REGION II
UNIVERSITY TRANSPORTATION
RESEARCH CENTER

REGION II
New York, New Jersey,
Puerto Rico, Virgin Islands

Marshak Hall, Room 910
The City College of NY
New York, NY 10031

Tel: 212-650-8050
Fax: 212-650-8374
Website: www.utrc2.org

PROGRAM PROGRESS PERFORMANCE REPORT

Submitted to the Office of the Assistant Secretary for Research and Technology

Federal Grant #	DTRT13-G-UTC32
Project Title:	University Transportation Research Center – Region 2
Name of Grant:	University Transportation Center
Program Director:	Camille Kamga, Ph.D., Director UTRC, Assistant Professor of Civil Engineering, The City College of New York, ckamga@utrc2.org, 212-650-8087
Submitting Official:	Penny Eickemeyer, peickemeyer@utrc2.org, 212-650-8074
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Reporting Period End Date:	March 30, 2017
Report Term or Frequency:	Six months

Signature: 

Penny Eickemeyer, Associate Director for Research, UTRC

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This report will cover UTRC's three mission areas: Research, Technology Transfer, and Education for activities that occurred under the Grant# DTRT13-G-UTC32 during this reporting period.

1. ACCOMPLISHMENTS

A. Goals and objectives

a) **Research:** To support the USDOT Strategic Goals and to advance the state of practice in planning and management of regional transportation systems; the research program consists of both agency-initiated and faculty-initiated studies
b) **Education and workforce development:** To improve the knowledge base and approach to problem solving of the region's transportation workforce
c) **Technology transfer:** To increase the awareness and level of information concerning transportation issues facing Region 2 to the education, research and practicing community; disseminate project reports, studies, analysis, and use of tools to the community; and provide unbiased information and testimony to decision-makers concerning regional transportation issues consistent with the UTRC theme.

B. Accomplishments under these goals

a) Research

Continued projects

The following projects continued during the reporting period:

- Accelerated Aging of Asphalt by UV-Oxidation (Manhattan College)
- Activity-Based Approach for the Design of Sustainable Area and Cordon Pricing Schemes (UPR)
- Adaptive Evacuation Transportation Planning Under Uncertainty-SUNY Binghamton
- An Agent-Based Disaster Response Inference Model for Assessment of Transportation Risk under Extreme Events (CCNY)
- An Examination of Commercial Vehicle Access to Residential Buildings in
- New York City (CCNY)
- Approach to Blast Resistant Design of Aging Transportation Structures with Little or No Stand-Off Distance (Manhattan College)
- Building a Sense of Place in an Information Era: Accessibility, Connectivity and Travel (RIT)
- Computational Synthesis of High-Performance Non-Pneumatic Tires (Stony Brook University)
- Crowdshipping: Evaluating its Impacts on Travel Behavior (CUNY)
- Deaf and Hard- of- Hearing Drivers: Making the Highways Safer for Everyone(RIT)
- Developing A Macroscopic Decision Making Tool For Emergency Evacuation Planning (RPI)

- Developing Generalized Linear Mixed Models For The Strategic Highway Safety Planning Process (UPR)
- Development of a New, Effective and Low-cost Media for Sustainable Management of Polluted Road Storm-water in Highly Urbanized Areas (Manhattan College)
- Development of a new connected eco-driving system at signalized intersections with adaptive signal (Polytechnic Institute of NYU)
- Development of Software for Analysis of Traffic Signal Support Structures-RPI (request a quarterly)-Michael Symans
- Disaster Relief Vehicle Routing Under Uncertainty (Binghamton University)
- Do Consumer Expenditures Affect Demand for Driving (Cornell)
- Dynamic Bus Routing Problem for Evacuation (SUNY Buffalo)
- Effects of Foreign Participation in U.S. High Speed Rail Projects(CUNY)
- The Effect of Optimization Strategy and Adoption Rate on V2X Technology Environmental Impact (RIT) Evaluation of Simulation Models for Road Weather Information System (Rowan)
- Efficacy of the Bacteria Encapsulation Concrete Self-Healing Method in a Harsh Environment (Manhattan College)
- Evaluating the Impacts of Real-Time Information on Subway Ridership in New York City (CCNY)
- Incorporating Probe Vehicle Data to Analyze Evacuation Route Resiliency (TCNJ)
- Induced Emissions and Energy Use in Transportation: Use of Social Media Feeds as an IM Support Tool (CCNY, Stony Brook University/ NYSERDA)
- Improve Congestion Performance Measures via Conflating Private and Public Information Sources (NJIT)
- Inferring High-Resolution Individual's Activity and Trip Purposes with the Fusion of Social Media, Land Use and Connected Vehicle Trajectories (SUNY Buffalo)
- Innovative Techniques for Maintenance, Repair and Reconstruction (MRR) of Asphalt Roadways (Syracuse University
- Investigating Public Opinions towards Emerging Transportation Technologies and Service Forms – (RPI)
- Investigation of Boundary Pressures and Internal Stresses in Geofoam Blocks (Syracuse)
- Managing the Daily Operations of a Bike Sharing System Using Mobile Stations – (SUNY Buffalo)
- Measuring Parking Intrusion in New York City Neighborhoods using Parking???? Tickets and Vehicle Plate Registration Data (NYU)
- Mitigation of Transportation Induced Vibration Using Seismic Metamaterials (SUNY Stony Brook)
- Mobile Bridge Scour Monitoring Using Autonomous Underwater Vehicle (Manhattan College)
- Portable and Integrated Multi-Sensor System for Data-Driven Performance Evaluation of Urban Transportation Networks (NYU)

- Potential Hydrodynamic Loads on Coastal Bridges in the Greater New York Area due to Extreme Storm Surge and Wave(CUNY)
- Public Transit and Mandatory Evacuations Prior to Extreme Weather Events in New York City (NYU)
- Recommendations for Improving Fire Performance of Steel Bridge Girders (Manhattan College)
- Risk analysis of autonomous vehicles in mixed traffic streams (Rowan)
- Secure and Private Sensing for Driver Authentication and Transportation Safety (NYIT)
- Securing Inter-Vehicular Networks with Time and Driver Identity Considerations (NYIT)
- Simulation of Automated Vehicles' Drive Cycles (SUNY New Paltz)
- Spectral Based Controllability-preserving Pedestrian Evacuation Network Synthesis Using Multilayered Estimation Models in Real-time (SUNY Maritime)
- The socialization of travel: the effects of traveler social networks on resiliency in traffic networks(RIT)
- The Spatial Effect of Socio-Economic Demographics on Transit Ridership: a Case Study in New York. (Manhattan College)
- Techniques for Efficient Detection of Rapid Weather Changes and Analysis of their Impacts on a Highway Network(SUNY Albany)
- Understanding Transit Finance: An Analysis of Transit Funding Around the World (Columbia)
- Urban Travel Time Variability: Spatio-Temporal Analysis for New York City (SUNY Stony Brook)
- Using visual information to determine the subjective valuation of public space for transportation: application to subway crowding costs in NYC-(Cornell)
- Utilizing Digital Exhaust from Smartphone Applications for Transportation Planning, Continuous Measurement and Market Analysis (CUNY)

Completed Projects

The following projects were completed during this reporting period:

- Alkali Silica Reaction (ASR) In Cement Free Alkali Activated Sustainable Concrete (Clarkson)-
- A Probability-Based Approach for Assessment of Roadway Safety Hardware (Manhattan College
- Assessing NJ Transit's Mobile App for Users' Receptiveness (CCNY/NJDOT) *CIDNY Task 2 - Develop a multi-agency/multi modal construction management tool (Polytechnic Institute of NYU, CCNY) *
- CIDNY Task 5 - Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal (Polytechnic Institute of NYU, University at Buffalo)
- CIDNY Task 6 - Strategic ITS Deployment Plan for New York City (CCNY, Stony Brook University)

- CIDNY Task 7 - Research on Pedestrians and Cyclists Safety Using ITS Technology in NYC (Polytechnic Institute of NYU)
- CIDNY Task 8 - Develop Data Storage and Access Platform for MTA Bus Time Data (Polytechnic Institute of NYU) *
- Drainage Identification Analysis and Mapping, Phase 2 – NJIT-complete
- Freight costs at the curbside
- Heterogeneous Regional Traffic Signal Control (SUNY at Buffalo)
- Hunts Point Terminal Market: The Feasibility of Waterborne Transportation (SUNY Maritime, CCNY/NYSERDA)
- Impact of Polymer Modification on Mechanical and Viscoelastic Properties of Binders (Rowan)
- Improving Cross- Frame Design to Reduce the Effects of Skew in Steel I- Girder (TCNJ)
- Innovative Travel Data Collection - Planning for the Next Two Decades (University at Albany/ NYMTC)
- Market Potential For Battery Electric Vehicles Based On Multi-Day Activity-Travel Patterns (University at Buffalo)
- Monitoring Infiltration Capacity of Different Types of Permeable Pavement (Manhattan College)*
- Regional Financing Options Study (CUNY (CSI)/NYMTC)
- Self-Heated Pavements (Stony Brook University)*
- Smart Bus System under Connected Vehicles Environment (NJIT) *
- Transportation Infrastructure Robustness: Analysis and Measurement (CCNY)*
- Using Mobile Computers to Automate the Change Order Decision Making Process and Improve Total Time and Cost Predictions on Highway Construction Projects (UPR) *
- Worker Safety Issues of WiFi Devices (TCNJ/NJDOT) complete*

*Completed in draft

Examples of Activity this period:

<u>Agency-sponsored NJDOT</u>

- **Assessing NJ TRANSIT's Mobile App for Users' Receptiveness to Geotargeting**

The overarching goal of this project is to assess NJ TRANSIT customer receptiveness to geotargeting, which refers to the practice of offering customized content to users based on the location of their mobile device when used to access an application.

During this period, the survey was conducted of current NJ TRANSIT app/MyTix users to understand customer reactions and receptiveness to geo-targeting through its mobile app to explore whether customers have concerns about privacy or intrusiveness or whether certain types of notifications within this platform would be more or less acceptable. A total of 1256 useable responses were received. The results were weighted, statistical analysis of the responses was conducted and a draft, final report was submitted.

NYCDOT/NYSDOT

- **CIDNY- Coordinated Intelligent Transportation Systems Deployment in New York City**

Final presentations were given in January 2017. Comments were solicited from agency partners and incorporated as needed.

Task 2- Develop a multi-agency/multi modal construction management tool (Polytechnic Institute of NYU, CCNY)

The objective of this research project is the evaluation of the Construction Impact Analysis (CIA) tool designed and developed by Washington State Department of Transportation (WSDOT).

During this reporting period, the draft report was developed.

Task 5- Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal (Polytechnic Institute of NYU, University at Buffalo)

This project is to develop a comprehensive guide to signal timing, new detection technologies and advanced signal timing concepts applicable in New York City. The final report was completed during the quarter.

Task 6 – Strategic ITS Deployment Plan for NYC (CCNY, NYU)

This project is to review and update the strategic ITS Deployment Plan for New York City regarding three key areas required for ITS deployment in the City: NYCDOT ITS Implementation Strategy, the NYCDOT Five-Year ITS Deployment Plan and the NYC Sub-Regional ITS Architecture (NYCSRA). During this period, the final report was completed.

Task 7- Pedestrians and Cyclists Safety Using ITS Technology in NYC (NYU)

The objective of this task is to research various ITS technologies for implementation in NYC for bike and pedestrian safety and make recommendations about where and when they should be placed. The Final report was completed during this period.

Task 8- Develop Data Storage and Access Platform for MTA Bus Time Data

This project has three main objectives:

- Develop efficient data acquisition, storage, maintenance and querying procedures to automate and improve the overall process of using MTA bus data.
- Create a web-based application that takes advantage of the MTA's on- going in house data development efforts as well NYU CUSP's extensive resources and expertise in the area of big data management.
- Provide recommendations to incorporate this developed app and its functionalities into existing NYCDOT protocols and operations.

The final report was completed.

NYSDOT

Development of Software for Analysis of Traffic Signal Support Structures

The objective of this project is to develop a computer program to perform load and stress analyses of existing and proposed span wire and mast arm traffic signal installations. The program will check strength and serviceability requirements of the latest AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and the NYSDOT Specifications.

During this period, existing software was re-organized for easier use, a review of software for performing capacity assessment of damaged poles (DPOLES software was also undertaken.

UTRC-Sponsored Research:

Focus Area: Promoting freight productivity, efficiency, and sustainability through multi-modal policy, planning, and logistics

- **An Examination of Commercial Vehicle Access to Residential Buildings in New York City**
  This study will identify what, if any, unique challenges exist for commercial vehicle access to residential buildings, and what externalities may result from differences in parking behavior at these locations. Findings from this analysis will be evaluated in the context of a growing body of international city logistics solutions to identify potential urban policy, parking regulation, and supply chain approaches to better accommodate goods deliveries to residential buildings in New York.

  During the reporting period, data analysis and collection were completed.

Focus Area: System modernization through implementation of advanced and information technologies

- **Evaluating the Impacts of Real-Time Information on Subway Ridership in NYC**
  An extensive literature review pertaining to the passenger benefits of real-time transit information was conducted. More than thirty academic and industry references on this topic were compiled and summarized to identify key themes in the literature. The literature review has now been written up in the form of a journal paper.

- **Managing the Daily Operations of a Bike Sharing System Using Mobile Stations**
  This project is to develop a novel, integrated framework for operating a mobile bike sharing system for mobile stations. To do so, the research will determine the optimal location for fixed and mobile stations, the number of bikes to be added or removed from each station every time period to satisfy the demand/supply needs, and the redistribution logistics while optimizing operational costs.

The model for locating the mobile and fixed bike stations as well as the model for redistributing the bicycles were developed and implemented. The literature review is fully documented.

Focus Area: Planning, monitoring, and implementation of communications and other technologies to understand and improve multi-modal transportation safety

- **Risk Analysis of autonomous vehicles in mixed traffic streams**

  The evolution in computing, communication and vehicular technologies has resulted in connected and autonomous vehicles. Due to its potential of significantly reducing highway crashes, fatality rates and improving quality of life, the autonomous vehicles are viewed as the next revolution in the transportation system by both private sector and public agencies.

  The research team finalized the survey tools (questionnaires, invitation email, and consent forms) to release survey. Also, based on the fault tree results, the research team established the strategies to minimize the risks associated with the vehicle automation.
  The team developed the framework of the benefits costs analysis to evaluate the identified risk minimization strategies.

- **Heterogeneous Regional Signal Control (Buffalo)**

  One critical task in regional traffic signal operations is how to establish different objectives and policies for varying arterial or subnetwork types. A typical urban network usually consists of different subnetwork types, such as the central business district (CBD), suburban areas, and rural areas. The heterogeneous objective naturally arises for traffic signal operations on such different subnetworks, but there is little in the literature that explicitly addresses the signal control problem in heterogeneous subnetworks. The objective of this project is to develop a mathematical framework to model a heterogeneous objective traffic signal control for different subnetworks.

  During this period, the researchers have finished a paper for network traffic signal control with a game theoretic approach. They are working on another paper for network traffic signal control with Cell transmission model.

- **Secure and Private Sensing for Driver Authentication and Transportation Safety**

  Research is looking into an approach to data collection for commercial driving applications and vehicle safety that puts users in control of how their information is used. By collecting local driving data in a manner that is decoupled from critical car components and Internet connections, the system will support a large variety of transportation applications without sacrificing vehicle security or driver privacy. This research will identify characteristics which uniquely categorize individuals' driving behavior and what set of sensing hardware is required to collect them. This information will be used to construct a model of user driving activity that can be applied to ensure that drivers are operating their vehicle in a safe and consistent manner.

One goal of this research is to explore how organizations can take full advantage of heterogeneous sensing by sharing and analyzing sensor data from different infrastructures in a secure and privacy-preserving manner. The methodology for this research involves a survey using simulation. The researchers recently finished both a smaller survey, and a larger scale study using simulation, performed a comprehensive analysis of the resulting data, and worked on final results and report.

Focus Area: Infrastructure design, monitoring, inspection, and management to ensure a State of Good Repair

- **Innovative Techniques for Maintenance, Repair, and Reconstruction (MRR) of Asphalt Roadways**

  The purpose of this study is to:

  1. Investigate various innovative maintenance, repair, and reconstruction techniques that can be used to improve condition levels of asphalt roadways in consideration of economic, social, and environmental impacts,
  2. Identify the important factors that affect the decision making procedures for selecting the most appropriate maintenance, repair, and reconstruction technique for asphalt roadways,
  3. Develop a high-level decision support tool that will allow evaluation of maintenance, repair, and reconstruction alternatives for asphalt roadways

  The research team is currently working on the decision support system and preparing the final report. They are also working on expanding our initial survey to city level agencies.

- **Portable Bridge Scour Monitoring Using Autonomous Underwater Vehicles: Technology Development And Risk Assessment-Based Platform For Deployment Prioritization**

  The purpose of this research is to present a cost effective technology to conduct bridge scour assessment using autonomous underwater vehicles.

  So far an extensive study of suitable sonars has been conducted. The selection was a combination of a mechanically steered, commercial grade 3-D sonar imager (MSR900 from EchoLogger) with an electronically steered, consumer grade fish finder imager (Humminbird HELIX 9 Chirp MEGA Si GPS G2N), expected to provide excellent performance and flexibility. At this point the researchers have developed navigation software based upon the IvP Helm application in the MOOS-IvP (http://oceanai.mit.edu/ivpman/pmwiki/pmwiki.php) system designed for autonomous underwater vehicles. It is designed to navigate to specified waypoints while avoiding obstacles. They have mounted cameras on the vessel and have begun capturing video into the Jetson TX1 embedded computer. Annular LED lighting and driver circuits have been developed. Progress has also been made in the machine learning portion of the project by interpreting sonar images and classifying bridge piers based upon the data presented. In addition, the research team is constructing a database of New York

bridge information pertinent to scour risk assessment**.** The NBI database lacks several important information required for scour risk assessment. This includes, for example, the detour length of the bridge in many cases. Currently, work on this is focused on gathering relevant information from alternative sources.

Focus Area: Promoting livable and sustainable communities through quality of life improvements and diverse transportation development

- **Activity-Based Approach for the Design of Sustainable Area and Cordon Pricing Schemes**

  This proposal combines state-of-the-art operations research techniques with the most recent knowledge in travel behavior science to develop a methodology for the optimal design of ACP (Area and Cordon-Based Pricing) schemes. It considers:
  (1) Behavioral aspects of travelers' activity, schedule, and time-use preferences at a disaggregate level
  (2) The space-time distribution of pollutants along with the space-time distribution of travelers, and (3)planning goals related to system-wide congestion levels and public health. A disaggregate agent-based travel behavior model and a multi-objective solution method for ACP problems are proposed as part of the design framework, which will be tested with data from New York City.

  Completed: During the reporting period, pollutant concentrations were estimated. Work continued on integrating several models that were developed by both PIs.

- **The Spatial Effect of Socio-Economic Demographics on Transit Ridership: a Case Study in New York.**

  Preliminary analysis of general mass transit usage based on census data has been conducted. Transit usage and select socio-economic data has been collected at the census tract level. A geocoded database has been created to house the socio-economic data. This data have been prepared for coding in the statistical computing and graphics software "R". Subway ridership will subsequently be added when finalized.

Focus Area: Securing transportation systems and improving planning for and response to extreme events

- **Public Transit and Mandatory Evacuations Prior to Extreme Weather Events in NYC**

  This project is to evaluate public transit services in areas considered to be at high risk for flooding in New York City and to provide a tool that can help transportation planners and city officials improve these services during evacuations. The research will also look at the characteristics of public transit in Zone 1 evacuation areas in relation to the socioeconomic characteristics of the communities that live there.

During this period, database organization and refinements for transit locations, flooding, and selected demographic data have been completed. The data analysis plan and analysis of the data is continuing. The project is also anticipating leveraging a jobs data base at the block group level for NYC to incorporate into the evacuation study to supplement residential location.

- **Incorporating Probe Vehicle Data to Analyze Evacuation Route Resiliency**

  The objective of this project is to 1)investigate various innovative maintenance, repair, and reconstruction techniques that can be used to improve condition levels of asphalt roadways in consideration of economic, social, and environmental impacts, 2) identify the important factors that affect the decision making procedures for selecting the most appropriate maintenance, repair, and reconstruction technique for asphalt roadways, and 3) develop a high-level decision support tool that will allow evaluation of maintenance, repair, and reconstruction alternatives for asphalt roadways.

  During this quarter, the research team worked on and submitted a paper to be presented at the TRB Annual Meeting. Also, initial findings of the research was presented at the Eighth International Conference on Maintenance and Rehabilitation of Pavements (MAIREPAV) in Singapore (27-29 July 2016).

- **An Agent-Based Disaster Response Inference Model for Assessment of Transportation Risk under Extreme Events**

  Recent events such as Hurricane Irene and Superstorm Sandy have revealed vulnerability to intense precipitation within the transportation sector. For regional resiliency, one has to understand the exposure of regional network/systems to correlated risks or simultaneous extremes, which can then support emergency management division in creating more effective disaster relief and response systems. Current disaster relief studies mostly focus on simulating traffic flow on the network or evaluating different dispatching and vehicle routing scenarios in response to disaster; it is not prognostic with underlying climate information. There is a necessity to understand the underlying reasons which generates the spatial-temporal demand. There is also a necessity to forecast, based on climate, individual level behavior and their nodal functions during a simultaneous extreme rainfall event. During the quarter, the researchers developed a model to predict ridership for subway stations in Manhattan when rain falls. They developed a hierarchical Bayesian Poisson Regression Model to predict ridership using the time of the day and previous hours of rainfall. Results indicated that ridership has significant negative sensitivity to rainfall for stations with residential land-use and an insignificant decrease for stations with commercial land-use.

- **Disaster Relief Vehicle Routing under Uncertainty**

  During the quarter, the research team completed the literature review and model and algorithm development. A conference paper was presented, and preliminary results were produced. A journal paper is expected to be submitted during the next reporting period.

b) Education and workforce development

During this period, UTRC accomplished the following:

- **NYMTC/UTRC September 11th Memorial Program Academic Initiative:**
  The two interns who were selected in July 2016 began their internship projects during this period. Preparation began in March for the upcoming selection process for the 2017-18 program. Two additional students will be funded.
- **Advanced Institute for Transportation Education (AITE):**
  During this period, eleven AITE scholarship awards were given, representing seven consortium institutions as follows:
  - NYU Tandon School of Engineering -2
  - NYU Center for Urban Science and Progress (CUSP) – 1
  - NYU Wagner – 1
  - New York Institute of Technology- 1
  - Rowan University- 1
  - Hunter College-2
  - SUNY Albany -3

c) Technology Transfer

Past Events

2016 Transportation Technology Summit: Innovative Mobility Solutions
November 16, 2016

This summit was co-sponsored by UTRC and held at The New York Institute of Technology, a UTRC member institution. The event brought together leading experts, academics, practitioners, industry stakeholders and advocates to discuss the rapidly changing and expanding world of transportation technology innovative solutions. The presenters explored the cutting-edge intelligent transportation systems, big data aggregation, and innovative transportation technology solutions to promote efficiency, safety, security and sustainability goals, as well as the impact on broader inter-modal and multi-modal transportation considerations. The summit encouraged forward thinking innovative concepts and addressed the pragmatic political reality of various movements (such as climate change/environmental policies and safety initiatives for reduced traffic fatalities).

ITS Travel Information Systems & Mobile Applications For Enhanced Transport
December 10, 2016, New York Institute of Technology

UTRC sponsored this half day event, organized by NYIT on December 10, 2016. The event's speakers presented on how innovations in ITS and apps for mobile devices are transforming the way traffic and transit data are communicated to customers in real time. While some innovations are quickly adopted by end-users, in particular those focusing on vehicle technologies /software; others require infrastructure investments and coordination with city and transportation planners before being implemented. This workshop focused on emerging technologies that increase multi-modal transport options and reduce traffic congestion, and associated emissions, and how innovations align with current transportation plans, and serve different constituencies, including people with special mobility needs.

Connected & Autonomous Vehicles Symposium
December 8-9, 2016, New York University, Brooklyn, NY

UTRC's Fifth Symposium on Connected and Autonomous Vehicles was held in New York City (on the campus of NYU Tandon School of Engineering in Brooklyn) on December 8-9, 2016. It focused on social, economic, environmental and safety benefits of connected and autonomous vehicles. New York City's current efforts to demonstrate vehicle-to-vehicle and other communication technology as part of USDOT's Connected Vehicle Pilot Deployment Program was highlighted along with talks on efforts at the other two USDOT deployment locations in southern Wyoming and Tampa, Florida.

The day included panels on Autonomous Vehicles for Smart Cities; Connected Vehicles for Transit; Safety and Long-Term Impacts of CV/AV; and CV/AV for Freight.

UTRC's co-sponsoring partners included NYU Tandon School of Engineering; NYU Center for Urban Science and Progress; Princeton University; SUNY Polytechnic Institute; and Transportation Informatics (TRANSINFO) at the University at Buffalo.

Moving Goods and People to, from, and along the Brooklyn Waterfront
March 31, 2017, Borough Hall, Brooklyn, New York

This joint, full day conference, sponsored by UTRC and the Brooklyn Waterfront Research Center from the New York City College of Technology, included a comprehensive conversation about the transportation needs of the communities, businesses, and visitors along the Brooklyn waterfront. The lunchtime keynote was Congressman Jerrold Nadler. Panelists included representatives of maritime industries, representatives from waterfront communities, developers of residential, commercial, and industrial properties, and transportation scholars. See BrooklynEagle.com article

Newsletter publications

The Fall 2016 issue of *UTRC Research News* was released during the reporting period.

d) Opportunities for Training and Development

Our seminars and workshops are designed to educate the transportation community on current issues in policy and best practices as well as foster meaningful discussion on these topics. We

also provide funding to the September 11th Memorial Program to select current students to serve in internship positions in regional and local agencies to enhance their educational experience.

- NYSAMPO

UTRC, through the CUNY School of Professional Studies is continuing to develop and offer courses per NYSAMPO's needs for training of staff from MPOs throughout New York State.

e) Dissemination of results:

- Quarterly Reports on project progress
- Completed final reports
- Papers and conferences

f) Plans for next reporting period:

- Video clips on completed projects are expected to be posted during the next reporting period. These projects include:

  Innovative Travel Data Collection- Catherine Lawson, PI, SUNY Albany
  CIDNY Reports- Tasks 2, 5, 6, 7, 8

2. PRODUCTS

Final reports, conference presentations, conference papers.

3. Participants and Collaborating Organizations						
Partner (University)	**Agency Sponsor**	**Location**	**Project(s) (#funded)**	**Contribution**	**Other Collaborators**	**Role**
Clarkson	N/A	Potsdam, NY	Faculty initiated -1(27),	research		
Cornell	N/A	Ithaca, NY	Faculty-initiated -2 (26) complete, 1 (27)	research		research
Cornell	NYMTC	Ithaca, NY	Agency-initiated-1(26)	Technical support		
Cornell	N/A	Ithaca, NY	Agency-initiated-1(28)	research		
Columbia	N/A	New York, NY	Faculty-initiated -1 (27) 1 (26)	research	Manhattan	research
CUNY:						
CCNY	N/A	New York, NY	Fac. Init 1(28)	Emerging scholar		
CCNY	N/A		Faculty- initiated-3(27) 1(28) 2(26) complete,	research	RPI	research
CCNY	NJDOT	New York, NY	Agency initiated-1	research		
CCNY	NYSERDA		Agency-initiated-3 (26), 1 (28)	research	SUNY Stony Brook	research
CCNY	NYSERDA		Agency-initiated (complete)	tech transfer		
CCNY	NYSDOT/NYSERDA		Agency-initiated	Research	Stony Brook, Maritime	Research, CIDNY
CCNY	NYMTC	New York	Agency	Tech support		
CSI/CUNY	NYMTC	New York	Agency-Initiated-1(27)	research		

CSI/CUNY	N/A	New York	Faculty-initiated-(28)	research		
Partner (University)	**Agency Sponsor**	**Location**	**Project(s) (#funded)**	**Contribution**	**Other Collaborators**	**Role**
John Jay College	N/A	New York	Faculty-initiated-(28)	research		
CUNY SPS	NYSAMPO		Agency-initiated	Workforce development		
Manhattan College	N/A	Bronx, NY	Faculty-initiated-3 (26), 1(28)	research		
Manhattan College	N/A	Bronx, NY	Faculty-initiated-4(28)	Emerging investigator		
NJIT	NYMTC	New York	Agency	Tech-Support		
NJIT	N/A	Newark, NJ	Faculty-initiated-1(27), 1 28)	research		
NJIT	NJDOT	Newark NJ	Agency initiated-1(26)	research		
NYIT	N/A	New York, NY	Faculty-initiated-1 (26). 1(28)	research		
NYU	N/A	New York, NY	Faculty- initiated- 1-(27) 1 (26)	research		
NYU		New York	1(27), 1 (28)	Ed/Tech		
NYU/ Tandon Sch. Engr.	NYCDOT, NYSDOT	New York, NY	Agency initiated-4	Research, CIDNY	CCNY(1), UB(1)	research
NYU/ Tandon Sch. Engr	N/A	New York, NY	Faculty-initiated (28) 1(26)	research		
RIT	N/A	Rochester, NY	Faculty-initiated-1			
RIT	N/A	Rochester, NY	Fac. initiated. (2) -28	Emerging invest.		
RIT	N/A	Rochester, NY	Fac. Initiated-1-(27)	Edu/Tech		

Rowan University	N/A	Glassboro, NJ	Faculty initiated-, 1 (27), 1 (28) 1 (26)	research		
Rowan University	N/A	Glassboro, NJ	Faculty-initiated	Ed-tech		
Partner (University)	**Agency Sponsor**	**Location**	**Project(s) (#funded)**	**Contribution**	**Other Collaborators**	**Role**
RPI	NYSDOT, NJDOT	Troy, NY	Agency-initiated 2(27),	research		
RPI	N/A	Troy, NY	Faculty- initiated-1(27), 1 (28) 1(26)	research		
SUNY:						
Albany	NYMTC NYSDOT	Albany, NY	Agency-initiated-2	Research/ technical support		
Buffalo		Buffalo, NY	Faculty-initiated- 1(27)	research		
Buffalo		Buffalo, NY	Faculty-initiated 1(27)-2 (28)	Emerging invest		
Buffalo		Buffalo, NY	Fac. Initiated -2 (28), 1(26)	Educ/tech trans		
Buffalo	NYSDOT/NYCDOT		Agency-initiated 1 (26)			NYU
Binghamton		Binghamton, NY	Faculty-initiated-1	research		
Binghamton		Binghamton	Faculty-initiated-1(28)	Emerg invest		
New Paltz		New Paltz, NY	Faculty-initiated-1(complete)	research		
New Paltz	N/A	New Paltz, NY	Faculty-initiated-1(28)	Emerging invest.		
Stonybrook	N/A	Stonybrook, NY	Faculty-initiated-1 (27), 1-(28)	research		

Stonybrook	NYSDOT/NYCDOT	Stonybrook, NY	CIDNY 2 (26)	research		
Stonybrook	N/A	Stonybrook, NY	Faculty-initiated(28)-1	Emerging Inves.		
Maritime	NYSERDA	Throggs Neck, NY	Agency-initiated-2(26)	Research	CCNY	research
Maritime	N/A	Throggs Neck, NY	Faculty-initiated-1	Research		

3. Participants and Collaborating Organizations

Partner (University)	**Agency Sponsor**	**Location** (see attached)	**Project(s)** (# funded)	**Contribution**	**Other Collaborators**	**Role**
Syracuse	N/A	Syracuse, NY	Faculty - initiated-), 1 (28)	research		
Syracuse	N/A	Syracuse, NY	1(28)	Ed/tech		
The College of New Jersey	NJDOT	Trenton, NJ	Agency-initiated-1(27)	research		
The College of New Jersey	N/A	Trenton, NJ	1(28)	Emerg invest.		
University of Puerto Rico	N/A	Mayaguez PR	Faculty-initiated- 1 (27), 1 (26)	research		
UPR	N/A	Mayaguez PR	Faculty- 1 (28) initiated	Emerg invest		
Agency Partners:						
NYSERDA		Albany, New York				
NYMTC		New York, NY				
NYMTC		New York, NY				
NYSDOT		Albany, NY				
NJDOT		Ewing, NJ				
NYCDOT		New York, NY				
Port Authority of NY/NJ		New York, NY				
ITS-New York						
NYSAMPO						

Partners and Location

Partner	Street	City, State, Zip
Clarkson	8 Clarkson Avenue	Potsdam, NY 13699
Cornell	Cornell University	Ithaca, NY 14853
CCNY	160 Convent Avenue	New York, NY 10031
John Jay College	524 W. 59th Street	New York, NY 10019
Queens College	65-30 Kissena Blvd	Flushing New York 11367
CUNY Graduate Center	365 5th Avenue	New York, NY 10016
NYIT		
NJIT	323 Martin Luther King Blvd	Newark, NJ 07103
NYU	726 Broadway #350	New York, NY 10003
NYU/POLY	6 Metrotech Center	Brooklyn, NY 11201
RPI	110 8th Street	Troy, NY 12180
RIT	One Lomb Memorial Dr	Rochester, NY 14623
Rowan	201 Mullica Hill Rd	Glassboro, NJ 08028
SUNY Binghamton		
SUNY Buffalo	12 Capen Hall	Buffalo, NY 14260
SUNY New Paltz		
Stony Brook	100 Nicolls Rd	Stonybrook, NY 11794
SUNY Maritime	6 Pennyfield Avenue	Throggs Neck, NY 10465
Stevens Institute of Technology	9th Street	Hoboken, NJ 07030
Syracuse University	303 University Pl #335	Syracuse, NY 13244
University of Puerto Rico	Puerto Rico, 65	Mayaguez 00860
Agencies:		
NYSDOT	50 Wolf Road	Albany, New York 12205
NYSERDA	17 Columbia Circle	Albany, New York 12203-6399
NYMTC	199 Water Street	New York, New York 10038
NYCDOT	55 Water Street	New York, New York 10041
NJDOT	1035 Parkway Avenue	Trenton, NJ 08625
NYCDOT	55 Water Street	New York, NY
PANYNJ	225 Park Avenue South	New York, NY 10003
ITS-NY	14 Loveland Court	Cranbury, NJ 08512
NYCT	2 Broadway	New York, NY 10004

Projects by Partner

Partner	Projects					
USC/Volvo						
Clarkson	Alkali Silica Reaction (ASR) in Cement Free Alkali Activated Sustainable Concrete					
Columbia	Characterization and Modeling of Photon Absorption in Asphalt Materials	Understanding Transit Finance: An Analysis of Transit Funding Around the World	Intelligent Wireless Charging for Electric Buses in Smart City			
Cornell	Evaluating the Role of Private Investment in Life Cycle Management of NYS Infrastructure Assets	Analyzing Willingness to Improve the Resiliency of New York City's Transportation	PPS-AQ and PPS-CMP hosting, maintenance, backup and technical support	Phase 2 Biological Control of Invasive Phragmites australis	Using visual information to determine the subjective valuation of public space for transportation: application to subway crowding costs in NYC	
CCNY	Feasibility of Lane Closures Using Probe Data	Freight Costs at the Curbside	Assessing NJ Transit's Mobile App for Users' Receptiveness	CIDNY Task 2 Develop a multi-agency/multi modal construction management tool	Task 6- Strategic ITS Deployment Plan for New York City	Transportation Infrastructure Robustness: Analysis and Measurement
CCNY Continued	Hunts Point Terminal Market: The Feasibility of Waterborne Transportation	Induced Emissions and Energy Use in Transportation: Use of Social Media Feeds as an IM Support Tool	An Agent-Based Disaster Response Inference Model for Assessment of Transportation Risk under Extreme Events	An Examination of Commercial Vehicle Access to Residential Buildings in New York City	Evaluating the Impacts of Real-Time Information on Subway Ridership in New York City	Potential Hydrodynamic Loads on Coastal Bridges in the Greater New York Area due to Extreme Storm Surge and Wave -

CCNY Continued	Accommodating Freight in Complete Streets Guidebook	Potential Hydrodynamic Loads on Coastal Bridges in the Greater New York Area due to Extreme Storm Surge and Wave	Crowdshipping: Evaluating its Impacts on Travel Behavior-	Activity-Based Approach for the Design of Sustainable Area and Cordon Pricing Schemes	Utilizing Digital Exhaust from Smartphone Applications for Transportation Planning, Continuous Measurement and Market Analysis	NYC Connected Vehicle Deployment Project
	Online Learning Program for Staff of New York State's Metropolitan Planning Organizations					
The College of Staten Island	Regional Financing Options Study	Utilizing Digital Exhaust from Smartphone Applications for Transportation Planning, Continuous Measurement and Market Analysis				
Manhattan College	Characterization and Modeling of Photon Absorption in Asphalt Materials	Development of a New, Effective and Low-cost Media for Sustainable Management of Polluted Road Storm-water in Highly Urbanized Areas	A Probability-Based Approach for Assessment of Roadway Safety Hardware	Approach to Blast resistant Design of Aging Transportation Structures with Little or No Stand - Off Distance	The Spatial Effect of Socio-Economic Demographics on Transport Ridership: A case study in New York	
NJIT	Hosting, maintenance and support for NYMTC PIMS	Feasibility of Lane Closures Using Probe Data	Smart Bus System under Connected Vehicles Environment	Improve Congestion Performance Measures via Conflating Private and Public Information Sources		
NYIT	Traffic Prediction using Wireless Cellular Networks	Secure and Private Sensing for Driver Authentication and Transportation Safety	Securing Inter-Vehicular Networks with Time and Driver Identity Considerations			

NYU (includes NYU/Poly)	Development of a new connected eco-driving system at signalized intersections with adaptive signal	Measuring Parking Intrusion in New York City Neighborhoods Using Parking Tickets	CIDNY Task 2 Develop a multi-agency/multi modal construction management tool	CIDNY Task 5 - Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal	CIDNY Task 7 - Research on Pedestrians and Cyclists Safety Using ITS Technology in NYC	
NYU (Continued)	CIDNY Task 8- Develop Data Storage and Access Platform for MTA BusTime Data	CIDNY Task 5- Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal	Public Transit and Mandatory Evacuations Prior to Extreme Weather Events in New York City	Portable and Integrated Multi-Sensor System for Data Driven Performance Evaluation of Urban Transportation Networks -CUSP		
RPI	Investigating Temporal Effects on Truck Accident Occurrence and Severity Level in NYC	Freight Costs at the Curbside	Analysis of Energy Efficient Highway Lighting Retrofits	Optimizing Work Zone Lighting	Developing A Macroscopic Decision Making Tool For Emergency Evacuation Planning	LED Roadway Lighting Benefits and Costs Collaboration
RIT	Building a Sense of Place in an Information Era: Accessibility, Connectivity and Travel	The Effect of Optimization Strategy and Adoption Rate on V2X Technology Environmental Impact	The Socialization of Travel: The Effects of Traveler Social Networks on Resiliency in Traffic Networks			
Rowan	Impact of Polymer Modification on Mechanical and Viscoelastic Properties of Binders	Risk analysis of autonomous vehicles in mixed traffic streams				

SUNY						
Stony Brook	CIDNY Task 6-Strategic ITS Deployment Plan for New York City	Induced Emissions and Energy Use in Transportation: Use of Social Media Feeds as an IM Support Tool	Self-heated Pavements	Computational Synthesis of High-Performance Non-Pneumatic Tires	Nano- modified geopolymers for concrete infrastructure rehabilitation	Mitigation of Transportation Induced Vibration using Seismic Metamaterials
	Urban Travel Time Variability: Spatio-Temporal Analysis for New York City					
Buffalo	CIDNY Task 5-Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal	Market Potential For Battery Electric Vehicles Based On Multi-Day Activity-Travel Patterns	Heterogeneous Regional Traffic Signal Control	Dynamic Bus Routing Problem for Evacuation,	Educating binational transportation networks, freight movements, and economic impacts	Managing the Daily Operations of a Bike Sharing System Using Mobile Stations
Maritime	Hunts Point Terminal Market: The Feasibility of Waterborne Transportation	Spectral Based Controllability-preserving Pedestrian Evacuation Network Synthesis Using Multilayered Estimation				
Albany	Innovative Travel Data Collection - Planning for the Next Two Decades	Technical Support for Use of National Performance Management Research Data Set	Techniques of Efficient Detection of Rapid Weather Changes and Analysis of their Impacts on a Highway Network			
Binghamton	Disaster Relief Vehicle Routing Under Uncertainty	Adaptive Evacuation Transportation Planning Under Uncertainty				

New Paltz	Simulation of Automated Vehicles Drive Cycles					
Syracuse University	Innovative Techniques for Maintenance, Repair and Reconstruction (MRR) of Asphalt Roadways	A Workshop on Implementation of Asset Management Principles for Local Street Network	Investigation of Boundary Pressures and Internal Stresses in Geofoam Blocks			
University of Puerto Rico	Developing generalized linear mixed models for the strategic highway safety planning process	Using Mobile Computers to Automate the Change Order Decision Making Process and Improve Total Time and Cost	Activity-Based Approach for the Design of Sustainable Area and Cordon Pricing Schemes			
The College of New Jersey	Worker Safety Issues of WIFI Devices	Improving Cross- Frame Design to Reduce the Effects of Skew in Steel I- Girder	Incorporating Probe Vehicle Data to Analyze Evacuation Route Resiliency			

Projects by Partner						
Partner	**Projects**					
Agencies:						
NYSDOT	Analysis of Energy Efficient Highway Lighting Retrofits	Technical Support for Use of National Performance Management Research	CIDNY Task 2 Develop a multi-agency/multi modal construction management tool			
NYSERDA	Hunts Point Terminal Market: The Feasibility of Waterborne Transportation	Induced Emissions and Energy Use in Transportation: Use of Social Media Feeds as an IM Support Tool	Eco-Driving Conference			
NYCDOT	Task 6- Strategic ITS Deployment Plan for New York City	CIDNY Task 5 - Develop a Comprehensive Guide to Signal Timing, New Detection and Advanced Signal	CIDNY Task 7 - Research on Pedestrians and Cyclists Safety Using ITS Technology in NYC	CIDNY Task 8- Develop Data Storage and Access Platform for MTA Bus Time Data		
NJDOT	Assessing NJ Transit's Mobile App for Users' Receptiveness	Optimizing Work Zone Lighting	Worker Safety Issues of WIFI Devices			
NYMTC	Hosting, maintenance and support for NYMTC PIMS	Innovative Travel Data Collection - Planning for the Next Two Decades	PPS-AQ and PPS-CMP hosting, maintenance, backup and technical support	Regional Financing Options Study		

4. IMPACTS

UTRC programs impact the transportation community in several ways. Through seminars, workshops, and conferences, information is disseminated and interdisciplinary discussions are fostered; which enable transportation professionals to gain knowledge and varying perspectives on issues. This, in turn, helps practitioners to implement policies that bring about efficient and effective solutions to meet local, regional, and national transportation needs. UTRC programs also have an impact on preparing the next generation of transportation professionals through internships and classroom- based instruction. Likewise, dissemination of research findings helps to foster collaboration between academic researchers and practitioners, which assists practitioners in implementing innovative solutions that meet their specific needs.

Impacts are expected from our new research projects as work continues.

5. CHANGES/PROBLEMS

Nothing to report

6. SPECIAL REPORTING REQUIREMENTS

Nothing to report