

NEW ENGLAND TRANSPORTATION CONSORTIUM QUARTERLY PROJECT PROGRESS REPORT

A. PROJECT NUMBER AND TITLE:

NETC 06-4 “Preventative Maintenance and Timing of Applications”

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Dr. Walaa Mogawer, P.E. University of Massachusetts Dartmouth

C. WEB SITE ADDRESS (*If one exists*):

http://www.uvm.edu/~transctr/?Page=netc/netc_fy/netc_fy2006.php#netc064

D. START DATE (*Per NETC Agreement*): 9/16/2013

E. END DATE (*Per NETC Agreement*): 9/15/2016

F. ANTICIPATED COMPLETION DATE:

9/15/2016

G. PROJECT OBJECTIVES:

The purpose of this project is to research existing best practices for pavement preventative maintenance strategies and adapt them to the unique variety of road conditions in New England (different traffic volumes, pavement materials, and northern climates). Additionally this research will attempt to outline pavement maintenance techniques and the inter-relationship with the timing of their application in New England. To meet the purpose of this project, the following objectives have been established:

1. Identify the components of a Pavement Preventive Maintenance (PPM) program.
2. Evaluate the state-of-the-practice relative to agencies (both US and worldwide) that have demonstrated successful implementation of a pavement preservation program. Identify both single treatment and multi-treatment strategies.
3. Use current and past projects as appropriate to evaluate techniques that have been successfully used to effectively extend the life of the pavement.
4. Identify and quantify the factors that influenced the successful implementation of a preservation technique, including time of treatment application in the existing pavement life cycle.
5. Validate the treatment parameters and methodologies using available tests for surface treatments as well as those for conventional flexible pavements (Hot Mix Asphalt mixtures) that might be modified to test these treatments
6. Determine the approximate cost for pavement preservation technique identified.
7. Develop an implementation pavement preservation manual for distribution to the state and local transportation agencies within the New England states.

H. REPORT PERIOD:

2015 Quarter 2 – April through June

I. ACCOMPLISHMENTS THIS PERIOD:

1. Work continued on the literature review for this project (Task 2).
2. The research team recently evaluated each of the projects provided by the participant states and the corresponding data in order to identify two suitable projects for optimal timing analysis and case study illustration. A memo was prepared and submitted to the project committee for review and comments.

J. PROBLEMS ENCOUNTERED (If any):

None

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

None during the current period.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task 1: Kick-Off Meeting (100%)

Task 2: Literature Review (50%)

Task 3: Internet Survey (80%)

Task 4: Assess Current Preventive Maintenance (PM) Practices in New England States (10%)

Task 5: Development of Pavement Preventive Maintenance Procedures for New England (10%)

Task 6: Laboratory and Field Testing (10%)

Task 7: Determination of Feedback Mechanism (0%)

Task 8: Development of Pavement Preventive Maintenance (PPM) Manual (0%)

Task 9: Training (0%)

Task 10: Preparation of the Final Report (0%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 30%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Continue work on the literature review. Compile and tabulate survey responses for Task 3 & 4.
Commence work on Task 5 & 6.

O. FINANCIAL STATUS:

As of: 06/31/15

Total Project Budget: \$ \$242,908.82

Total Expenditures: \$ 34,901.56

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 07-1 “In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations”

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Jo Sias Daniel, Ph.D., P.E., Department of Civil Engineering, University of New Hampshire

C. WEB SITE ADDRESS (If one exists):

<http://www.unh.edu/civil-engineering/materials>
<http://www.uvm.edu/trc/netc/netc-research-projects/ff-2007-research-projects/>

D. START DATE (Per NETC Agreement):

7/1/2013

E. END DATE (Per NETC Agreement):

3/31/2016

F. ANTICIPATED COMPLETION DATE:

*If different from the END DATE in paragraph E., the reason must be given. It is the responsibility of the Principal Investigator to insure that the project, including review of the draft report by the Project Technical Committee and the printing of the Final Report, is completed prior to the Agreement End Date. Costs incurred after the Agreement End Date cannot be reimbursed. **Requests for extensions of the Agreement End Date must contain the reasons for the request and be submitted so as to arrive in the Coordinator’s office at least 90 days prior to the Agreement End Date.***

3/31/2016

G. PROJECT OBJECTIVES:

The main objectives of this research are to:

- Determine the in-place properties of pavement cross-sections containing recycled materials common to the New England region
- Relate changes in those properties to variations in temperature and moisture, particularly during the spring thaw period

H. REPORT PERIOD:

2015 Quarter 2 – April through June

I. ACCOMPLISHMENTS THIS PERIOD:

This quarter has been focused on FWD testing at the NH and ME sites and analysis of the data. Regular FWD testing has been conducted at all four sites through the spring thaw and recovery period. Several additional FWD tests will be conducted to capture full recovery into the summer period. Analysis of the FWD data has focused on the adjusted center deflection (ACD) and various parameters that can be calculated directly from the deflection measurements. The frost – thaw depth plots with the adjusted center deflection measurements during the spring thaw and recovery period are shown in Figures 1-3 for Auburn, Waterford, and Warren Flats sites, respectively. The deflections increase to a maximum value shortly after full thaw occurs for each section. Gradual recovery has been observed in the Auburn and Warren Flats sites with the analysis that has been completed to date. The analysis for the Kancamagus site has not yet been completed.

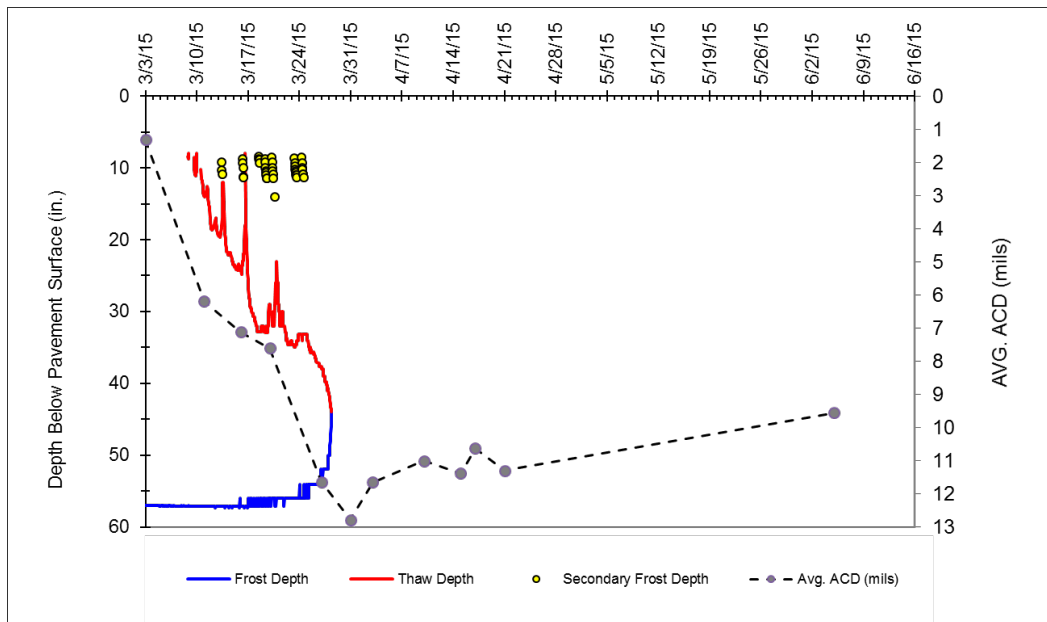


Figure 1 Frost-Thaw Depth and Average Adjusted Center Deflection for Auburn, ME

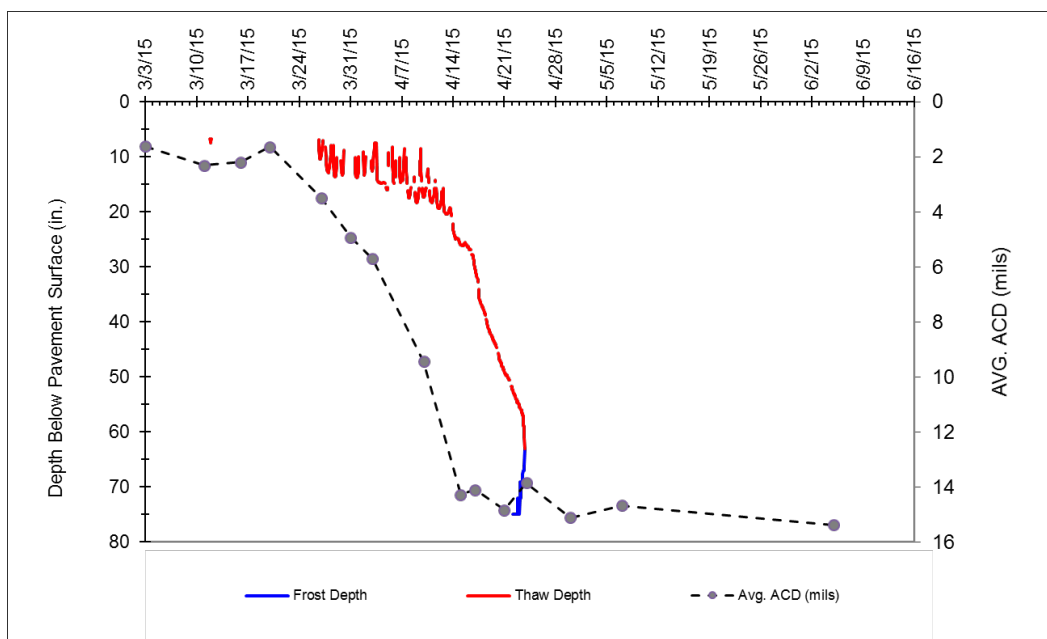


Figure 2 Frost-Thaw Depth and Average Adjusted Center Deflection for Waterford, ME

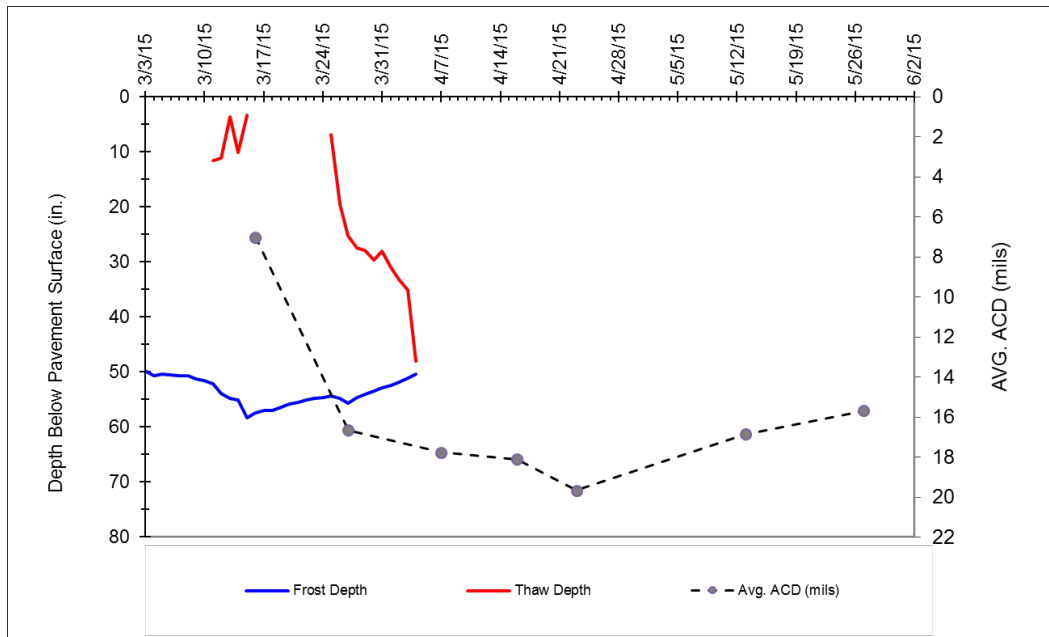


Figure 3 Frost-Thaw Depth and Average Adjusted Center Deflection for Warren Flats, NH

Figures 4-6 show examples of the FWD deflection analysis that the research team is conducting. Figure 4 shows the adjusted center deflection and corrected area parameter for the Auburn, ME site. Figures 5 and 6 show modulus values that are estimated from the measured FWD deflections. Similar plots for the Waterford, ME site were presented during the technical committee meeting on June 9, 2015. Similar analysis for the NH sites is underway.

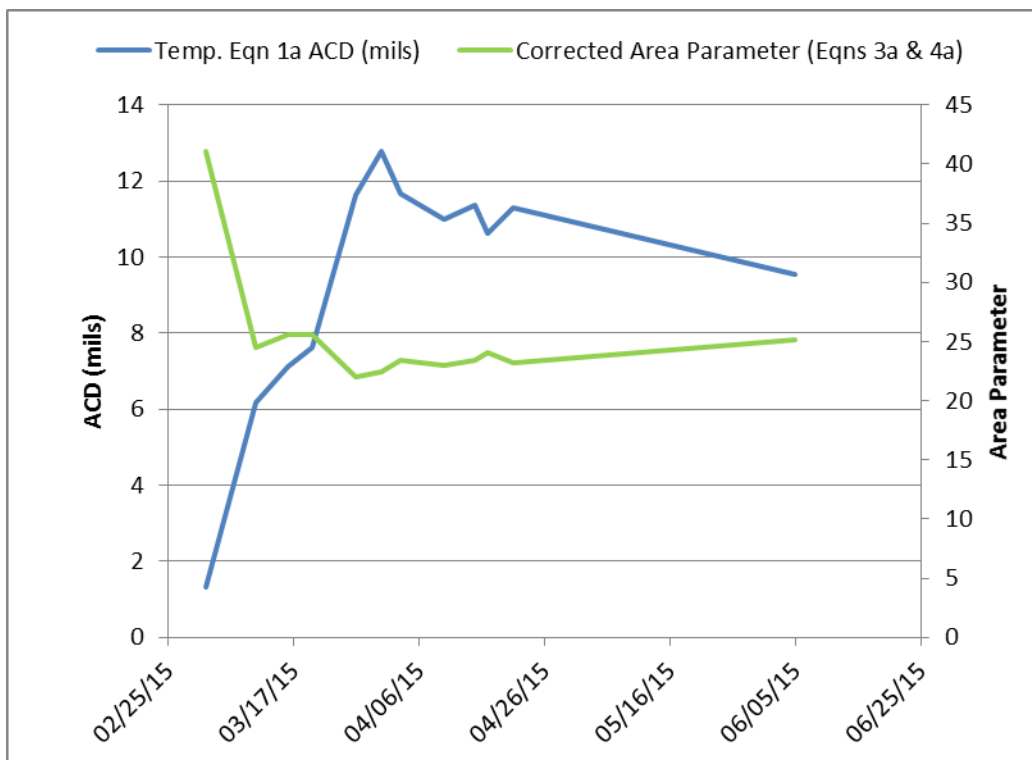


Figure 4 Adjusted Center Deflection and Deflection Area Parameter for Auburn, ME

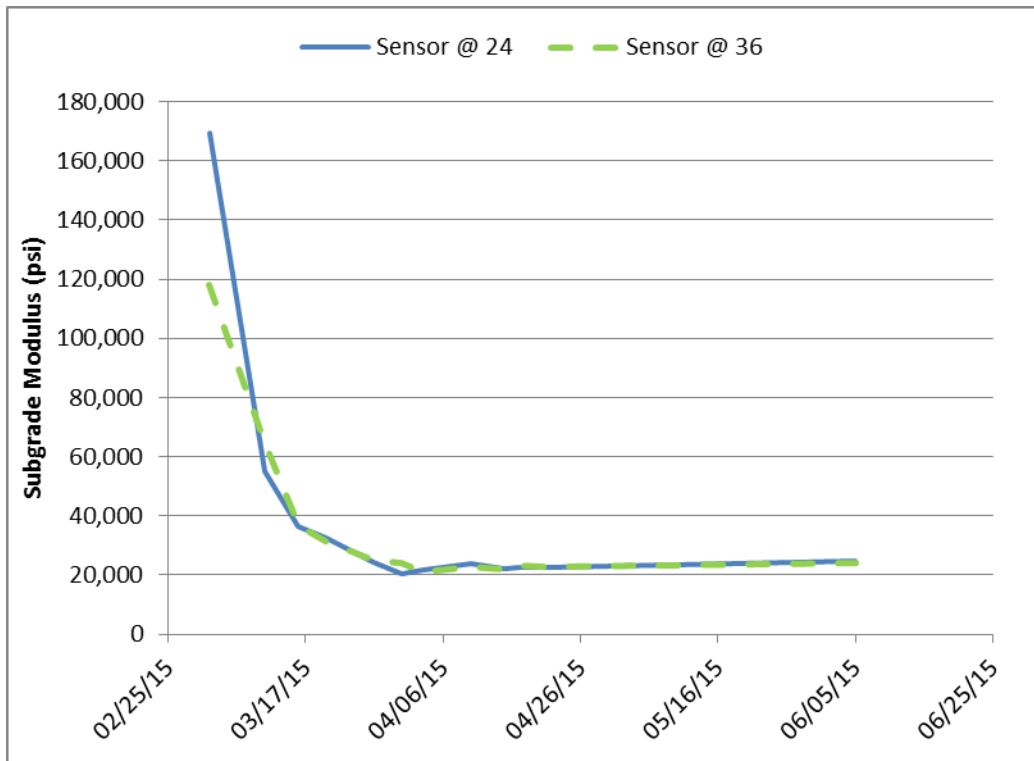


Figure 5 Subgrade Modulus Values Estimated from 24" and 36" FWD Sensors

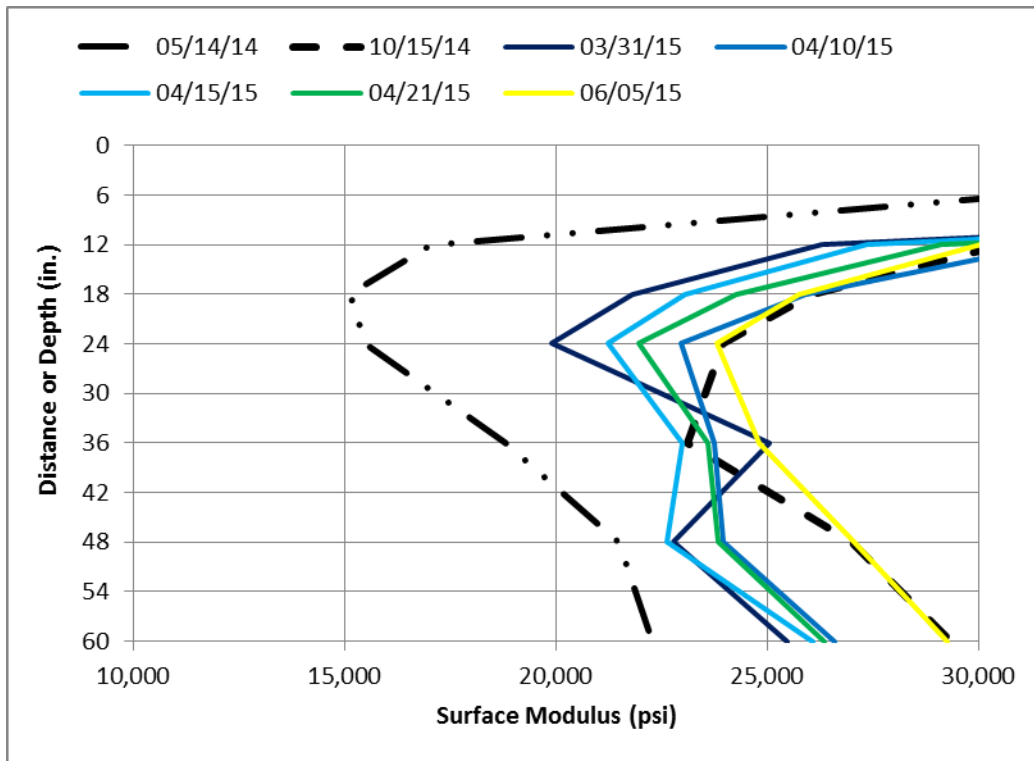


Figure 6 Modulus Values with Depth Estimated from FWD Deflection Measurements

J. PROBLEMS ENCOUNTERED (If any):

None during the current period.

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

Presentation to the technical committee on June 9, 2015.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task 1: Conduct Survey and Identify Potential Test Sites (100%)

Task 2: Select Test Sites and Develop Work Plan (100%)

Task 3: Execution of Work Plan (90%)

Task 4: Data Analysis (50%)

Task 5: Final Report (0%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 75%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

A few additional FWD tests will be conducted this quarter. The research team will complete the analysis of the FWD results in combination with the measurements from the in-place instrumentation. Pavement evaluation and back calculation of modulus values from the FWD testing will begin this quarter.

O. FINANCIAL STATUS:

As of: 7/2/15

Total Project Budget: \$ 198,154

Total Expenditures: \$ 116,054

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 09-2: "Effective Establishment of Native Grasses on Roadsides"

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Julia Kuzovkina, Cristian Schulthess, Robert Ricard, Department of Plant Science and
Landscape Architecture, University of Connecticut, Storrs, CT
Glenn Dryer, Director, Connecticut College Arboretum, New London, CT

C. WEB SITE ADDRESS (*If one exists*):

D. START DATE (*Per NETC Agreement*): 09/1/2013

E. END DATE (*Per NETC Agreement*): 02/28/2016

F. ANTICIPATED COMPLETION DATE: 02/28/2016

If different from the END DATE in paragraph E., the reason must be given. It is the responsibility of the Principal Investigator to insure that the project, including review of the draft report by the Project Technical Committee and the printing of the Final Report, is completed prior to the Agreement End Date. Costs incurred after the Agreement End Date cannot be reimbursed. Requests for extensions of the Agreement End Date must contain the reasons for the request and be submitted so as to arrive in the Coordinator's office at least 90 days prior to the Agreement End Date.

G. PROJECT OBJECTIVES:

To build a comprehensive knowledgebase for a gradual transition toward sustainable native roadside vegetation cover which will support transportation goals for safety and infrastructure reinforcement while providing economic, ecological and aesthetic advantages. The direct deliverables to the New England Departments of Transportation include the Manual with guidelines for the effective establishment of native grasses on roadsides in New England and a model for an accelerated adoption and commercialization of this novel ecological restoration approach.

A. REPORT PERIOD: 1/4/2015 - 6/30/2015

B. ACCOMPLISHMENTS THIS PERIOD:

The following activities were implemented during this reporting period:

Survey and Interviews:

The write-up of the interviews of the 5 New England DOT is in progress.

Establishment of the new demonstration sites along Rt. 6:

April 2015: CT DEEP was contacted to assist with the Truax drill and to provide an operator for the establishment of one demonstration site.

Establishment of the demonstration sites along Rt. 6:

May 7, 2015 and May 15, 2015 – new demonstration sites were sprayed with RoundUp non-selective herbicide

May 21, 2015 – some demonstration sites were mowed and raked

May 22, 2015 – a new trial for the establishment of the little bluestem with was planted using topsoil, hydromulch, straw, clayballs and sawdust at the site #1 along Rt.6.

May 28, 2015 – a site #2 was planted with the Truax seed drill

May 22, 2015 all sites along Rt. 6 were visited with Rebecca Brown (University of Rhode Island) to consult about the establishment of native grasses.

By-weekly site inspections were conducted throughout June to observe the germination and establishment rates.

C. PROBLEMS ENCOUNTERED (If any):

No problems were encountered during this reporting period.

D. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

No technology transfer activities are reported for this period.

E. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task1: Literature Review

Research the information resources to provide a synthesis of the knowledgebase relevant to the establishment and management of native grasses and forbs in New England. This literature review will survey scholarly articles, books, working papers and other relevant sources (dissertations, conference proceedings), providing a description, summary, and critical evaluation of the materials to determine which information sources make a significant contributions to the understanding of the topic of the potential of native grasses for roadside planting.

40% complete

Task 2: Interviews

Develop a questionnaire to invite New England DOT's to be the target audience to evaluate the current status of the use of native and exotic plants on roadsides, to assess the interest level in using native species, and to examine the likelihood of roadside managers adopting this approach.

90% complete

Task 3: Field Inspections/Testing

Identify native species with the best potential for roadside plantings in New England; identify ecotypes which should be recommended for New England. Develop effective establishment protocols through modification of existing approaches. Evaluate native grass tolerances and potential for degradation of roadside contaminants.

70% complete

F. PERCENT COMPLETION OF TOTAL PROJECT: 55%

G. ACTIVITIES PLANNED FOR NEXT QUARTER:

Complete the interview analyses and write-up. Continue writing a chapter about the establishment of the demonstration plots along Rt. 6. Evaluate the plots installed last fall. Establish additional experimental plots in May.

H. FINANCIAL STATUS:

As of: Month, Day, Year

Total Project Budget: \$ 80,000.00

Total Expenditures: \$57,320.38= \$ 36,162.05 (direct cost) + 21,158.33 (indirect cost)

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE: NETC 09-03: Advanced Composite Materials in New England's Transportation Infrastructure: Design, Fabrication and Installation of ACM Bridge Drain System

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s): Dr. Roberto Lopez-Anido P.E. University of Maine's Advanced Structures and Composites Center

C. WEB SITE ADDRESS: *www.composites.umaine.edu*

D. START DATE: September 1, 2013

E. END DATE (Per NETC Agreement): August 31, 2015

F. ANTICIPATED COMPLETION DATE: December 31, 2015

A no-cost extension was requested on May 20th to document FRP bridge drains installations at selected bridge sites. The Project Technical Committees approved this modification.

G. PROJECT OBJECTIVES:

1. Design and fabricate a standard FRP drain that can be produced economically for use throughout New England bridges; and
2. Install the fabricated drain system in two to three representative bridge applications in New England to provide information on its performance, ease of construction, and cost.

H. REPORT PERIOD: 4/1/2015 to 6/31/2015

I. ACCOMPLISHMENTS THIS PERIOD:

- Two teleconferences were held with the Project Technical Committee on May 20th and June 24th.
- The installation of FRP drains was documented at the Union Street westbound overpass bridge in Bangor, ME on June 3rd. The bridge visit was coordinated with the AASHTO Domestic Scan Team.
- A Dropbox folder was setup to share technical information with the Project Technical Committee.
- Task 4 – Product validation: baseline mechanical properties and durability
The draft reports summarizing baseline mechanical properties and durability performance based on coupon tests for three vendors were reviewed with the Technical Committee.
- Tasks 5 and 6 - Document installation of FRP drains in bridges
Contacted MaineDOT to coordinate the inspection of FRP drains installation in three bridges: 1) Westbrook Bridge, 2) Howland-Enfield Bridge, and 3) Union Street Eastbound Overpass Bridge. Develop an inspection protocol for FRP bridge drains

J. PROBLEMS ENCOUNTERED (If any):

None

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

- The final report for Tasks 1-3 was previously submitted to the Technical Committee. Some minor revisions are on going. The revised report will be submitted in the next period.
- The final report for Task 4 will be submitted to the Technical Committee in the next period.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

M. PERCENT COMPLETION OF TOTAL PROJECT: 81%

Task	Percent of project	Percent complete
1 - Review of typical bridge drains	10%	99%
2- Develop standard drain requirements	40%	99%
3 - Identify and contact FRP manufacturers	10%	100%
4 -Baseline mechanical properties and durability	10%	85%
5 - Coordinate installation at demonstration bridges	10%	10%
6 - Document drain condition after installation	10%	65%
7 - Prepare final reports	10%	50%
	100%	81%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

- Submit draft report for Task 4 summarizing test data and discussing compliance with specifications.
- Generate feedback from manufacturers on minimum allowable baseline and durability values for mechanical properties, and assurance on field performance and durability
- Coordinate with DOTs inspection and documentation of bridge drain installations.

O. FINANCIAL STATUS:

As of: June 26th, 2015

Total Project Budget: \$ 165,000

Total Expenditures: \$ 134,914

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 10-3 “Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology”

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Professor Walaa S. Mogawer, PE, F.ASCE, Highway Sustainability Research Center (HSRC), University of Massachusetts

C. WEB SITE ADDRESS (If one exists):

http://www.uvm.edu/~transctr/?Page=netc/netc_fy/netc_fy2010.php#netc103

D. START DATE (Per NETC Agreement):

9/16/2013

E. END DATE (Per NETC Agreement):

9/15/2016

F. ANTICIPATED COMPLETION DATE:

*If different from the END DATE in paragraph E., the reason must be given. It is the responsibility of the Principal Investigator to insure that the project, including review of the draft report by the Project Technical Committee and the printing of the Final Report, is completed prior to the Agreement End Date. Costs incurred after the Agreement End Date cannot be reimbursed. **Requests for extensions of the Agreement End Date must contain the reasons for the request and be submitted so as to arrive in the Coordinator’s office at least 90 days prior to the Agreement End Date.***

9/15/2015

G. 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 20°C. The test(s) selection will be based, as described later in the proposal, 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.

H. REPORT PERIOD:

2015 Quarter 1 – April through June

I. ACCOMPLISHMENTS THIS PERIOD:

1. UMass Dartmouth contacted Tilcon CT about reproducing the mixtures produced in October 2014 that did not meet the required volumetric properties.
2. UMass Dartmouth contacted the other contractor (Palmer Paving) who agreed to produce mixture for this study. This contractor stated that they will produce the mixtures in April or May 2015.
3. An additional contractor was contacted (PJ Keating) to determine if they would help with producing the mixtures for this study in the event one of the selected contractors cannot supply the mixtures.

J. PROBLEMS ENCOUNTERED (If any):

The research team has been making arrangements with contractors to provide plant produced mixtures as stated in the scope of work. However, only once did a contractor provide mixtures. Unfortunately, these mixtures did not meet the target volumetric criteria and accordingly were omitted from further study. The research team has been in negotiation with one contractor located in Massachusetts in the hope of getting the mixtures produced this summer. If this contractor or the other contractors cannot supply the mixtures, the research team will propose using lab produced mixtures instead of plant produced mixtures. The PI will plan a conference call meeting in early fall to give the committee an update.

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

None during the current period.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task 1: Literature Review (80%)

Task 2: Determine Critical Information (60%)

Task 3: WMA Technologies Selection Process (50%)

Task 4: Identify Moisture Susceptibility Test (25%)

Task 5: Development of a Testing Matrix (60%)

Task 6: Obtain Plant Produced Samples (15%)

Task 7: Laboratory Testing of Plant Produced Samples (0%)

Task 8: Prepare a Final Report (0%)

Task 9: Execute Implementation Plan (0%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 40%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

UMass Dartmouth will attempt to obtain and begin testing the plant produce mixtures.

O. FINANCIAL STATUS:

As of: 6/31/15

Total Project Budget: \$ 150,157.70

Total Expenditures: \$ 30,276.15

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 13-1: Development of High Early-Strength Concrete for Accelerated Bridge Construction Closure Pour Connections

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Sergio F. Breña (PI) – University of Massachusetts Amherst
Scott A. Civjan (Co-PI) – University of Massachusetts Amherst

C. WEB SITE ADDRESS (*If one exists*):

D. START DATE (*Per NETC Agreement*): September 01, 2014

E. END DATE (*Per NETC Agreement*): April 02, 2016

F. ANTICIPATED COMPLETION DATE: August 31, 2016

A no cost extension is expected to be requested to accommodate the current coordination contract that NETC has with the University of Vermont. The proposed project period was for 24 months.

G. 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.

H. REPORT PERIOD: April 01, 2015 – June 30, 2015

I. ACCOMPLISHMENTS THIS PERIOD:

Task 1: Literature Search

- Progressed on written summary of the literature review including main findings of relevant research reports, technical papers and survey responses.
- Performed additional literature review to obtain research reports and technical papers to assist in further development of mix design trial batches.

Task 3: Develop Mix Design

- Tested 7 concrete mix design trial batches initially based off of a state-of-practice mix design, and compared test results using compressive strength tests on 4 by 8 in. cylinders and workability. The adjustments made to the state-of-practice mix design throughout the 7 trial batches include decreased maximum coarse aggregate size, elimination of fly ash, modification of admixture quantities and variation of the water-to-cement ratio.
- Developed new base mix design using proportioning specified in ACI 211.4-R: Guide for Selecting High-Strength Concrete Using Portland Cement and Other Cementitious Materials.

Task 4: Test Mixture

- Shrinkage test (AASHTO PP 34-99) setup has been fully designed and fabricated nearly to completion.

J. PROBLEMS ENCOUNTERED (If any):

No problems encountered to date.

K. TECHNOLOGY TRANSFER ACTIVITIES:

No technology transfer activities were performed.

L. STATUS BY TASK:

Task 1: Literature Search – 85% complete

Task 2: Develop Mixture Design Specification – 35% complete

Task 3: Develop Mix Design – Trial batches being developed –25%

Task 4: Test Mixture – Experimental test setups are being designed and prepared (5%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 35 %

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Task 1: Literature Search

- Continue working on written summary of the literature review including main findings of relevant research reports, technical papers and survey responses.
- Continue literature search as required.

Task 2: Develop Mixture Design Specification

- Adjust existing concrete mix design specifications based on feedback from the NETC Project Technical Committee (**pending feedback from committee**).

Task 3: Develop Mix Design

- Adjust the newly proportioned mix design (ACI 211.4R proportions) to obtain required strength and sufficient workability.
- Test preliminary concrete mixtures that reach compressive strength goal and qualitatively acceptable workability for remaining initial short-term performance criteria (set time, air content and slump).

Task 4: Test Mixture

- Complete fabrication of shrinkage test (AASHTO PP 34-99) setup. Execute practice tests using the test setup.
- Begin design and fabrication of bar pullout test (ASTM A944) setup.

O. FINANCIAL STATUS:

As of: June 30, 2015

Total Project Budget: \$ 174,923

Total Expenditures : \$ 50,947

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 13-2 “HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures”

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Professor Walaa S. Mogawer, PE, F.ASCE, Highway Sustainability Research Center (HSRC), University of Massachusetts

C. WEB SITE ADDRESS (*If one exists*):

<http://www.uvm.edu/trc/netc/netc-research-projects/ffy-2013-research-projects/>

D. START DATE (*Per NETC Agreement*):

06/01/14

E. END DATE (*Per NETC Agreement*):

05/31/16

F. ANTICIPATED COMPLETION DATE:

05/31/16

G. PROJECT OBJECTIVES:

The goal of this research will be to evaluate plant-produced HMA mixtures that contain RAS to identify the critical material properties and plant operations that are needed to produce RAS mixtures with fatigue and low temperature cracking properties equivalent (or better than) typical mixtures that are produced. In order to accomplish this goal, the following research objectives are proposed:

1. Determine the current state-of-practice with regards to 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 (i.e. use higher temperatures, longer silo storage times 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.

H. REPORT PERIOD:

2015 Quarter 2– April through June

I. ACCOMPLISHMENTS THIS PERIOD:

1. UMass Dartmouth continued to contacted several producers of asphalt mixtures in New England about their availability and willingness to participate in the study. Finally, once contractor stated that his company will help the research team with the study.
2. The literature review for this project is almost completed.

J. PROBLEMS ENCOUNTERED (If any):

None

K. TECHNOLOGY TRANSFER ACTIVITIES: *List any reports, papers, presentations published/presented during the report period or anticipated for the next quarter.*

None during the current period.

L. STATUS BY TASK: *Show Work Task Number, description and % complete for each task including those completed, those underway, and those not started.*

Task 1: Kick-Off Meeting (0%)

Task 2: Literature Review (80%)

Task 3: Determine Critical RAS Information (0%)

Task 4: Determine Regional Asphalt Mixture Producers in New England with Capabilities and Willingness to Produce Mixtures Incorporating RAS for this Study (15%)

Task 5: Assist Producers in Evaluating the Properties of the RAS and RAP to be used in Production (0%)

Task 6: Assist Producers in Developing Laboratory Mixture Designs Utilizing RAS and Determine Actual RAS Binder Contribution to Mixtures (0%)

Task 7: Produce and Obtain Plant Produced RAS Mixtures (0%)

Task 8: Vary Production Parameters (Temperatures, Silo Storage, etc.) to Obtain Similar Virgin and RAS Mixtures (0%)

Task 9: Construct Test Matrix and Evaluate the Performance of the Plant-Produced Mixtures (0%)

Task 10: Identify Critical Material Properties and Plant Operations that Yield RAS Mixtures with Performance Properties Equivalent to Typical All-Virgin Material Mixtures (0%)

Task 11: Develop a Plant Guideline for the Use of RAS in Virgin and RAP Mixes (0%)

Task 12: Prepare a Final Report (0%)

Task 13: Execute Implementation Plan (0%)

M. PERCENT COMPLETION OF TOTAL PROJECT: 10%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

Complete Literature Review. The contractor (PJ. Keating) will deliver the virgin materials (asphalt binder, aggregates, and shingles) that will be used in producing the mixture. UMass will start developing mixture designs.

O. FINANCIAL STATUS:

As of: 06/31/15

Total Project Budget: \$ 249,784.92

Total Expenditures : \$ 5,000

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE: NETC 13-3

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s): Eshan V. Dave, University of New Hampshire

C. WEB SITE ADDRESS (*If one exists*):

D. START DATE (*Per NETC Agreement*): 3/27/2015

E. END DATE (*Per NETC Agreement*): 3/31/2016

F. ANTICIPATED COMPLETION DATE: 3/31/2016

G. PROJECT OBJECTIVES:

- (1) Review of current QA process used by New England DOTs for precast and prestressed concrete elements (PCE/PSE).
- (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.

H. REPORT PERIOD: 1/1/2015 – 3/31/2015

I. ACCOMPLISHMENTS THIS PERIOD:

During this past quarter good progress was made in this study. The researchers reviewed a number of specifications and QA process documents from various New England State DOTs as well as continued the literature review on the topic. The project kick-off meeting was held at University of New Hampshire on April 30th. The meeting aided in refining the research activities and also aided in making initial contact with the various DOT personnel involved with the study. The meeting also helped refine the interview questionnaire prepared by researchers.

Co-PI of the project is also involved in developing inspector training course for NETTCP for PCE/PSE. The pilot for this course was taught during this quarter and was attended by the student working on the project.

During this quarter the researchers visited three DOTs (NH, ME and RI) as part of the QA process reviews through interview of DOT engineers and QA inspectors. All interviews have already been transcribed and the information is being processed towards developing a common acceptance standard for PCE/PSE.

J. PROBLEMS ENCOUNTERED (If any): None

K. TECHNOLOGY TRANSFER ACTIVITIES: None

L. STATUS BY TASK:

Task 1: State of the Practice Review: A literature review on common acceptance standard is completed and is being converted into a write-up. The visit of DOTs for QA process review is completed for three agencies. The information from those visits is already processed and documented.

Task 2: Development of Common Acceptance Standards for PCE/PSE: Information from the literature review and the visits to three DOTs has allowed some preliminary formations of the framework for common acceptance standards. This process will continue with the additional visits to remaining DOTs as well as PCE/PSE fabricator.

Task 3: Reporting and Technical Committee Meetings: No progress to report.

M. PERCENT COMPLETION OF TOTAL PROJECT: ____20____%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

- Interview with DOT engineers and QA inspectors for CT, MA and VT
- Visit of PCE/PSE facility and interview of fabricator(s) as well as New England PCI
- Development of draft common acceptance standards

O. FINANCIAL STATUS:

As of: 7/1/2015

Total Project Budget: \$ 100,000

Total Expenditures: \$ 91,354.90

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.

**NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT**

A. PROJECT NUMBER AND TITLE:

NETC 14-2: Investigation of Northern Long-Eared Bat Roosting Sites on Bridges

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):

Scott A. Civjan (PI) – University of Massachusetts Amherst
Elizabeth Dumont (Co-PI) – University of Massachusetts Amherst
Alyssa Bennett (External Research Associate) – VT Fish and Wildlife department

C. WEB SITE ADDRESS (*If one exists*):

D. START DATE (*Per NETC Agreement*): February 01, 2015

Notice to Proceed received May 07, 2015

E. END DATE (*Per NETC Agreement*): April 02, 2016

F. ANTICIPATED COMPLETION DATE: April 02, 2017

As discussed with the NETC coordinators and at the Kick-off Meeting with the Project Technical Committee a no cost extension is expected to be requested to accommodate the Notice to Proceed date. The proposed project period was to initiate in February, but notice to proceed was not received until May 07, 2015. This reduced the field work possible in the first summer of the project which is critical to the project success and will need to be concluded in summer 2016.

G. PROJECT OBJECTIVES:

The main objective of the proposed research project is to develop a screening tool and to demonstrate its accuracy in determining the presence of NLEB roosting in New England bridges. Additional information will be collected and disseminated related to preferred structural types for bat roosting, New England bat population distributions and evaluation of existing public data already collected by State Fish and Wildlife Departments and Transportation Agencies throughout New England.

H. REPORT PERIOD: April 01, 2015 – June 30, 2015

I. ACCOMPLISHMENTS THIS PERIOD:

- Kick –off meeting on May 18, 2015
- Literature review completed including searches in databases, web searches and contact with researchers and relevant organizations
- Phone interviews with Fishery and Wildlife, DOT and other organization personnel completed
- Joined and posted inquiries regarding bats in bridges to relevant listserv groups
- Acoustic monitoring equipment ordered and partially received
- Infra-red camera ordered and received
- Miscellaneous supplies purchased for field work
- Advertising, interviewing and hiring of two undergraduate research assistants completed
- Training by Alyssa Bennett completed for Scott Civjan, Angela Berthaume and Helen Yurek
- Initial use of acoustic monitoring equipment at VT bridge site known to have active bat roosting.
- GIS software set up to integrate maps with National Bridge Inventory to determine routes for visual screening and instrumentation

- Rapid visual screening of over 70 bridges in VT, NH, RI and MA to evaluate for signs of roosting to narrow down instrumented structures

J. PROBLEMS ENCOUNTERED (If any):

- Notice to proceed was three months past the project start date. The project relies on data collected during summer months, requiring work during summer 2016 to complete the project.
- Project notice to proceed precludes any 2015 data from early season (pre-maternity roosting).
- Interactions with Fish and Wildlife, DOT and other organization personnel did not identify any new bridges with known or likely bat presence (per Tasks 1 and 3). Therefore more effort than anticipated will be involved in rapid visual screening of bridges to identify specific bridges for monitoring program. Currently over 70 bridges have been screened in VT, NH, RI and MA by the project team while awaiting equipment. Based on these initial interviews it is expected that the scope of Task 3 will need to be revised.
- Acoustic monitoring equipment was on backorder, most received in late June.
- External battery cables and Sonobat software are still not received by UMass.
- Personnel on project will differ from proposed. Two undergraduate research assistants have been hired to assist a graduate student (funded by NSF scholarship) working on the project. This will be re-evaluated for the second year.

K. TECHNOLOGY TRANSFER ACTIVITIES:

No technology transfer activities were performed.

L. STATUS BY TASK:

Task	% Complete
Task 1: Knowledge Summary including Literature Search	85%
Task 2: Regional Habitat Requirements	75%
Task 3: Create Standard Protocol and Survey Inspection Personnel	20%
Task 4: Protocol Survey of Bridges, Implementation and Field Observations	
4.1 Protocol Survey	0%
4.2 Implementation and Field Observations	0%
Task 5: Final Report	0%

M. PERCENT COMPLETION OF TOTAL PROJECT: 15 %

N. ACTIVITIES PLANNED FOR NEXT QUARTER:

- Rapid visual screening of bridges in Western MA, ME and Northern NH
- Acoustic monitoring and thermal imaging of at least nine bridges during maternity roosting season
- Acoustic monitoring and thermal imaging of at least nine bridges during post-maternity roosting season
- Initial evaluation of data
- Initial reporting of bridge characteristics including signs of structural causes of staining and signs of possible bat roosting

O. FINANCIAL STATUS:

As of: June 30, 2015

Total Project Budget: \$ 205,554

Total Expenditures: \$ 42,949.91

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.