education goal of the Center was to develop curriculum, courses, and delivery systems for interdisciplinary transportation programs that include experiential training in intermodal transportation operations.

Education modules consist of academic programs that were developed through Curriculum Redesign and Classroom Strategies.

**CURRICULUM REDESIGN**

The existing transportation programs within Hampton University (HU) were revised and integrated to offer an interdisciplinary curriculum with emphasis in intermodal transportation. The undergraduate and graduate transportation courses were updated to incorporate case studies.

**MBA with Logistics Management**

The MBA curriculum was altered to include emphasis in intermodal transportation and its impact on business logistics. It included topics such as transportation planning, optimization, challenges in logistics due to transportation, etc.

The NHI educational resources were utilized while implementing advanced course materials and case studies that incorporated transportation issues in supply chain/logistics into the MBA 551 curriculum. Graduate students were encouraged to participate in transportation and logistics case competition, conferences, guest lectures, field trips, and workshops to gain an exposure to career opportunities and advanced degree programs in transportation available at other universities.

**MAJOR AND MINOR IN AVIATION MANAGEMENT AND CONCENTRATION IN TRANSPORTATION MANAGEMENT**

These aviation modules prepare students to work in the aviation industry, which is a large and growing segment of intermodal transportation, especially in the global economy. A growing number of undergraduate students are currently pursuing a major and minor in Aviation Management, and a Concentration in Transportation Management. An increase in airfreight and passenger movement through the region’s two international airports will result in added pressure on the surface transportation modes creating need for skills in air transportation to supplement surface transportation modes.

Students majoring in other fields of study are offered an opportunity to earn a minor in Aviation Management. The course curriculum was revised to increase emphasis on intermodal transportation, aviation safety, and legislation tools to ensure safe operations of the civil aviation fleet. The Aviation Management minor and Concentration in Transportation Management modules were developed to attract bright students from other majors to the transportation educational and workforce development modules. The Concentration in Transportation Management provides students an opportunity to earn a major degree in their field of study with a concentration in transportation management. It was implemented in both the Aviation and Management departments and is promoted to students through workshops and offering of scholarships.

**CLASSROOM AND OTHER STRATEGIES**

**Intermodal Transportation Components**

Nine existing transportation management and related courses offered across campus were identified and stored in a database.
The current undergraduate and graduate transportation courses and the undergraduate Aviation Management courses were updated to incorporate intermodal transportation components and case studies. The graduate courses were altered to include emphasis on intermodal transportation as well as its impact on business logistics. Case studies which incorporate transportation concepts on supply chain/logistics management were included in the curriculum.

**Transportation Scholarships**
The announcement of scholarships and internships encouraged students to consider Aviation Management major/minor and Concentration in Transportation Management modules. It has attracted and educated our bright students in transportation. A Presidential Scholar joined the project team as a student research intern. Other scholars from across campus were selected as Transportation Fellows to work on research projects in the Student Transportation Fellowship Program (STFP). The overall goal of the STFP is to attract and educate the next generation of transportation professionals through well designed education and job training programs. To meet this goal, selected STFP students were assigned independent research projects on safety related topics, and attended the transportation workshop, and guest lectures.

**Transportation Labs**
The computers and equipment used in research projects are made available to students to conduct class experiments and research projects. The HU Accident Research Center (HUARC) located in the School of Business acquired a driving simulator from DriveSquare, Inc. for studying driver distraction. The simulator has three sensors—brake pedal, accelerator pedal and front wheels that create multiple driving scenarios. It is being used for training as well as generating a data log for each session which includes red light infractions, crossing of yellow lines, severing and number of crashes. The objective of the driving simulator is to study the attitude of drivers towards “Texting-While-Driving” and incorporate the results in the education and training modules.

**Classroom Upgrades**
The goal was to educate the next generation of transportation professionals in the usage and application of advanced simulation software packages as well as improve quality of student interaction. To achieve this goal, advanced simulation software packages and state-of-the-art classroom technology that includes a Smart Board Model 685 with UF75 Projector, Kramer 1x2 XGA Distribution Amplifier, and a Multimedia Lectern have been installed in the Transportation and Logistics Classroom (Buckman Hall 208) in the School of Business for use in conducting courses for the education modules.

**Workforce Development**
The workforce development includes internal and external training modules that are geared towards building the transportation workforce through student research interns working alongside faculty researchers on several research projects, in-plant internships, lecture series, and the fellowship programs.
1. Texting While Driving Lecture
City of Poquoson’s Police Chief Clifford T. Bowen made a presentation to a group of freshman students on the dangers of texting while driving. The participants were part of the texting while driving study group. Mr. Bowen highlighted various aspects of texting while driving such as “Inattention Blindness” caused due to distraction and how it impairs drivers’ ability to maneuver an obstacle. Students raised several questions related to law and enforcement of the texting while driving statutes.

2. Career Management
Mr. Christopher Lawson, Division Administrator for the Federal Highway Administration (FHWA) and the Principal Representative for the FHWA in the District of Columbia discussed with Hampton University students the importance of career management.

3. Safety Issues
Mr. Hari Kalla, MUTCD Team Leader, Office of Operations (HOTO-1) at the FHWA delivered a lecture entitled Traffic Safety: A Federal Perspective.

The lecture, attended by faculty members and students from across the campus generated a lively question and answer session.
4. Transit Route Design
Dr. Jeremy Blum from Penn State Harrisburg delivered a lecture on Agent-Based Optimization of Transit Route Network Design.

The Transit Route Network Design (TRND) model seeks to optimize a set of bus routes and schedules that maximizes the utility of the bus system for passengers while minimizing operator cost.

5. Airline Careers.
The Department of Aviation invited First Officer Steve Forest, Continental Airlines, Boeing 777 and First Officer Joanne Forest, United Airlines, Airbus A-320 for a lecture presentation. Both speakers had substantial flying experience. The main focus of their presentation was on careers in the airline industry. Initially, Steve and Joanne described their career paths in the airline industry. Both were graduates of college aviation programs and worked at a variety of jobs in the aviation industry before joining the airlines.

6. Research Projects at VTRC
Dr. Steven R. Sharp, Research Scientist at the Virginia Transportation Research Council (VTRC), Charlottesville Office presented the different types of research projects conducted by VTRC.

Research and Field Interns
The internship program included a variety of majors who were placed in internships at facilities located in Hampton and Norfolk. The interns worked on selected research projects that were mutually beneficial to the company and students.
Evaluation of Internships
A survey instrument was used to evaluate the impact of the internship program on students and participating organizations. It was based on the feedback from current and past participants, as well as the stated goals of the internship programs over past several years. Each responding intern completed the survey to determine desired outcomes and expectations of the internship. In addition, team members performed a summative evaluation by interviewing mentors and interns to examine benefits, costs, and suggestions for future enhancement of the program. The survey was administered on the past participants of the internship program to gain longitudinal analysis of the effectiveness of the internship program.

Since 1995, approximately 80 students have participated in the internship program. The 14 former interns that responded to a feedback survey indicated that the internship experiences were very educational (Figure 2). Around 70% of the interns considered transportation careers at some point of time in their career (Figure 3), however less than 10% of the interns secured employment with transportation organizations. Due to the small sample size, final conclusions have not been drawn. The study continues with greater number of responses expected from the past interns.

![Internship Evaluations](image1.png)

**Figure 2. Summary of internship evaluations**

![Workforce Outcomes](image2.png)

**Figure 3. Intern career choices**
1. Ms. Alexa Hollinshead was selected for the 2012 Outstanding Student of the Year award. Ms. Hollinshead worked as a research intern with Hampton Roads Transit (HRT) and Potomac and Rappahannock Transportation Commission (PRTC). She has a joint publication in the National Conference on Intermodal Transportation proceedings and the Management and Production Engineering Review, Vol. 4, No. 1, March 2013.

2. Ms. Dionne West was selected for the 2011 Outstanding Student of the Year. Dionne is a senior in the five-year MBA program and is on a partial athletic scholarship with the Women’s Golf Team. In her most recent internship with Hampton Roads Transit, Dionne participated in the launching of the Light Rail Transit system in Norfolk, Virginia.

3. Mr. Shaun Harvell, was selected for the 2010 Outstanding Student of the Year Award for his research project entitled: Bird Aircraft Strike Hazard (BASH) Deterrent Technology: Ultrasonic versus Infrasonic Sound Waves. Shaun is an outstanding student, and peer leader having earned and held the respect of faculty, staff, and fellow students.

4. Ms. Courtney Mitchell was selected for the 2009 Outstanding Student of the Year Award. She worked with Dr. Ates Akyurtlu on analyzing NOx emissions at high traffic intersections and was involved in self-training of the NOx Emission Analyzer, the CA-LINE4 software, and modeling of air pollution.

Ms. Lexis Phillips was the final ESITAC recipient of the 2013 Outstanding Student of the Year Award. Ms. Phillips is a Presidential Scholar currently working at the Hampton University Accident Research Center (HUARC). She conducts studies on texting-while-driving and driver distraction.
1. Mr. Tyler Crawford was selected as the 2013-2014 Eisenhower Fellow. His research was in the area of Air Transportation.

2. Mr. Henry Norris participated in the TRB annual meeting in Washington, D.C. in January 2013. Mr. Norris completed his airport research project, and graduated in May, 2013 with plans to work for the FAA.

3. Mr. Westin Goetz participated in the 2008-2009 Dwight D. Eisenhower Transportation Fellowship Poster Session where he presented the numerous benefits of Next Generation Air Traffic Control System, specifically, the Automatic Dependent Surveillance Broadcast System currently being implemented by the FAA.

This provided him an opportunity to share the current events and future technologies being used by the aviation industry with professionals in all areas of the transportation industry.

The following table shows the number of fellowships that have been awarded during the 2006-2009 period.

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>No. of Fellowships</th>
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<tr>
<td>2008-2009</td>
<td>3</td>
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<td>2007-2008</td>
<td>4</td>
</tr>
<tr>
<td>2006-2007</td>
<td>3</td>
</tr>
</tbody>
</table>

Mr. Crawford is currently serving as an Airport Management Intern at the San Jose airport.
National Summer Transportation Institute (NSTI)

Since 2008, ESITAC has played an active role in the School of Business National Summer Transportation Institute (NSTI). At each institute, Professor Carey Freeman, Associate Director (Education) presented an overview of the transportation industry to the high school participants and organized the ESITAC essay contest. The essay contest required students to prepare a paper on a transportation-related topic. The ESITAC awarded cash prizes to the winners of student essay contest:

High School Students Participating in the 2010 STI at Hampton University.

Professor Freeman Distributing Prizes to Winner of the Transportation Essay Competition.
**NSTI Program Evaluation**

The ESITAC conducted an evaluation of the National Summer Transportation Institute (NSTI) to explore its impact on generating interest in transportation for middle and high school students. The objective was to assess whether the students that complete the Hampton University NSTI Program are encouraged to seek additional transportation-related opportunities that will prepare them for careers within the field of transportation. A survey was mailed to former NSTI participants to ascertain the perceived educational value of the program. A total of 37 participants that responded to the survey reported improvement in various skills sets (Figure 4). The exposure to key personnel in the FHWA and VDOT coupled with mentoring and academic enhancement provided by the program’s staff was found to be effective for the students that participated in the NSTI Program. Over 60% of the respondents selected science, technology, engineering and mathematics (STEM) related majors in the college (Figure 5). Consistent with prior research, the mentorship provided during the 4-week summer program was found to be valuable and effective. The exposure to key personnel in the FHWA and VDOT coupled with mentoring and academic enhancement provided by the program’s staff was found effective in enhancing math and technology skills for the participants.

![Figure 4](image1.png)

**Figure 4.** Average agreement scores in improvement of various skills in NSTI.

![Figure 5](image2.png)

**Figure 5.** College majors selected by the participants of NSTI.
TECHNOLOGY TRANSFER

National Conference for Intermodal Transportation 2012
On October 11-12, 2012, ESITAC hosted its 1st National Conference on Intermodal Transportation: Problems, Practices, and Policies on the campus of Hampton University. The Keynote Speaker was Mr. Jeff Keever, Senior Deputy Executive Director, Virginia Port Authority. More than 120 participants including students, faculty members, city planners, and transportation professionals from all over the world participated in the conference. Several technical abstracts were received by the conference technical committee which reviewed all the submissions and made recommendations for inclusion into the conference program. Totally, 34 technical papers were selected for presentation and 14 other topics were selected for the various plenary sessions.

The conference incorporated a wide range of transportation topics including transportation policy, safety, security, environment, infrastructure, simulation, education and workforce development. The conference agenda included an opening session, two plenary sessions, one panel discussion and nine different technical sessions.
On October 1, 2010, ESITAC hosted a Symposium on Transportation Issues and Problems in the Hampton Roads. Around 50 participants including students, faculty members, city planners, and transportation professionals from the Hampton Roads area participated in the symposium. This full-day event started with opening remarks by Dr. Kelwyn D’Souza, ESITAC Director. The Symposium included nine different presentations and a panel discussion on the transportation issues in the Hampton Roads.

The presentations were followed by a panel discussion. The panelists consisted of Mr. Jim Ponticello, Dr. Camelia Ravanbakht, Mr. Timothy Rayner and Dr. Stephen Sharp. The panel was moderated by Dr. Jale Akyurtlu. The symposium’s organizing committee consisted of Dr. Jale Akyurtlu, Mr. Carey Freeman and Dr. Sharad Maheshwari.
CLEARING HOUSE FOR ESITAC ACTIVITIES

ESITAC Website
The Center has maintained its website since 2008. The website includes links that disseminate research and education activities to wider audiences. Abstracts as well as full research reports are posted on the site. Conference proceedings, research publications, lectures and other educational programs are also posted on the website. All published semi-annual newsletters and annual reports to date are available on this website. The address of the website is http://biz.hamptonu.edu/esitac/.

Semi-Annual Newsletter
ESITAC’s Strategic Plan was approved by RITA in December 2007. The first newsletter was published in June 2008. A total of 12 semi-annual newsletters have been published from June 2008 to December 2013. These newsletters provide information on the Center’s activities. It includes articles on transportation research and educational efforts as well as other transportation related activities of the Center. The newsletter is electronically circulated within RITA, USDOT, UTCs, ESITAC partners, and University administrators and faculty.

Annual Report
The Annual Report was published in three parts: Part A Corporate Style, Part B Research Project Status Report, and Part C Performance Indicator Report. The first annual report was published in August 2008 documenting the first two years of activities (June 2006 – May 2008). A total of six annual reports have been published from August 2008 – August 2013.)
Related Workshops and Courses
The Center organized a series of workshops and courses. The participants comprised of transportation officials from local governments, Virginia DOT, organizations, faculty and students. An overview of these courses and workshops are provided in the following sections:

1. Sustaining Our Communities

The 31st Annual Conference on the Black Family took place on March 18-20, 2009 and had the theme of Sustaining Our Communities. The ESITAC organized a panel on Sustainability. Another panel of great interest to ESITAC was organized by Parsons Brinckerhoff (PB) on Sustainable Transportation. The first panel was organized by the ESITAC investigators from the Chemical Engineering Department. The two speakers were Dr. Ates Akyurtlu and Ms. Cynthia Burbank; and Dr. Jale Akyurtlu was the moderator.

Dr. Ates Akyurtlu’s presentation was on Sustainable Manufacturing; covered the meaning of sustainability and its inevitability, and included examples to sustainable chemical processes practiced globally. He mentioned that global warming was mushrooming into a greater threat and the earth’s limited resources such as oil, minerals and usable water were getting depleting; the direly needed sustainable approaches will result in the preservation of the resources and the reduction of the life cycle cost.

Ms. Cynthia J. Burbank’s presentation was entitled Global Climate Change – The Transportation Challenges That Face the US. Ms. Burbank, also, stressed the importance of sustainability with respect to global climate change. She stated that in order to halt the global warming, 80% reduction in CO2 emissions
is needed by 2020; by 2050, vehicles have to be virtually decarbonized. She stated that the highest priority was to maximize the energy efficiency of the current vehicles, invest in decarbonizing vehicles and fuels, and adopt procedures that reward conservation and stimulate technology innovation. She mentioned several simple ways for families to adopt to reduce the emission of greenhouse gases.

2. Context Sensitive Solutions (CSS) – The Pillar of Sustainable Highways

The ESITAC hosted the Parsons Brinckerhoff (PB) workshop entitled, Context Sensitive Solutions (CSS) on April 1, 2009 at the University Student Center. The workshop was presented by Jake Keller, Vice President, Principal Project Manager, Senior Professional Associate at PB and Marsha Kaiser, Vice President and Managing Principal, Place Making Group at PB.

As a leader in development and operation of infrastructure to meet the needs of communities around the world, PB provides strategic consulting, planning, engineering, and construction management services to public and private sector clients. Sustainability can be defined as designing, building, and producing in such a way that the environment will be kept livable for future generations. Climate change has attracted attention of the departments of transportation to the importance of sustainability. Therefore, the idea of designing sustainable highways was explored during the workshop, whose goal was to contest the notion that highways are an obstacle to sustainability.

A total of 46 participants: from PB and its clients and Hampton University faculty members and students from the School of Business and the Department of Chemical Engineering attended the workshop.

The CSS practices were discussed to meet sustainability goals. The application of CSS principles and practices were demonstrated using examples from state departments of transportation. It was clear that three factors, namely, functional requirements, environmental stewardship, and sustainable highways, have to be considered simultaneously; and an optimum highway design solution has to be achieved within the constraints of these factors.
Officials from the City of Virginia Beach, City of Chesapeake, James City County, Virginia Department of Transportation (VDOT), Hampton Roads Transit (HRT) and Federal Highway Administration (FHWA) were among the PB clients that attended the workshop. This was the largest attended CSS workshop with the highest age difference among the attendees. Case studies were developed by teams and lively discussions followed the presentations.

3. National Environmental Policy Act (NEPA) Course

Parsons Brinckerhoff (PB) collaborated with ESIAC to offer a short course on the NEPA process. The course was conducted at Hampton University on February 24, 2010. The NEPA has been a part of the transportation planning process since 1969.

The course discussed the Policy Act, Environmental Impact Statements, and how to design context sensitive transportation solutions required by NEPA. Specifically, how the NEPA umbrella concept influences the transportation decision-making process; the roles and responsibilities of the participants in the NEPA process; the importance of a reasoned, collaborative process when developing and evaluating alternatives; how to balance an array of conflicting interests and values while making transportation project decisions, and the documentation requirements of the NEPA process.

Mr. Stephen Plano and Ms. Nancy Skinner, PB planners and NEPA experts, served as instructors. Around 45 participants attended the course including students, faculty, PB employees, and planners from local government agencies. This mixed group provided useful exchange of ideas, problems and concerns, and mentoring opportunities for our students.
4. Climate Change and its Effects on Transportation Infrastructure
On 4 April 2012, Parsons Brinckerhoff (PB) in collaboration with ESITAC, hosted an educational seminar: Climate Change/Sea Level rise and its Effects on Transportation Infrastructure, at Hampton University. Mr. Joseph Curtis coordinated the seminar for PB. Several noted PB technical experts and university professors with years of experience in the field of climate change addressed the participants.

Ms. Suzanne Johnson, PB, served as panel moderator. Mr. Lewis White, Mr. Ben McFarlane, Dr. Ismail Karatas, and Dr. David Pezza made presentations. The seminar was attended by students, local transportation officials from surrounding cities, and university professors.

5. Workforce Development Workshop
On November 12, 2013, Hampton University hosted a regional workshop on Transportation Workforce Development for Non-Technical Professionals. Around 50 transportation professionals, faculty, and students participated in the workshop. The focus of the workshop was on developing a workforce to meet the rapid changes around the nations that are transforming transportation systems, services, and education.
RESEARCH PRESENTATIONS AND PUBLICATIONS

RESEARCH PRESENTATIONS


Akyurtlu, A. & Akyurtlu, J. “Effect of Ozone and Distance from a Major Roadway on Nitrogen Oxides Concentrations.” The 2nd International Conference on Environmental Pollution and Remediation, Montreal, Quebec, Canada, August 28-30, 2012.


(Left) Dr. Ates Akyurtlu making presentation at the 2nd Int. Conf. on Environmental Pollution and Remediation held at Montreal, Canada. (Right) Dr. Ates Akyurtlu making a presentation at the Urban Environmental Pollution Conference.


D’Souza, K. A. “An Overview of Eastern Seaboard Intermodal Transportation Applications Center (ESITAC) and Research Related to Intersection Traffic Accident Analysis” Civil Engineering Association (CEA) Workshop.


(Left) Dr. Devendra Parmar making a presentation at the 2011 ASNT Fall Conference. (Left Center) Dr. Devendra Parmar making a presentation at the 18th World Congress on Intelligent Transport Systems. (Right Center) Dr. Parmar with Dr. Marvin Hamstad, Conference Chair, 53rd AEWG. Dr. Parmar was the opening speaker at the Conference. (Right) Dr. Devendra Parmar making a presentation at SMT2010.


RESEARCH PUBLICATIONS


Maheshwari, S. K. & D’Souza, K. A. Modeling Traffic Accidents at Signalized Intersections in the City of Norfolk, Virginia. Accepted for publication in Academy of Information and Management Sciences Journal (AIMSJ).


Dr. Ates Akyurtlu (extreme right) demonstrating lab equipment to RITA Site Visit team members: Denise Dunn (L), Lydia Mercado (C), and Dr. Moges Ayele (R).


Above: Artistic vantage point of Varina Enon Bridge
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