This report was sponsored by the New England Transportation Consortium, a cooperative effort of the Departments of Transportation and the Land Grant Universities of the six New England States, and the U.S. Department of Transportation’s Federal Highway Administration.

The contents of this report reflect the views of the author(s) who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Departments of Transportation or the Land Grant Universities of the six New England States, or the U.S. Department of Transportation’s Federal Highway Administration. This report does not constitute a standard, specification, or regulation.
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INTRODUCTION

The New England Transportation Consortium (NETC) is a cooperative effort of the transportation agencies of the six New England States, the six New England state land grant universities, and the Federal Highway Administration (FHWA). Through the Consortium, the states pool professional, academic, and financial resources for transportation research leading to the development of improved methods for dealing with common problems associated with the administration, planning, design, construction, rehabilitation, reconstruction, operation, and maintenance of the region’s transportation system. The Consortium’s activities are currently being managed by the University of Vermont Transportation Research Center (UVM TRC), with the Vermont Agency of Transportation (VAOT) acting as the Lead Agency.

The program is intended to supplement, not to replace, ongoing state and federal research activities and other national programs such as the National Cooperative Highway Research Program (NCHRP). To this end, a Memorandum of Understanding (MOU), establishing NETC has been consummated by the six New England state transportation agencies.

The following goals were established for NETC in order to focus the resolve of participating state transportation agencies and universities:

- Implementation of a three-pronged program for the New England region consisting of research and development; technology transfer; and education and training.
- Development of improved methods for dealing with common transportation problems.
- Providing an important source of trained professionals for employment in the Region.

NETC membership now extends to the following agencies: Connecticut Department of Transportation (ConnDOT); Massachusetts Department of Transportation; Maine Department of Transportation; New Hampshire Department of Transportation (NHDOT); Rhode Island Department of Transportation (RIDOT); Vermont Agency of Transportation (VAOT); and, FHWA.

Each of the member state transportation agencies has designated a state university to participate with the state transportation agency in developing and conducting the transportation research program. The following universities have been designated as member universities: University of Connecticut, University of Maine, University of Massachusetts System, University of New Hampshire System, University of Rhode Island, and University of Vermont.

NETC was first established, and work began, in 1986 and, over the years, has undergone a transformative process wherein the management and administrative processes have been under the governance of various governmental and non-governmental organizations. With each change in leadership, the experiential and institutional lessons that have been learned were incorporated into the administration of the program. And so, at the current time, the collective experience of over two decades is now addressed and incorporated in the administration of the NETC program.

In 1984, the Massachusetts Institute of Technology (MIT), the state transportation agencies of five New England states (Maine, Massachusetts, New Hampshire, Rhode Island and Vermont), the American Association of State Highway and Transportation Officials (AASHTO) and FHWA initiated the first transportation pooled fund (TPF) study, administered by RIDOT, to determine the feasibility of establishing a regional consortium. In 1985, the same group of organizations initiated
a second TPF study, again administered by RIDOT, to develop a work program. From 1986 to 1995, various research projects were funded through the NETC program in five funding blocks called “Rounds.”

RIDOT was the Lead Agency for the first two pooled fund studies. For the five Rounds, state funds were transferred to AASHTO, the Lead Agency (i.e., Administrative Agency), through FHWA, and a single contract was effected between AASHTO and MIT, the Coordinator. MIT would then enter into a contract with the selected university for a particular research project.

In 1994, ConnDOT stated its intention to participate in NETC and offered to act as Lead Agency. During Federal Fiscal Year (FFY) 1994, FHWA assumed the Lead Agency designation to facilitate the transition process. MIT and AASHTO exited NETC, effective FFY1994. ConnDOT entered NETC, effective FFY1995, and was the Lead Agency until the Vermont Agency of Transportation assumed the responsibility in March 2010. Maine Department of Transportation assumed the responsibility of Lead Agency in March 2017. During 2018, most new projects were led by MaineDOT while the VTrans led pooled fund completed older projects.
2018 HIGHLIGHTS

1. THE FOLLOWING NETC-FUNDED TRANSPORTATION RESEARCH PROJECTS, VALUED AT $1,646,336, WERE ACTIVE AT NEW ENGLAND STATE UNIVERSITIES AND CONSULTING AGENCIES IN 2018:

   a. University of Massachusetts: $1,041,653
      - Walaa Mogawer (Dartmouth):
        - “Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology”
        - “HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures”
      - Sergio F. Breña (Amherst): “Development of High-Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections”
      - Chris Ahmadijan (Amherst): “Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers & Engineering Technicians”
      - Yuanchang Xie (Lowell): “Optimizing Future Work Zones in New England for Safety and Mobility”
      - Michael Knodler (Amherst): “Using the New SHRP2 Naturalistic Driving Study Safety Databases to Examine Safety Concerns for Teens and Older Drivers”

   b. University of New Hampshire: $504,683
      - Eshan Dave:
        - “Improved Regionalization of Quality Assurance (QA) Functions”
        - “Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England”
      - Jeffrey Foster: “Use of Forested Habitat Adjacent to Highways by Northern Long Ear Bats (and Other Bats)”

   c. AECOM: $50,000

   d. Vanasse Hangen Brustlin, Inc. (VHB): $50,000
      - Frank Gross: “Quick Response: Quantification of Research Benefits”

2. TECHNOLOGY TRANSFER:

   a. Requests for Information and Technical Assistance: The NETC Coordinator’s office responded to the following requests:
      - Matt Mann (UMass University Rep) requested a copy of the 17-2 final report.
      - Daniel Stomski (MassDOT) and Kay Wille (UConn) requested a copy of the 13-1 final report.
b. Conference Attendance and Exhibiting: The NETC Coordinator’s office attended the following conferences and events: None during 2018.

c. NETC Research Project Reports:

2. NETC 10-3: “Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology,” Walaa Mogawer; Alexander Austerman; March 2018, NETCR103
3. NETC 14-4: “Optimizing Future Work Zones in New England for Improved Safety and Mobility,” Yuanchang Xie; Nathan H. Gartner; Polichronis Stamatiadis; Tianzhu Ren; Gustavo Salcedo; March 2018, NETCR104
4. NETC 13-2: “HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixture,” Walaa Mogawer; Milad Zokaei Ashtiani; Alexander Austerman; June 2018, NETCR105
5. NETC 15-3: “Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England,” Eshan Dave; Jo Sias Daniel; Rajib B. Mallick; Christopher DeCarlo; Ram Kumar Veeraragavan; Nivedya Madankara Kottayi; August 2018, NETCR109
7. NETC 13-1: “Development of High Early-Strength Concrete for Accelerated Bridge Construction Closure Pour Connections,” Sergio Brena; Scott Civjan; Stephanie Castine; Gercelino Ramos; December 2018, NETCR115

d. Technical Papers and Presentations:

- NETC 13-1: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.
- NETC 13-3: The research team will present at the 2019 TRB Annual Meeting in Washington, D.C.
- NETC 14-1: The research team will present at the 2019 TRB Annual Meeting in Washington, D.C. The team also had a paper accepted:
- NETC 14-4:
  - A paper entitled “Cooperative Merging in Highway Work Zone
Enabled by Connected and Autonomous Vehicles” has been accepted by the 2018 ASCE International Conference on Transportation & Development to be held in Pittsburgh, Pennsylvania on July 15-18, 2018.

- Dr. Xie was invited to give a talk at the 2018 TRB Annual Meeting. The title of his talk is “Cooperative Highway Work Zone Merge Control for Improved Mobility and Safety.”

- NETC 15-3: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.

- NETC 17-2: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.
PROGRESS OF ACTIVE PROJECTS

PROJECT NUMBER: 10-3

PROJECT TITLE: “Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Professor Walaa S. Mogawer, PE, F.ASCE, Highway Sustainability Research Center (HSRC), University of Massachusetts

STATUS: Closed

AGREEMENT TERM: 9/16/2013 – 5/31/2017

ANTICIPATED COMPLETION: 5/31/2017

PROJECT OBJECTIVES: The research project will evaluate the moisture susceptibility and low temperature cracking properties of RAP mixtures produced with WMA technologies. Plant mixtures produced with varying RAP contents and warm mix technologies will be sampled. Laboratory testing will include an evaluation of mixtures susceptibility to moisture damage using one or more of the following tests: (1) AASHTO T324 “Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)”, (2) AASHTO T-283 “Resistance of Compacted Hot Mix Asphalt (HMA) to Moisture-Induced Damage”, and (3) ratio of wet to dry dynamic modulus measured at 20ºC. The test(s) selection will be based on the literature review conducted under Task 1. Also, the low temperature cracking susceptibility will be evaluated using the following two tests: (1) AASHTO TP10-93 “Standard Test Method for Thermal Stress Restrained Specimen Tensile Strength (TSRST)” and (2) AASHTO T322 “Standard Method of Test for Determining the Creep Compliance and Strength of Hot Mix Asphalt (HMA) Using the Indirect Tensile Test Device.” Additional testing will include evaluating the effect of the different WMA technologies on the workability of the mixtures and evaluating the degree of blending between the RAP binder and the virgin binder using a procedure developed by Bonaquist.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. UMass Dartmouth continued analysis of the test data for all the mixtures tested to date.
2. UMass Dartmouth followed up with the second contractor producing mixtures for this study. The contractor stated that the high RAP mixtures prepared using foaming as the WMA technology would be produced in the spring.
3. UMass Dartmouth received the following plant produced mixtures from the second contractor (Palmer Paving, Springfield MA) in mid-May 2017:
   - SSC 12.5mm 75 Gyration WMA with 29% RAP (1.5% Binder Replacement) Foaming WMA
   - SSC 12.5mm 75 Gyration WMA with 39% RAP (2.0% Binder Replacement) Foaming WMA
   - SSC 12.5mm 75 Gyration WMA with 48% RAP (2.5% Binder Replacement) Foaming WMA
4. The following tests were completed on each mixture using multiple replicates:
   - Volumetric verification (density, VMA, VFA, etc.)
   - Moisture susceptibility testing using the Hamburg wheel tracking device (HWTD) in
accordance with AASHTO T324 at 45°C
- Low temperature cracking using the disk-shaped compact tension (DCT) test at -18°C
- Constructed performance space diagram (HWTD vs. DCT) for each mixture
- Moisture susceptibility (TSR) in accordance with AASHTO T283
- Low temperature cracking using the thermal stress restrained specimen test (TSRST)
- Mixture dynamic modulus and subsequent construction of mixture master curve
- Dynamic modulus (E*) ratio evaluation of moisture susceptibility

5. Summary sheets of results were constructed and data was analyzed
6. UMass Dartmouth began work on the draft final report.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

- A Transportation Research Board (TRB) paper entitled “Understanding Influence of Moisture on Performance of Plant-Produced High Reclaimed Asphalt Pavement Content Mixtures Incorporating Warm-Mix Asphalt Technologies” was presented in at the Transportation Research Board 96th Annual Meeting in Washington DC on January 10th, 2017 in TRB session 636 “Reclaimed Asphalt Pavement and Recycled Asphalt Shingles in Asphalt Mixtures.”
PROJECT NUMBER: 13-1

PROJECT TITLE: “Development of High Early-Strength Concrete for Accelerated Bridge Construction Closure Pour Connections”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Sergio F. Brena – University of Massachusetts Amherst

STATUS: Closed

AGREEMENT TERM: 9/1/2014 – 8/31/2018

ANTICIPATED COMPLETION: 8/31/2018

PROJECT OBJECTIVES: To develop and validate concrete mixtures capable of developing high early strength without detrimentally affecting their long-term durability. The mixtures are for use in projects using accelerated bridge construction methods.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. All testing was completed. The research team completed the final report in December 2018.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

• Reports: “Development of High Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections.” Brena, Sergio F.; Civjan, Scott A.; Castine, Stephanie; Ramos, Gercelino, December 2018, NETCR115.

• Papers and Presentations: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.
**PROJECT NUMBER:** 13-2

**PROJECT TITLE:** “HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures”

**PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S):** Professor Walaa S. Mogawer, PE, F.ASCE, Highway Sustainability Research Center (HSRC), University of Massachusetts

**STATUS:** Closed

**AGREEMENT TERM:** 6/1/2014 – 12/1/2017

**ANTICIPATED COMPLETION:** 12/1/2017

**PROJECT OBJECTIVES:** The goal of this research is to evaluate plant-produced HMA mixtures that contain RAS to identify the critical material properties and plant operations needed to produce RAS mixtures with fatigue and low temperature cracking properties equivalent (or better than) typical mixtures that are produced. Research objectives:

1. Determine the current state-of-practice for recycled shingle usage in paving mixtures.
2. Locate regional asphalt mixture producers in New England with capabilities and willingness to produce mixtures incorporating RAS for this study. From this list of producers, select producers so that both batch and drum plant are utilized for production.
3. Assist the selected producers in evaluating the properties of the RAS and RAP to be used in production.
4. Construct a matrix of mixtures that will be produced. An all-virgin material control mixture, 5% RAS mixture and a 5% RAS + RAP mixture will be designed.
5. Assist the selected producers in developing laboratory mixture designs utilizing RAS that meet the required volumetric criteria.
6. Produce the mixtures using a batch plant and drum plant. Produce mixtures assuming 100% blending of the RAS and virgin binder and at the calculated actual RAS binder contribution.
7. Sample the mixture at the plant and verify volumetric properties. Mixtures not meeting the volumetric properties should be produced again with alteration to the production parameters (use higher temperatures, longer silo storage or increased mixing times).
8. Construct a matrix for evaluating the performance of the mixtures with emphasis of low temperature and fatigue cracking. The matrix should contain a component to evaluate the effect of aging on the degree of blending between aged and virgin binders.
9. Identify critical material properties and plant operations that yield RAS mixtures with performance properties equivalent to typical all-virgin material mixtures.
10. Develop a guideline for the use of RAS in virgin and RAP mixtures.

**PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:**

1. The final report was completed in June 2018.

**REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:**

- A Transportation Research Board (TRB) paper entitled “Performance Characterization of Asphalt Mixtures Incorporating Recycled Asphalt Shingles: Mechanical Approach to Asphalt Binder Degree of Blending” was presented at the Transportation Research Board 96th Annual Meeting in Washington DC on January 10th, 2017 in TRB session 636 “Reclaimed Asphalt Pavement and Recycled Asphalt Shingles in Asphalt Mixtures.”
PROJECT NUMBER: 13-3

PROJECT TITLE: “Improved Regionalization of Quality Assurance (QA) Functions”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Eshan Dave, University of New Hampshire

STATUS: Open

AGREEMENT TERM: 12/1/2014 – 1/25/2019

ANTICIPATED COMPLETION: 1/25/2019

PROJECT OBJECTIVES:

2. Review of QA specifications for PCE/PSE.
3. On the basis of the review and through working with the technical review committee of the project, develop common acceptance standards for PCE/PSE to be used by NETC constituents.
4. Develop a cost-sharing mechanism to accompany the common acceptance standards.
5. Identify agencies and contractors to conduct pilot implementation of the common acceptance standards.
6. Develop a list of additional materials and services for which common acceptance standards might be beneficial and feasible.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. The research team completed “Phase I” of the final report in March 2018. Note, a Phase II of the project was added in 2018 with additional funds.
2. For Phase II of the project, the following have been completed:
   a. **Exploration of Cost-Share, Invoicing and Payment Mechanisms for Sharing of QA Resources:** In the previous task researchers initiated review of literature to determine if any published reports or papers have discussed the cost-share, invoicing and payment mechanisms that would fit the needs of the current study. Initial review did not yield fruitful results in terms of readily available framework or mechanisms that are available in published literature that has been routinely used by State transportation agencies in United States. Simultaneously to this review, researchers have been developing a questionnaire for financial administration personnel at DOTs. Once finalized, this questionnaire will be sent to each of the NETC constituent agency in form of an online survey. This survey will be followed up with phone call interviews to expand the information.
   b. The research team has completed interviews with 4 out of 6 New England state DOT contacts (also using the survey). Interviews still need to be scheduled with RIDOT and MassDOT.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

- “Improved Regionalization of Quality Assurance (QA) Functions.” Dave, Eshan V.; Sias, Jo; Kotowski, Michael, March 2018, NETCR110. (Phase I)
PROJECT NUMBER: 14-1

PROJECT TITLE: “Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers and Engineering Technicians”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Chris Ahmadjian, University of Massachusetts, Amherst

STATUS: Closed

AGREEMENT TERM: 3/1/2015 – 12/31/2017

ANTICIPATED COMPLETION: 12/31/2017

PROJECT OBJECTIVES:

1. To identify and review existing Competency Models (CM) and matrices that can help in the development of a DOT specific competency model
2. To perform a gap analysis on the existing CM’s and matrices to create a DOT specific employee competency matrix
3. To create a CM framework for each of the NETC member states
4. To run a pilot program in one of the NETC member states
5. To determine the financial benefits (return on investment) of having a CM in place
6. To create an implementation plan and technology transfer strategy for the research results
7. To deliver a final report

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. The final report was completed in December 2018.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

- “Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers and Engineering Technicians.” Ahmadjian, Chris; Knodler, Michael; Fitzpatrick, Cole; Ryan, Alyssa; Bouchard, Chelsea, December 2018, NETCR111.
PROJECT NUMBER: 14-4

PROJECT TITLE: “Optimizing Future Work Zones in New England for Safety and Mobility”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Yuanchang Xie, University of Massachusetts, Lowell

STATUS: Closed

AGREEMENT TERM: 7/6/2015 – 12/31/2017

ANTICIPATED COMPLETION: 12/31/2017

PROJECT OBJECTIVES:

Given the aging infrastructure and the anticipated growing number of work zones in New England, it is of utmost importance to optimize their layouts to improve safety and to mitigate their impact on mobility. This study aims to use the Transportation Research Board’s SHRP2 Naturalistic Driving Study (SNDS) data for investigating driver behavior in work zones under different traffic, lighting, and weather conditions. In addition, data from the smart work zones (SWZs) in Massachusetts (and other New England states if available) to validate the findings obtained from the analysis of the SNDS data is also proposed. Based on the analysis of the SNDS and SWZs data, improved work zone TTCPs will be developed. These TTCPs will be evaluated using an advanced driving simulator and a microscopic traffic simulation tool. The main objectives of this study include:

- Literature Review: A focused review on work zone safety will be conducted.
- SNDS Data Analysis: Critical factors that may potentially affect (either positively or negatively) driver behavior in work zones under various conditions will be reviewed and analyzed based on the SNDS data. These factors may include traffic signs, variable message signs, law enforcement, work zone layout, etc.
- Identify and Quantify Strategies: The identified factors will be further examined and tools will be developed to quantify these factors’ impacts on three key aspects of improving work zone safety: reducing speed, maintaining safe distances, and preventing driver distraction. In addition, the impacts of these factors on reducing near crash events will be studied. Investigating near crash events and driver behavior/maneuvers immediately prior to them will allow us to better understand how work zone crashes occur.
- Proposed Work Zone Control Plans: Based on the SNDS data analysis results and a review of work zone control strategies, new and improved work zone TTCPs will be developed.
- Validate the Results: Field data collected from smart work zones (SWZs) in Massachusetts (and other New England states if available) will be used to evaluate the performance of certain work zone TTCPs. If there is a match between the SWZs and the work zones in the SNDS data, the corresponding data sets will be compared both quantitatively and qualitatively. In addition, an advanced driving simulator and a microscopic traffic simulator will be used to evaluate the safety and mobility performance of various work zone layouts and controls. Extensive driving simulator studies will be conducted to evaluate how drivers respond to different work zone layouts and controls.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. The final report was completed in March 2018.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:
• A paper entitled “Modelling Highway Work Zone Traffic Safety and Driver Behaviours in the United States Using a Virtual Reality Driving Simulator” has been accepted to the 2017 Road Safety & Simulation Conference to be held in The Hague, Netherland in October 2017.

• A paper entitled “Cooperative Merging in Highway Work Zone Enabled by Connected and Autonomous Vehicles” has been accepted by the 2018 ASCE International Conference on Transportation & Development to be held in Pittsburgh, Pennsylvania on July 15-18, 2018.

• Dr. Xie has been invited to give a talk at the 2018 TRB Annual Meeting. The title of his talk is “Cooperative Highway Work Zone Merge Control for Improved Mobility and Safety”.

• An abstract entitled “Cooperative Highway Work Zone Merge Control for Improved Mobility and Safety” has been submitted to the 2018 MassDOT Moving Together Conference.

• “Optimizing Future Work Zones in New England for Improved Safety and Mobility.” Xie, Yuanchang; Gartner, Nathan H.; Stamatiadis, Polichronis; Ren, Tianzhu; Salcedo, Gustavo, March 2018, NETCR104.
PROJECT NUMBER: 15-1

PROJECT TITLE: “Use of Forested Habitat Adjacent to Highways by Northern Long Ear Bats (and Other Bats)”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Jeffrey Foster, University of New Hampshire

STATUS: Open

AGREEMENT TERM: 12/1/2016 – 11/30/2018

ANTICIPATED COMPLETION: 11/30/2018

PROJECT OBJECTIVES: Our overall objective addresses several major gaps in the knowledge of Northern long-eared bat (NLEB; Myotis septentrionalis) distributions and activity as they relate to the use of highway habitat in New England.

The research objectives will be achieved by accomplishing 8 tasks:

- Task 1. Literature review on NLEB habitat requirements and effects of anthropogenic disturbance, focusing on the effects of roadways.
- Task 2. Develop a “Zone of Influence” matrix for highway induced stressors.
- Task 3. Compile existing data on NLEB and other rare bat species distributions.
- Task 4. Request presence/absence data from State Depts of Transportation and other sources.
- Task 5. Determine land cover (habitat) being used or not used by NLEB.
- Task 6. Determine data gathering needs to improve model inference.
- Task 7. Identify data gaps in sampling of NLEB in specific habitats that may require additional data collection on presence/absence.
- Task 8. Develop screening tool and GIS model that would show zones of influence around highways.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. MYSE distribution modeling was completed.
2. A draft final report was submitted to the TAC for review.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

None thus far.
PROJECT NUMBER: 15-2

PROJECT TITLE: “Using the New SHRP2 Naturalistic Driving Study Databases to Examine Safety Concerns for Teens and Older Drivers”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Siby Samuel, University of Massachusetts, Amherst

STATUS: Open

AGREEMENT TERM: 01/01/2017 – 12/31/2018

ANTICIPATED COMPLETION: 12/31/2018

PROJECT OBJECTIVES: To examine SHRP2 NDS and identify primary concerns with older driver safety when navigating left turns at permissive and protected signalized intersections.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

- A conference call meeting was held with the project’s Technical Advisory Committee in October to discuss project progress and the latest analysis and results, and to get feedback from committee members. The UMass researchers prepared a Powerpoint presentation for the meeting.
- The research team reviewed driver videos and data tables to gather additional information about the left turn crashes and near crashes involving drivers age 65 and over.
- The research team prepared the draft final report for the project and shared it with the Technical Advisory Committee members for their review.
- A conference call meeting was held with the project’s Technical Advisory Committee in December to review the draft final report for the project and get feedback from committee members. The UMass researchers prepared a Powerpoint presentation for the meeting.
- The research team began revising the draft final report to incorporate feedback from the Technical Advisory Committee.
- The research team began preparing the factsheet and research poster to summarize the project and its findings.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

None thus far.
PROJECT NUMBER: 15-3

PROJECT TITLE: “Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Eshan Dave, University of New Hampshire

STATUS: Closed

AGREEMENT TERM: 08/01/2016 – 07/31/2018

ANTICIPATED COMPLETION: 07/31/2018

PROJECT OBJECTIVES:

1. Evaluate good and poor performing asphalt mixtures in New England and determine mechanisms responsible for poor performing mixtures
2. Determine impacts of remedial measures (anti-stripping additives and hydrated lime) in reducing moisture susceptibility of poor performing mixtures
3. Assess impacts of moisture induced-damage on pavement performance and service life
4. Recommend an evaluation framework consisting of appropriate test procedure(s), specification, analysis procedure verified with field performance data that is reliable and suitable for moisture susceptibility testing of asphalt mixtures used in New England

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

1. The final report was completed in August 2018.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

- “Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England.” Dave, Eshan V.; Sias Daniel, Jo; Mallick, Rajib B.; DeCarlo, Christopher; Veeraragavan, Ram Kumar; Kottayi, Nivedya Madankara, August 2018, NETCR109.
- The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.
PROJECT NUMBER: 15-4


PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Jo Sias Daniel, University of New Hampshire

STATUS: Open

AGREEMENT TERM: 07/05/2018 – 01/04/2019

ANTICIPATED COMPLETION: 01/04/2019

PROJECT OBJECTIVES:

1. Review current asphalt pavement QA processes used by each state through interviews and literature review.
2. Identify best practices by working with agencies and contractors.
3. Identify cross-border issues that may impact the implementation of a uniform QA process and determine actions to alleviate these issues.
4. Develop recommendations for use of the research products in the NETTCP QA technology program.
5. Develop a white paper that provides guidance and an initial roadmap for uniform QA processes regarding HMA Acceptance and Quality Control testing in New England

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

- The research team reviewed the current state of the practice of QA for asphalt pavement construction in the northeast, including current FHWA recommendations and requirements.
- They also conducted a survey of NETC member agencies to identify the cross-border issues that may be a challenge to the adoption of a uniform QA process.
- The response of the survey were analyzed and compiled.
- The project kickoff meeting was held with the TAC to present and further discuss the results of the survey. Proceedings of the kickoff meeting were documented and made available to the TAC members with topics for internal agency discussion in preparation for the workshop.
- The research team held a workshop on cross-border issues.
- A draft final report was completed.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

None thus far.
PROJECT NUMBER: 17-1
PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Chris Chaffee, AECOM
STATUS: Closed
AGREEMENT TERM: 04/10/2018 – 10/10/2018
ANTICIPATED COMPLETION: 10/10/2018

PROJECT OBJECTIVES:
- Identify multi-state issues related to the testing and deployment of CVs, AVs, and CAVs in New England
- Document opportunities and challenges related to multi-state CV, AV, and CAV issues
- Prepare an action plan that minimizes the challenges and pursues the opportunities

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:
1. The final report was completed in October 2018.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:
- NETC 17-2: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.
PROJECT NUMBER: 17-2

PROJECT TITLE: “Quick Response: Quantification of Research Benefits”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Frank Gross, VHB

STATUS: Open

AGREEMENT TERM: 07/05/2018 – 01/04/2019

ANTICIPATED COMPLETION: 01/04/2019

PROJECT OBJECTIVES:

- Implement or adapt the MnDOT research project Benefit Estimation Tool for 2-3 NETC projects.
- Develop detailed guidelines to identify and gather the inputs required for the benefit categories of these projects.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2018:

2. Performed and completed a comprehensive assessment of the MnDOT tool.
4. Gathered inputs to demonstrate the Excel-based tool with the example research.
5. Developed a draft version of the Excel-based tool for demonstration with one example research project.
7. Scheduled the final TAC meeting for December 18, 2018 to review all draft deliverables.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2018:

None thus far.
## FINANCIAL STATUS

### 1. FINANCIAL STATUS OF ACTIVE PROJECTS:

<table>
<thead>
<tr>
<th>NO.</th>
<th>PROJECT TITLE</th>
<th>APPROVED BUDGET</th>
<th>INVOICES APPROVED FOR PAYMENT</th>
<th>PROJECT BALANCE</th>
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<td>10-3</td>
<td>Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology</td>
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<td>HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures</td>
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<td>15-1</td>
<td>Use of Forested Habitat Adjacent to Highways by Northern Long Ear Bats (and Other Bats)</td>
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<td>Quick Response: New England Connected Automated Vehicles</td>
<td>$50,000</td>
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<td>Quick Response: Quantification of Research Benefits</td>
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2. FUND BALANCE:

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<th>ITEM</th>
<th>OBLIGATION FOR PROJECTS</th>
<th>TRAVEL</th>
<th>OBLIGATIONS AND EXPENDITURES</th>
<th>BUDGET EXPENDED</th>
<th>INVOICE</th>
<th>CUMULATIVE BALANCE</th>
<th>NOTES</th>
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Notes: Project admin.
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<tr>
<th>ITEM</th>
<th>OBLIGATION FOR PROJECTS</th>
<th>TRAVEL</th>
<th>INVOICE</th>
<th>CUMMULATIVE BALANCE</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>05-2: Evaluation of Potential of Supercritical Flue Gas</td>
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### NETC Fund Balance

#### As of December 31, 2018

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<thead>
<tr>
<th>Item</th>
<th>Obligation for Projects</th>
<th>Travel Obligations and Expenditures</th>
<th>Budget</th>
<th>Expenditure</th>
<th>Invoice</th>
<th>Cumulative Balance</th>
<th>Notes</th>
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#### Member Obligations 2005 - $100,000

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<th>Action</th>
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<th>Obligation</th>
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#### NY DOT Obligations - $50,000

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<td>1.1</td>
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#### Coord./Admin. Of NETC Calendar Year 2005 - $130,922

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#### Coord./Admin. Of NETC Calendar Year 2006 - $133,616

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#### Coord./Admin. Of NETC Calendar Year 2007 - $136,961

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#### Coord./Admin. Of NETC Calendar Year 2008 - $138,616

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#### Coord./Admin. Of NETC Calendar Year 2009 - $140,061

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#### Coord./Admin. Of NETC Calendar Year 2010 - $141,561

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#### Coord./Admin. Of NETC Calendar Year 2012 - $144,561

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#### Coord./Admin. Of NETC Calendar Year 2013 - $145,061

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<th>Action</th>
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#### Coord./Admin. Of NETC Calendar Year 2014 - $146,561

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#### Coord./Admin. Of NETC Calendar Year 2016 - $148,561

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#### Coord./Admin. Of NETC Calendar Year 2017 - $149,061

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#### Coord./Admin. Of NETC Calendar Year 2018 - $150,061

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</tbody>
</table>
NETC Fund Balance Notes:

1. Member FFY allocations are obligated between October 1 and December 31.
2. A credit of $6,599.70 for NETC’s overpayment to UConn for CY 2004 NETC Management was applied, by UConn, to the ‘Indirect Cost’ for project 02-5. Therefore although the total expenditures of the project were $26,279.69 the amount paid by NETC was $19,679.99.
3. Per minutes of NETC Adv. Comm. Mtg. 5/12/08: "It was agreed that since the encumbered amount for NETC 05-7 was incorrectly shown in the Fund Balance Report (April 30, 2008) as $70,000 and the correct amount is $100,000, the amount of funding to be allocated for the third ranked problem statement for the FFY 09 research program (NETC 09-3) would be set at the amount of the revised unencumbered fund balance remaining (at that time) after the allocation of funds for NETC 09-1 and NETC 09-2, i.e., $48,847." (Note no longer relevant. TAC revised budget. AHC 6/25/2013)
4. Work on project suspended pending resolution of authorization of payment for costs incurred prior to execution of project agreement. VAOT to submit request to FHWA for approval of costs incurred prior to execution of the project agreement in accordance with 23CFR Section 1.9.
5. During the Process to Close out SPR-3(089) and TPF-5(201), it became clear that there was a discrepancy between the NETC Coordinator's Fund Balance Tracking Sheet and what was actually left over in the accounts. The reconciliation is approximately $-450,000. This leads me to believe that an annual contribution from the 1990s might have been canceled, but it is not reflected in the tracking sheet. Unfortunately, SPR-3(009) has been closed for a long time, so the detailed account information cannot be obtained.
6. Contributions for FY 2012 and FY 2013 were canceled in an Advisory Committee ballot dated 1/10/14. Connecticut had already made their contribution. Therefore, they will not need to make a contribution for FY 2014.
7. Contributions for FY 2016 have been waived.
8. FY2017 Contributions are listed as Obligations, but not in the balance for TPF-5(222) as those transfers are still pending/debated.
9. This is an accounting update to reflect funds transferred from previous funds SPR-3(089) and TPF-5(201) into TPF-5(222).
10. Project budgets include Proposal Budget or Final Invoice Budget and UVM Facilities and Administration fees of $8,625.
11. Project 17-3 (i.e. 13-3 Phase II) does not have F&A added onto the initial phase of 13-3.
1. POLICIES AND PROCEDURES:


2. ANNUAL REPORTS:

“Annual Report For Calendar Year 1995,” March 1996, NETCR3
“Annual Report For Calendar Year 1996,” January 1997, NETCR4
“Annual Report For Calendar Year 1997,” January 1998, NETCR9
“Annual Report For Calendar Year 1998,” January 1999, NETCR10
“Annual Report For Calendar Year 1999,” January 2000, NETCR21
“Annual Report For Calendar Year 2000,” August 2001, NETCR27
“Annual Report For Calendar Year 2001,” December 2002, NETCR40
“Annual Report For Calendar Year 2002,” November 2003, NETCR41
“Annual Report For Calendar Year 2003,” September 2005, NETCR55
“Annual Report For Calendar Year 2005,” August 2006, NETCR61
“Annual Report For Calendar Year 2006,” April 2007, NETCR68
“Annual Report For Calendar Year 2007,” February 2008, NETCR70
“Annual Report For Calendar Year 2008,” April 2009, NETCR75
“Annual Report For Calendar Year 2009,” March 2010, NETCR79
“Annual Report For Calendar Year 2010,” April 2011, NETCR84
“Annual Report For Calendar Year 2011,” December 2011, NETCR90
“Annual Report For Calendar Year 2012,” February 2013, NETCR92
“Annual Report For Calendar Year 2013,” February 2014, NETCR94
“Annual Report For Calendar Year 2014,” February 2015, NETCR95
“Annual Report For Calendar Year 2015,” January 2018, NETCR102
“Annual Report For Calendar Year 2016,” April 2018, NETCR106
“Annual Report For Calendar Year 2017,” April 2018, NETCR107
“Annual Report For Calendar Year 2018,” February 2019, NETCR 116

3. REPORTS, PAPERS, AND PRESENTATIONS 1988-1995:


“Regional Rail Planning In New England,” Martland, C.P. Little, and Alvaro, A.E., MIT, August 1993. (Accepted for publication 1994)


4. REPORTS, PAPERS AND PRESENTATIONS 1995-2018:

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Title</th>
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<tbody>
<tr>
<td>N/A</td>
<td>Construction Costs of New England Bridges</td>
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<tr>
<td></td>
<td><strong>Reports:</strong></td>
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<tr>
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<td><strong>Papers and Presentations:</strong></td>
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<td>N/A</td>
<td>Tire Chips as Lightweight Backfill for Retaining Walls, Phase II: Full-Scale Testing</td>
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</tr>
<tr>
<td></td>
<td><strong>Papers and Presentations:</strong></td>
</tr>
<tr>
<td></td>
<td>“Civil Engineering Uses for Tire Chips,” Humphrey D.N. A six-hour short course presented to the Nebraska Department of Environmental Quality, the Maine Dept. of Transportation, the Texas Engineering Extension Service, the Manitoba Tire Stewardship Board, the Alberta Tire Recycling Management Board, and the Arkansas Department of Pollution Control and Ecology.</td>
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<tr>
<td>N/A</td>
<td>Tire Chips as Lightweight Backfill for Retaining Walls, Phase II: Full-Scale Testing (cont’d):</td>
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<td>Papers and Presentations (cont’d):</td>
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<td>“Highway Applications of Tire Shreds,” Humphrey, D. A 7-hour short course presented to the RI DOT, April 1999.</td>
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<td>N/A</td>
<td>New England Vehicle Classification And Truck Weight Program, Phase I</td>
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<td>Reports:</td>
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</table>
N/A  New England Vehicle Classification And Truck Weight Program, Phase I (cont’d):
Reports (cont’d):


Papers and Presentations:


N/A  Bridge Rail Crash Test, Phase II: Sidewalk-Mounted Rail
Reports:


94-1   Structural Analysis of New England Subbase Materials And Structures

Reports:

Papers and Presentations:


Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques

Reports:

Papers and Presentations:


Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques (cont’d):

Papers and Presentations (cont’d):


Procedures for the Evaluation of Sheet Membrane Waterproofing:

Reports:


Papers and Presentations: None
94-4  

**Durability of Concrete Crack Repair Systems:**  
Reports: None

Papers and Presentations:

“Durability of Concrete Crack Repair System,” Tsiatas, G. and Robinson, J. Presentation to representatives of the Chemical Grouting Division of Kajima Corporation (Japan), University of Rhode Island, College of Engineering, October 26, 1999.

95-1  

**Use of Tire Chip/Soil Mixtures to Limit Frost Heave and Pavement Damage of Paved Road**  
Reports:  

Papers and Presentations:


"Highway Applications of Tire Shreds,” Humphrey, D. A 7-hour short course presented to the RI DOT, April 1999.

“Field Trial of Tire Shreds as Insulation for Paved Roads,” Humphrey, D., Chen, L.H., Lawrence, B. A paper presented at the 10th International Conference on Cold Regions Engineering: Putting Research into Practice, held in Hanover, NH, August 16-19, 1999.

95-2  

**Suitability of Non-Hydric Soils for Wetland Mitigation**  
Reports:  

Papers and Presentations: None
95-3 Implementation and Evaluation of Traffic Marking Recesses for Application of Thermo-Plastic Markings on Modified Open Graded Mixes
Reports:

Papers and Presentations:


95-5 Buried Joints In Short Span Bridges
Reports: None

Papers and Presentations:

95-6 Guidelines for Ride Quality Acceptance of Pavements
Reports:

Papers and Presentations: None

96-1 Implementation of Superpave
Reports:
“Superpave Implementation,” Mahoney, James, Stephens, Jack E., September 1999, NETCR18.
Effectiveness of Fiber Reinforced Composite as Structural and Protective Coverings for Bridge Elements Exposed To Deicing Salt Chlorides

Reports:

Papers and Presentations:


“Recent Advances in Fiber Composites,” Seminar Series, University Cataleuna, Spain, June 28, 1999.


96-3 Effectiveness Of Fiber Reinforced Composite As Structural And Protective Coverings For Bridge Elements Exposed To Deicing Salt Chlorides (cont’d):
Papers and Presentations (cont’d):


97-1 A Portable Method to Determine Chloride Concentration on Roadway Pavements
Reports:

Papers and Presentations: None

97-2 Performance Evaluation and Economic Analysis of Combinations of Durability Enhancing Admixtures (Mineral and Chemical) In Structural Concrete for the Northeast U.S.A
Reports:

Papers and Presentations:
“Performance Evaluation of Durability Enhancing Admixtures (Mineral and Chemical) in Structural Concrete,” Sund, D., Report in Partial Fulfillment of Master of Science in Civil Engineering Degree, Department of Civil and Environmental Engineering, University of Massachusetts, Amherst, September, 1999.
97-2 Performance Evaluation and Economic Analysis of Combinations of Durability Enhancing Admixtures (Mineral and Chemical) In Structural Concrete for the Northeast U.S.A (cont'd):
Papers and Presentations:


97-3 Determining Properties, Standards and Performance of Wood Material as an Erosion Control Mulch and as a Filter Berm
Reports:

Papers and Presentations:

97-4 Early Distress of Open-Graded Friction Course (OGFC)
Reports:

Papers and Presentations: None

99-1 Bridge Rail Transitions – Development and Crash Testing
Reports:

Note:
Design documents for the NETC 2-Bar Curb-Mounted and 4-Bar Sidewalk-Mounted Bridge Rail Transitions are available from the NETC Coordinator.
Bridge Rail Transitions – Development and Crash Testing (cont’d):
Papers and Presentations:


Evaluation of Asphalitic Expansion Joints
Reports:

Papers and Presentations: None

Development of Priority Based Statewide Scour Monitoring Systems In New England
Reports:

Papers and Presentations:

Quantifying Roadside Rest Area Usage
Reports:

Papers and Presentations:
Results from the rest-area research were included in a presentation by the PI:
Analytical and Experimental Investigation of the Effects of Concrete Removal Operations on Adjacent Concrete That Is To Remain

Reports:

Papers and Presentations:


“Effect of Demolition on Remaining Part of Concrete Bridge, Numerical Analysis Vs. Experimental Results.” Presented and published in the proceedings of Internationales Kolloquium uber die Anwendungen der Informatik in Architectur und Bauwesen, Germany, June 2000

“The Effect of Bridge Rehabilitation on the Remaining Structural Parts.” Presented and published in the proceedings of the ASCE conference at Stanford University, August 2000.

Ground-Based Imaging and Data Acquisition Systems for Roadway Inventories in New England - A Synthesis of Practice

Reports:

Papers and Presentations: None

Evaluation of Permeability of Superpave Mixes

Reports:

Papers and Presentations:

00-3  Design, Fabrication and Preliminary Testing of a Composite Reinforced Timber Guardrail
Reports:

Papers and Presentations: None

00-4  Portable Falling Weight Deflectometer Study
Reports:

Papers and Presentations: None

00-5  Guardrail Testing Modified Eccentric Loader Terminal (MELT) at NCHRP 350 TL-2
Reports:

Papers and Presentations:
Dean Alberson, Texas Transportation Institute, Principal Investigator presented the results of the crash tests conducted on the MELT guardrail terminal to the Association of General Contractors/American Road Transportation Builders Association/American Association of State Highway Transportation Officials Task Force 13 meeting in Seattle, Washington, April 2002.

00-6  Effective Visualization Techniques for the Public Presentation of Transportation
Reports:

Papers and Presentations:
00-7  A Complete Review of Incident Detection Algorithms and Their Deployment: What Works and What Doesn’t
Reports:

Papers and Presentations:
“Use of Driver-Based Data for Incident Detection,” Parkany, Emily, Submitted to the 7th International Conference on Applications of Advanced Technologies in Transportation Engineering (AATT), Boston, August 2002.

00-8  Performance and Effectiveness of a Thin Pavement Section Using Geogrids and Drainage Geocomposites in a Cold Region
Reports:

Papers and Presentations:

01-1  Advanced Composite Materials for New England’s Transportation Infrastructure: A Study for Implementation and Synthesis of Technology and Practice
Reports:

Papers and Presentations: None

01-1  Advanced Composite Materials in New England’s Transportation Infrastructure - Technology Transfer Phase 1: Selection of Prototype
T2 Phase I
Reports:

Papers and Presentations: None
01-2 Development of a Testing Protocol for QC/QA of Hot Mix Asphalt
Reports:

Papers and Presentations:

01-3 Design of Superpave HMA for Low Volume Roads
Reports:

Papers and Presentations:

01-6 Field Evaluation of a New Compaction Monitoring Device
Reports:

Papers and Presentations: None

02-1 Relating Hot Mix Asphalt Pavement Density to Performance
Reports:

Papers and Presentations:

02-2 Formulate Approach for 511 Implementation in New England Reports:

Papers and Presentations: None

02-3 Establish Subgrade Support Values for Typical Soils in New England Reports:

Papers and Presentations:


02-5 Determination of Moisture Content of Deicing Salt at Point of Delivery Reports:

Papers and Presentations: None
Sealing of Small Movement Bridge Expansion Joints

Reports:

Papers and Presentations:


02-6 Phase 2 Sealing of Small Movement Bridge Expansion Joints - Phase II: Field Demonstration and Monitoring

Reports:

Papers and Presentations:


Validating Traffic Simulation Models to Inclement Weather Travel Conditions with Applications to Arterial Coordinated Signal Systems

Reports:

Papers and Presentations:


Intelligent Transportation Systems Applications to Ski Resorts in New England

Reports:

Papers and Presentations:

Ability of Wood Fiber Materials to Attenuate Heavy Metals Associated with Highway Runoff

Reports:

Papers and Presentations: None
03-2 Field Studies of Concrete Containing Salts of an Alkenyl-Substituted Succinic Acid
Reports:

Papers and Presentations:


03-3 Feasibility Study of an Erosion Control Laboratory in New England
Reports:

Papers and Presentations: None

03-3 Phase 2 Design Considerations for a Prototype Erosion Control Laboratory in New England
Reports:

Papers and Presentations: None

03-4 Measuring Pollutant Removal Efficiencies of Stormwater Treatment Units
Reports:

Papers and Presentations:

03-5 Evaluation of a Field Permeameter as a Longitudinal Joint Quality Indicator
Reports:

Papers and Presentations:


03-6 Fix It First: Utilizing the Seismic Property Analyzer and MMLS to Develop Guidelines for the Use of Polymer Modified Thin Lift HMA vs. Surface Treatments
Reports:

Papers and Presentations: None
03-7 Basalt Fiber Reinforced Polymer Composites

Reports:

Papers and Presentations:


“Investigation of Basalt Fiber Composite Aging Behavior for Applications in Transportation,” Q. Liu, M. T. Shaw, R. S. Parnas, A.M. McDonell, Polymer Composites.


04-1 Phase 2 Recycling Asphalt Pavements Containing Modified Binders - Phase 2

Reports:

Papers and Presentations:

04-2  Driver-Eye-Movement-Based Investigation for Improving Work-Zone Safety

Reports:

Papers and Presentations:

“Understanding and Quantifying Driver Response,” Muttart, J.W., Texas Association of Accident Reconstructionist Specials, Houston, TX, February 17 & 18, 2006.


04-3 Estimating the Magnitude of Peak Flows for Steep Gradient Streams in New England
Reports:

Papers and Presentations:

04-4 Determining the Effective PG Grade of Binder in RAP Mixes
Reports:

Papers and Presentations:

04-5 Network-Based Highway Crash Prediction Using Geographic Information Systems
Reports:

Papers and Presentations:


05-1 Development of Supplemental Resistance Method for the Design of Drilled Shaft Rock Sockets
Reports:

Papers and Presentations: None
05-5 Measurement of Adhesion Properties Between Topcoat Paint and Metalized/Galvanized Steel with Surface Energy Measurement Equipment

Reports:

Papers and Presentations:

05-6 Employing Graphic-Aided Dynamic Message Signs to Assist Elder Drivers’ Message Comprehension

Reports:

Papers and Presentations:


05-7 Warrants for Exclusive Left Turn Lanes at Unsignalized Intersections and Driveways

Reports:
05-7 Warrants for Exclusive Left Turn Lanes at Unsignalized Intersections and Driveways (cont’d):
   Papers and Presentations:
   “A Decision Support System for Predicting the likely Benefits of Left-turn Lane Installation,” Ranade, S., Sadek, A.W. and Ivan, J., 2007, TRB Annual meeting, Paper No. 07-0992; January 2007; Transportation Research Record, 2023:28-36, 2007. This paper received the Best Paper Award from the Committee on Operational Effects of Geometrics at the 2008 Annual Meeting.


05-8 Evaluation and Implementation of Traffic Simulation Models for Work Zones
   Reports:

   Papers and Presentations:


06-1 New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design Guide with Level 2 & 3 Inputs
   Reports:

   Papers and Presentations:
06-1 New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design Guide with Level 2 & 3 Inputs (cont’d):
Papers and Presentations:


06-3 Establishing Default Dynamic Modulus Values for New England Reports:

Papers and Presentations: None

06-4 Preventative Maintenance and Timing of Applications Reports: NETC 06-4: “Preventative Maintenance and Timing of Applications,” Smith, Kelly; Peshkin, David; Mogawer, Walaa; Austerman, Alexander; June 2017, NETCR101

Papers and Presentations: None

07-1 In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations Reports:

Papers and Presentations: None

09-2 Effective Establishment of Native Grasses on Roadsides Reports:
“Effective Establishment of Native Grasses on Roadsides,” Kuzovkina, Julia; Schulthess, Cristina P.; Ricard, Robert; Dryer, Glenn, June 2016, NETCR97.

Papers and Presentations: None

09-3 Advanced Composite Materials: Prototype Development and Demonstration Reports:

Papers and Presentations: None

10-3

**Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology**


13-1

**Development of High Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections**

Reports: “Development of High Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections.” Brena, Sergio F.; Civjan, Scott A.; Castine, Stephanie; Ramos, Gercelino, December 2018, NETCR115.

Papers and Presentations: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.

13-2

**HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures**


13-3

**Improved Regionalization of Quality Assurance (QA) Functions**

Reports: “Improved Regionalization of Quality Assurance (QA) Functions.”
Papers and Presentations: The research team will present at the 2019 TRB Annual Meeting in Washington, D.C.

14-1 Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers & Engineering Technicians
Reports: “Measuring the Effectiveness of Competency Models for Job-Specific Professional Development of Engineers and Engineering Technicians.” Ahmadjian, Chris; Knodler, Michael; Fitzpatrick, Cole; Ryan, Alyssa; Bouchard, Chelsea, December 2018, NETCR111.

Papers and Presentations: The research team will present at the 2019 TRB Annual Meeting in Washington, D.C.

14-2 Investigation of Northern Long-Eared Bat Roosting Sites on Bridges
Reports: “Investigation of Northern Long-Eared Bat Roosting Sites on Bridges,” Civjan, Scott; Dumont, Elizabeth; Bennett, Alyssa; Berthaume, Angela; May 2017, NETCR100

Papers and Presentations:
Lunch and Learn and Project Summary Workshop for ME/VT/NH: Concord NH 3/13/17
Project Summary Workshop for MA/CT/RI: Westborough MA 3/24/17

14-4 Optimizing Future Work Zones in New England for Safety and Mobility
Reports: “Optimizing Future Work Zones in New England for Improved Safety and Mobility.” Xie, Yuanchang; Gartner, Nathan H.; Stamatiadis, Polichronis; Ren, Tianzhu; Salcedo, Gustavo, March 2018, NETCR104.

Papers and Presentations:
A paper entitled “Modelling Highway Work Zone Traffic Safety and Driver Behaviours in the United States Using a Virtual Reality Driving Simulator” has been accepted to the 2017 Road Safety & Simulation Conference to be held in The Hague, Netherland in October 2017.
A paper entitled “Cooperative Merging in Highway Work Zone Enabled by Connected and Autonomous Vehicles” has been accepted by the 2018
ASCE International Conference on Transportation & Development to be held in Pittsburgh, Pennsylvania on July 15-18, 2018.

Dr. Xie has been invited to give a talk at the 2018 TRB Annual Meeting. The title of his talk is “Cooperative Highway Work Zone Merge Control for Improved Mobility and Safety.”

15-1 Use of Forested Habitat Adjacent to Highways by Northern Long Ear Bats (and Other Bats)
Reports: None

Papers and Presentations: None

15-2 Using the New SHRP2 Naturalistic Driving Study Databases to Examine Safety Concerns for Teens and Older Drivers
Reports: None

Papers and Presentations: None

15-3 Moisture Susceptibility Testing for Hot Mix Asphalt Pavements in New England

Papers and Presentations: The research team participated in the VTrans Research Symposium that took place on September 12, 2018. For this symposium a poster and fact sheet were prepared in coordination with NETC.


Papers and Presentations: None

17-1 Quick Response: New England Connected Automated Vehicles

Papers and Presentations: None

17-2 Quick Response: Quantification of Research Benefits
Reports: None
Papers and Presentations: None