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NEW ENGLAND TRANSPORTATION CONSORTIUM

NETCR95 February 2015

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NEW ENGLAND TRANSPORTATION CONSORTIUM

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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
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 “Round”.

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.
2014 HIGHLIGHTS

1. THE FOLLOWING NETC-FUNDED TRANSPORTATION RESEARCH PROJECTS, VALUED AT $1,385,929 WERE ACTIVE AT NEW ENGLAND STATE UNIVERSITIES IN 2014:

   a. **University of Massachusetts: $817,775**
      - Dr. Walaa Mogawer (Dartmouth):
        - “Preventative Maintenance and Timing of Applications”
        - “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”
      - Dr. Sergio F. Breña (Amherst):
        - “Development of High-Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections”

   b. **University of New Hampshire: $198,154**
      - Dr. Jo-Sias Daniel:
        - “In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations”

   c. **University of Rhode Island: $125,000**
      - Dr. Sze Yang:
        - “Measurement of Adhesion Properties between Topcoat Paint and Metalized/Galvanized Steel with ‘Surface-Energy’ Measurement Equipment”

   d. **University of Connecticut: $80,000**
      - Dr. Julia Kuzovkina:
        - “Effective Establishment of Native Grasses on Roadsides”

   e. **University of Maine: $165,000**
      - Dr. Roberto Lopez-Anido:
        - “Advanced Composite Materials: Prototype Development and Demonstration”
2. TECHNOLOGY TRANSFER:

a. Requests for Information and Technical Assistance: The NETC Coordinator’s office responded to the following requests:

- **Delaware Concrete Pavement (SPS-2) Tech Day**: The Advisory Committee member from RIDOT requested that the NETC Coordinator distribute information about the Tech Day to the entire NETC network.
- **URI Korea Winter J Term Program**: Professor K. Wayne Lee from URI requested that the NETC Coordinator distribute information about the program to the entire NETC network.
- **Association of Modified Asphalt Producers** Now accepting scholarship applications (AMAP): Mark Felag from RIDOT requested that the NETC Coordinator distribute information about the scholarship to the entire NETC network.

b. Conference Attendance and Exhibiting: The NETC Coordinator’s office attended the following conferences and events:

- **Transportation Research Board 94th Annual Meeting**: The NETC Coordinator attended this meeting as per the Advisory Committee’s recommendation. The recommendation is to attend the Annual TRB conference every year to review any activities related to subjects that are currently being researched through the NETC. (January 2014)
- **Northeast Pavement Preservation Partnership Annual Meeting**: The NETC Coordinator attended this meeting in an effort to improve our efforts to collect Research Problem Statements by collaborating with New England Technical Groups like NEPPP. (April 2014)
- **Annual New England Materials & Research Engineer’s Meeting**: The NETC Coordinator attended this meeting, as per the Advisory Committee’s recommendation, to keep updated on current research in New England. The NETC also provided sponsorship for the event. (May 2014)
- **Northeast Association of State Transportation Officials**: The NETC Coordinator attended and exhibited at this meeting, as per the Advisory Committee’s recommendation. (June 2014)
- **AASHTO 2014 Research Advisory Committee Meeting**: The NETC Coordinator attended this meeting as per the Advisory Committee’s
recommendation. The recommendation is to attend the Annual RAC conference every year, but only exhibit every four years when the meeting is held in our region. (July 2014)

• 90th Annual Meeting of the North Eastern States Materials Engineers’ Association. The NETC Coordinator attended this meeting, as per the Advisory Committee’s recommendation, to keep updated on current research in New England. The recommendation is to attend on an as-needed basis, and not to exhibit. (October 2014)

c. NETC Research Project Reports, Technical Papers and Presentations:

- Research Project Reports: Findings from the following research projects were distributed to: New England’s State Transportation Agencies and State Universities, The American Association of State Highway and Transportation Officials’ Region 1 Research and Advisory Committee, The National Technical Information Service, and the US Department of Transportation’s National Transportation Library:


- Technical Papers and Presentations: There were no technical papers or presentations in 2014.

3. OTHER:

a. Extended TPF-5(222): The end date for the Transportation Pooled Fund with Vermont as the lead state was originally scheduled to end in 2014. The Advisory Committee voted to extend the TPF for an additional 4 years, so now it is set to end in 2018. This will allow for research and services to continue uninterrupted.

b. Closed out SPR-3(089): The NETC is funded using Transportation Pooled Fund (TPF) accounts. Previously, they were referred to as SPR accounts. SPR-3(089) was the active account when Connecticut was the lead state for the NETC. In 2014, ConnDOT and FHWA-CT worked together to officially close out SPR-3(089). The remaining funds are now being transferred to the active TPF-5(222).
PROGRESS OF ACTIVE PROJECTS

PROJECT NUMBER: 05-5

PROJECT TITLE: Measurement of Adhesion Properties Between Topcoat Paint and Metallized/Galvanized Steel with Surface Energy Measurement Equipment

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Sze C. Yang, PI, and K. Wayne Lee, Co-PI, University of Rhode Island

STATUS: Continuing


ANTICIPATED COMPLETION: 9/23/2013

PROJECT OBJECTIVES:

1. Compare the adhesion properties of NEPCOAT-approved topcoat paint over metallizing to topcoat paint over galvanizing using specialized “surface-energy” measuring lab methods. As a control the adhesion properties of topcoat paint over zinc primer painted steel substrates will also be measured.
2. Investigate various factors affecting the adhesion of topcoat paint over galvanizing.
3. Report and recommend practices which produce the best adhesion of NEPCOAT-approved topcoat paints over metalized and particularly galvanized steel surfaces.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2014:
Final Report was distributed in September 2014.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014:

PROJECT NUMBER: 06-4

PROJECT TITLE: “Preventative Maintenance and Timing of Applications”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Dr. Walaa Mogawer, P.E. 
University of Massachusetts Dartmouth

STATUS: Open

AGREEMENT TERM: 9/16/2013 – 9/15/2015

ANTICIPATED COMPLETION: 9/15/2015

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.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2014:
• UMass Dartmouth hosted the project Kick-Off Meeting on February 12th, 2014. UMass Dartmouth continued work on the literature review and internet survey.
• UMass Dartmouth received data on CDs from NHDOT and is in the process of reviewing the data to include in the research project. UMass Dartmouth continued work on the literature review and internet survey.
• In September 2014, UMass Dartmouth formally requested a no additional cost time extension for this project of twelve month (new end date 9/15/2016). The research team is requesting the extension in order to include more new pavement preservation projects ongoing in the New England states. New Hampshire DOT provided valuable data
during the last quarter to include in the project and the research team is currently seeking similar data from the remainder of the New England state transportation agencies. Furthermore, the research team is still investigating the best vender to purchase the needed testing devices required for Task 6. Furthermore, more time is needed for field evaluation of the preservation projects included in the study. These evaluations will help identify the best time for applying a pavement preservation which is the main scope of the project. UMass Dartmouth is waiting for a response on this time extension request. UMass Dartmouth continued work on the literature review and internet survey (Task 2 and 3).

• A new contract was prepared for the consultant Mr. David Peshkin.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
PROJECT NUMBER: 07-1

PROJECT TITLE: “In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations”

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Jo Sias Daniel, Ph.D., P.E., Department of Civil Engineering, University of New Hampshire

STATUS: Open


ANTICIPATED COMPLETION: 3/31/2016

PROJECT OBJECTIVES: The main objective of this research is to determine the in-place properties of pavement cross-sections containing recycled materials common to the New England region, and to relate changes in those properties to variations in temperature and moisture. The study will focus primarily on obtaining field data from base layers (as opposed to asphalt surface layers) that have been constructed with different types of unbound or bound recycled layers such as full depth reclamation (with or without stabilizing additives), plant mix recycled asphalt pavement (PMRAP), or foamed asphalt. The research team will work with the NETC advisory board members to identify appropriate field sites where the pavement design is clearly documented and where pavement performance can be linked to factors such as traffic loadings, moisture regimes and freeze-thaw effects. Laboratory testing will also be included to complement the analysis of in-place test data and instrumentation monitoring.

The importance of testing reclaimed layers with Falling Weight Deflectometer, evaluating the response at the different times of the year, and utilizing good practices during mix design and construction have been emphasized by multiple researchers. Based on their conclusions, the following testing and analysis plan is proposed for the study. In order to accomplish this research, five tasks have been established and are broken into two Phases.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2014:

- The research team began testing on the two existing sites in NH. The Warren Flats site was tested on February 21 and on March 21. On both dates, thermistor data suggests that there was some temporary thawing down to about 5 inches beneath the top of pavement. In between those temporary thawing events, there have been refreezing events. Based upon forecast air temperatures and cumulative thawing indices, it is anticipated that the current thawing event (beginning March 28) is likely to continue with minimal or no refreezing. The first Kancamagus testing will thus likely be during early thaw conditions; frozen conditions will be tested in 2015. Testing of both the Warren Flats and Kancamagus sites will continue through the next quarter, to capture stiffness data during the thaw-weakened period as well as the recovery period. The research team has also been working with the ME DOT to identify an appropriate location for instrumentation on the PMRAP Waterford/Norway project.
- Identification and partial instrumentation of two new sites in ME.
• Instrumentation and testing of soils samples from the two new ME sites. ME Instrumentation Sites: The site located in Waterford, ME on Rt 118 was instrumented last quarter and the paving was completed over the summer. The site located on Rt 122 in Auburn ME was instrumented on August 21, 2014 once the full-depth reclamation with emulsion was done and before the surface layer was placed. The post for the data logger at this site will be installed in the coming quarter and data collection will begin. Field and Lab Tests for ME sites: During drilling operations for instrument installation, standard penetration testing (SPT) was conducted, and samples were obtained for laboratory testing. In the lab, sieve analysis and moisture content determination were performed on each sample, and then each sample was classified according to the USCS and AASHTO classification systems.

• The instrumentation of the Auburn, ME site on Rt. 122 was completed and ME DOT conducted baseline FWD testing for the two sites. The research team contracted with Mr. Bob Eaton to have data loggers installed at the three NH Kancamagus sections to collect hourly temperature in the pavements through the winter and spring thaw period. The research team has also contracted with CRREL to conduct the FWD testing on the Warren Flats and Kancamagus sections during the winter and 2015 spring thaw and recovery season. ME DOT has generously agreed to conduct the FWD testing at the two ME locations during the winter and 2015 spring thaw and recovery season. The proposed plan for the FWD testing is listed below:
  1. Fall baseline (completed)
  2. Frozen condition (Jan/early Feb)
  3. Pre-thaw (late Feb/early March)
  4. Weekly during thaw and early recovery
  5. Bi-weekly through recovery
  6. Early July

• If possible, early thaw and refreeze events will also be captured. The research team will be monitoring the temperature data and air temperatures to determine the appropriate timing for the FWD teams to begin the weekly testing to capture the spring thaw. The research team held a web conference with the technical committee on December 5th to discuss the project status and plans. Additional questions were received after the meeting from TC member David Kilpatrick and the research team sent a response to all TC members on December 22nd.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
PROJECT NUMBER: 09-2

PROJECT TITLE: “Effective Establishment of Native Grasses on Roadsides”

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

STATUS: Open


ANTICIPATED COMPLETION: 2/28/2016

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.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2014:
• Two investigators – Kuzovkina and Dreyer – attended the Ecological Landscape Symposium: New Directions in the American Landscape on January 9-10, 2014 at the Connecticut College Arboretum to gather relevant information for the Manual and to meet the practitioners in the field of ecological restoration. Kuzovkina and Schulthess conducted the candidate search and interviewing through the American Society for Horticultural Sciences for the Graduate Assistant position to work on this project. February 26, 2014 all co-PIs and candidate for the Graduate Assistant John Campanelli met with the practitioner Larry Weaner at the Connecticut College Arboretum to discuss the selection of native grasses for demonstration sites along Rt. 6 in Connecticut. January-March 2014 all co-PIs conducted the literature search to access all relevant information for the Manual. February-March 2014 – development of the specifications of native grass plantings for the demonstration sites. 5 March, 2014 – phone discussion with Colonial Seed LLC about the plant specifications for the demonstration sites. February-April 2014 communication with Dr. Rebecca Brown from the University of Rhode Island about the project: development of the bluestem ecotype study and discussion of the specifications for the demonstration sites. March 25, 2014 – Kuzovkina visited the University of Delaware to communicate with the colleagues – Susan Barton and Valann Budischak – working on similar DOT project in Delaware. Discussion about saw-dust establishment protocol. March 29-31, 2014 – John Campanelli initiated seed ordering from Ernst Conservation Co.
• John Campanelli was hired for the Graduate Assistant position to work on this project. He conducted the literature search for the appropriate mixture of native seeds to establish demonstration plots.
April 12 – Cristian Schulthess and John Campanelli collected soil samples from the proposed demonstration sites along Rt. 6

April 23 Kuzovkina and Schulthess met with Don Woodall from Colonial Seed Co at the road sites to discuss the project

Colonial Seed Company, CT was consulted during April-May for the protocols suitable for the establishments of demonstration plots.

CT DOT managers were contacted in order to obtain the permit for the establishment of three demonstration sites along Rt. 6. The meeting with the DOT managers was scheduled for May 9 2014 to inspect the sites to confirm the suitability of obtaining permit. The permit was obtained on May 14, 2014.

May 20, 2014 all co-PIs, Colonial Seed Co and other consultants on the project met at the proposed demonstration sites along Rt. 6 to confirm the establishment protocols. The seeding protocols include the use of a seed drill, hydroseeding, use of sawdust, and use of a Jacobsen overseeder.

CT DEEP was contacted to assist with the Truax drill and to provide an operator for the establishment of one demonstration site. Uconn Landscaping was scheduled to conduct the hydroseeding, and Colonial Seed to conduct the overseeding.

Establishment of the demonstration sites along Rt. 6:

May 14, 2014 – all demonstration sites were sprayed with RoundUp non-selective herbicide

May 21, 2014 – all demonstration sites were mowed and raked

May 27, 2014 – a site with saw-dust application was planted

May 28, 2014 – a site was hydroseeded with two levels of mulch

May 29, 2014 – a site was planted with the Truax seed drill

June 3, 2014 – a site was seeded with the Jacobsen overseeder.

June 11, 2014 – two botanists from the Arnold Arboretum visited the sites to conduct a survey of existing native and introduced vegetation along Rt. 6.

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

July 8, 2014 Inspection of the demonstration sites with Mark Lavoi from the Colonial Seed Co to assess the early establishment success of plantings and herbicide needs.

Campanelli visited a meadow in Western Connecticut installed by the DEEP using a TRUAX seed drill in spring 2014 (Trust Land location: 262 Grantville Rd, Winsted, CT).

November 21, 2014: Native plant specialist Mark Brownlee from American Native Plant Nursery

Maintenance of the demonstration sites along Rt. 6

During July1-September 30:
  o Kuzovkina and Campanelli conducted weekly visits to the three sites to evaluate the germination rates of grasses and forbs as well as weed pressure.
  o Botanists from the Arnold Arboretum were consulted to assist with the identification of native and introduced plant species along Rt. 6.

July 8, 2014: Inspection of the demonstration sites along Rt. 6 with Mark Lavoi from the Colonial Seed Co to assess the early establishment success of plantings as well as herbicide needs.
• July 28, 2014: Application of Quinclorac to control crabgrass (sites 1 and 2) and SpeedZone to control dicots weeds (the hillside near site 1).
• August 8: Inspection of the demonstration sites along Rt. 6 with Don Woodall from the Colonial Seed Co. to discuss management strategies.
• August 31-5: Applications of Round Up and Plateau to the newly established small plots along Rt.6 to study the augmentation of pre-existing native populations approach.
• September 29: Inspection of the demonstration sites along Rt. 6 with Glenn Dreyer from the Colonial Seed Co to discuss management strategies.
• August 7: Kuzovkina and Campanelli visited a meadow in Western Connecticut installed by Larry Weaner.
• September 30: Participation in the Colonial Seed Company Open House to discuss various protocols for the establishment of native grasses and forbs.
• October 15, 2014: Campanelli established native cool-season grass plots
• December 1, 2014: Kuzovkina and Campanelli prepared clay balls with native grass seeds for dormant seeding
• December 15, 2014: Campanelli established dormant seeding plots using clay balls and direct seeding

Survey and Interviews:

• Ricard and Campanelli developed a survey instrument based on the qualitative research approach to survey the New England DOT officers. The actual face-to-face interviews will be conducted during October-November.
• November 17, 2014 – interview with the RI DOT managers
• December 8, 2014 – interview with the Maine DOT managers
• December 22, 2014 – interview with the New Hampshire DOT managers
• January 6, 2015 – scheduled to interview the Massachusetts DOT managers

Other projects:

• July 1-August 31- establishment of a demonstration garden at the UConn Research Farm which includes native grasses and forbs suitable for New England roadsides; this garden serves for educational purposes and for the preparation of a portfolio of pictures which will be used for the Manual.
• July 1-August 31 - establishment of the research plots for the bluestem ecotype study at the UConn Research Farm; this study will characterize and compare 12 ecotypes of little bluestem from various states of New England, Pennsylvania and New York to determine which ecotypes should be used for the roadsides in New England.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014:  None thus far.
PROJECT NUMBER: 09-3

PROJECT TITLE: Advanced Composite Materials in New England’s Transportation Infrastructure: Design, Fabrication and Installation of ACM Bridge Drain System

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

STATUS: Open

AGREEMENT TERM: 9/1/2013 – 8/31/2015
ANTICIPATED COMPLETION: 8/31/2015

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.

PROGRESS/ACCOMPLISHMENTS THROUGH DECEMBER 31, 2014:
• Draft specifications were submitted to committee – Final versions ready for submittal
• Reports for task 1, 2 and 3 were drafted and submitted
• Potential demonstration projects were identified.
• Vendor witness plates received for ACO and Kenway. Vendors were screened and selected for participation.
• Drain designs from participating DOTs were collected for review and comparison.
• Material properties were reviewed and evaluated for inclusion to the specifications
• Specifications were re-written to comply to the FHWA specification format.
• Questionnaire drafted and circulated to DOTs regarding problem areas and best practices as viewed by design and field maintenance departments.
• Demonstration projects in Bangor, ME and Richmond, ME were visited and installations of FRP bridge drains were documented. One project in Westbrook, ME has the specification from this project available for bid and closed on December 10, 2014. This bridge uses 8 FRP bridge drains with specifications from this project with and average line item price of all 5 contractors bidding of $2,900 each (range of $2,000 to $3,500 ea).
• Materials testing for baseline strength and durability specimens of ACO and Kenway specimens were completed. FRP Bridge Drain Pipe/Grace composites have baseline control values completed. Durability testing is on going.
• An additional supplier of FRP bridge drains was identified who provide the drains for the Richmond-Dresden bridge project in Maine. This company is United Fiberglass of America in Springfield, OH.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
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: Open

AGREEMENT TERM: 9/16/2013 – 9/15/2015

ANTICIPATED COMPLETION: 9/15/2015

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 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, 2014:

• UMass Dartmouth hosted the project Kick-Off Meeting on February 7th, 2014. UMass Dartmouth conducted two phone meetings with two contractors (Palmer Paving - MA, & Tilcon - CT) who will produce mixtures for this study. Due to plant limitations, the batch plant mixtures may not be produced in 2014, but may be produced in 2015. The remaining mixtures are scheduled to be produced in late April or early May 2014. UMass Dartmouth will be on site during production for sampling and specimen production. A production information sheet was developed to be utilized to quantify the critical production parameters related to the mixtures. UMass Dartmouth updated the internet survey based on the comments obtained during the Kick-Off Meeting. Subsequently, UMass Dartmouth began the process of loading the surveys onto the internet system for solicitation of responses.
• UMass Dartmouth conducted additional meetings with the two contractors, (Palmer Paving - MA, & Tilcon - CT). Based on the additional meetings, the production
matrix was updated. UMass Dartmouth updated a list of state agencies and contractors that will be targeted to complete the surveys.

- UMass Dartmouth conducted additional meetings with the two contractors, (Palmer Paving - MA, & Tilcon - CT) to determine when the mixtures will be produced. Each responded they will be produced in the fall of 2014. In September 2014, UMass Dartmouth formally requested a no additional cost time extension for this project of twelve month (new end date 9/15/2016). The basis of the request is that the contractors have not produced or provided the mixtures required for this study. Recently, the contractors informed the PI that the mixtures should be produced very soon in the fall of 2014. Therefore, an extension is needed as the testing will require sixteen months for completion (as listed in the proposal). UMass Dartmouth is waiting for a response on this time extension request. UMass Dartmouth continued work on Task 1: Literature Review and Task 2: Determine Critical Information (Survey).

- Tilcon CT produced 12.5mm mixtures required for this study on 10/11/14. UMass Dartmouth was on-site during production to sample each mixture and document production parameters (RAP moisture content, etc.). UMass Dartmouth began verifying the volumetric properties of each produced mixture. The mixtures verified did not meet the volumetric properties. The contractor assured UMass Dartmouth that these mixtures will be reproduced again during spring 2015.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
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 (PI) – University of Massachusetts Amherst, Scott A. Civjan (Co-PI) – University of Massachusetts Amherst

STATUS: Open

AGREEMENT TERM: 9/1/2014 – 4/2/2016

ANTICIPATED COMPLETION: 8/31/2016
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 was for 24 months.

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, 2014:
• Initiated the literature review by collecting and summarizing research reports and journal papers.
• Reviewed ASTM/AASHTO materials testing standards that are applicable to the project.
• Prepared a survey that was sent to New England State DOTs and precast/prestressed producer members of the PCI Northeast Bridge Technical Committee.
• Met at the PCI Northeast Bridge Technical Committee to discuss project and seek feedback.
• Executed a kickoff meeting with members of the NETC Project Technical Committee.
• Compiled and analyzed responses to the survey that was sent to New England State DOTs and precast/prestressed producer members of the PCI Northeast Bridge Technical Committee, including previously used high-early strength concrete mix designs and specifications.
• Began to prepare concrete mix design specifications based on the literature review and feedback from surveys.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
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: Open


ANTICIPATED COMPLETION: 5/31/2016

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, 2014:

- UMass Dartmouth contacted several producers of asphalt mixtures in New England about their availability and willingness to participate in the study. One contractor located in Massachusetts agreed to produce the necessary mixtures to fulfill the objectives of the study.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH DECEMBER 31, 2014: None thus far.
## FINANCIAL STATUS

### 1. FINANCIAL STATUS OF ACTIVE PROJECTS:

Table 1: Financial Status of Projects Active During 2014 (As of December 31, 2014):

<table>
<thead>
<tr>
<th>NO.</th>
<th>PROJECT TITLE</th>
<th>APPROVED BUDGET</th>
<th>INVOICES APPROVED FOR PAYMENT</th>
<th>PROJECT BALANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-5</td>
<td>Measurement of Adhesion Properties Between Topcoat Paint and Metallized/Galvanized Steel with Surface Energy Measurement Equipment</td>
<td>$125,000.00</td>
<td>$124,895.54</td>
<td>FINAL</td>
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<tr>
<td>06-4</td>
<td>Preventative Maintenance and Timing of Applications</td>
<td>$242,909.00</td>
<td>$5,247.26</td>
<td>$237,661.74</td>
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<tr>
<td>07-1</td>
<td>In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations</td>
<td>$198,154.00</td>
<td>$91,823.87</td>
<td>$106,330.13</td>
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<tr>
<td>09-2</td>
<td>Effective Establishment of Native Grasses on Roadsides</td>
<td>$80,000.00</td>
<td>$17,295.14</td>
<td>$62,704.86</td>
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<tr>
<td>09-3</td>
<td>Advanced Composite Materials: Prototype Development and Demonstration</td>
<td>$165,000.00</td>
<td>$76,869.00</td>
<td>$88,131.00</td>
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<tr>
<td>10-3</td>
<td>Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology</td>
<td>$150,158.00</td>
<td>$13,611.77</td>
<td>$136,546.23</td>
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<tr>
<td>13-1</td>
<td>Development of High-Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections</td>
<td>$174,923.00</td>
<td>$17,491.75</td>
<td>$157,431.25</td>
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<tr>
<td>13-2</td>
<td>HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures</td>
<td>$249,785.00</td>
<td>$0</td>
<td>$249,785.00</td>
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</tbody>
</table>
## 2. FUND BALANCE:

### NETC Fund Balance

**As of December 31, 2014**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>OBLIGATION FOR PROJECTS</th>
<th>TRAVEL OBLIGATIONS AND EXPENDITURES</th>
<th>BUDGET</th>
<th>EXPENDED</th>
<th>INVOICE</th>
<th>CUMULATIVE BALANCE</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td><strong>Unexpended balance of NETC funds from AASHTO</strong></td>
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<td><strong>$72,777.07</strong></td>
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<td><strong>Member Obligations 1994 = 6 X $75,000</strong></td>
<td>450,000.00</td>
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<td><strong>$322,777.07</strong></td>
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<td><strong>Member Obligations 1995 = 7 X $75,000</strong></td>
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<td><strong>95-1:</strong> Use of Tire Chips/Soil Mixtures to Limit Pavement Damage of Paved Roads</td>
<td>450,000.00</td>
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<td><strong>$75,000.00</strong></td>
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<td><strong>95-2:</strong> Suitability of Non-Hydraulic Soils for Wetland Mitigation</td>
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<td><strong>$41,000.00</strong></td>
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<td><strong>95-3:</strong> Implementation and Evaluation of Traffic Management Measures for Application of Wood Waste Compost, etc.</td>
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<td><strong>95-5:</strong> Efficacy of Fiber Reinforced Composites as Protective Covering for Concrete roadway</td>
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<td><strong>$11,000.00</strong></td>
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<td><strong>$435,000.00</strong></td>
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<td><strong>97-1:</strong> A Portable Method for Determining Chloride Concentration on Roadway Pavements</td>
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<td><strong>$96,000.00</strong></td>
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<td><strong>97-2:</strong> Performance Evaluation &amp; Economic Analysis of Durability Enhancing</td>
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<td><strong>$90,000.00</strong></td>
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<td><strong>97-3:</strong> Determining Properties &amp; Standards &amp; Performance</td>
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<td><strong>$210,000.00</strong></td>
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<td><strong>Member Allocations 1998 = 6 X $75,000</strong></td>
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<td><strong>98-1:</strong> Travel Tech. Comm. (Aug. 98 tel. poll) for 1998 = $5,000</td>
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<td><strong>Member Obligations 2000 = 6 X $100,000</strong></td>
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<td><strong>$908,500.25</strong></td>
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<td><strong>99-1:</strong> Bridge Rail Transitions</td>
<td>600,000.00</td>
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<td><strong>$70,000.00</strong></td>
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<td><strong>Member Obligations 2001 = 6 X $100,000</strong></td>
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<td><strong>$776,334.48</strong></td>
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<td><strong>99-1:</strong> Advanced Composite Materials for New England's Transportation</td>
<td>600,000.00</td>
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<td><strong>$104,385.35</strong></td>
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<td><strong>99-2:</strong> Development of a Testing Protocol for Quality Control of Construction of Flexible Pavements</td>
<td>600,000.00</td>
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<td><strong>$25,385.19</strong></td>
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<td><strong>Member Obligations 2002 = 6 X $100,000</strong></td>
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<tr>
<td>ITEM</td>
<td>OBLIGATION FOR PROJECTS</td>
<td>TRAVEL OBLIGATIONS AND EXPENDITURES</td>
<td>BUDGET</td>
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<td>NY DOT Obligation = $596,551.38</td>
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<td>1,005,386.41</td>
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<td>Coord/Adm. Of NETC Calendar Year 2002</td>
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<td>02-1: Relating Hot Mix Asphalt Pavement Density to Performance</td>
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<td>02-2: Formulate Approach for 511 Implementation in New England Phase 1</td>
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<td>02-2: Formulate Approach for 511 Implementation in New England Phase 2</td>
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<td>02-3: Establish Subgrade Support Values (N) for Typical Soils in New England</td>
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<td>02-5: Determination of Moisture Content of Deicing Salt at Point of Delivery</td>
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<td>02-6: Sealing of Expansion Joints - Phase 3</td>
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<td>02-7: Calibrating Traffic Simulation Models to Indicate Weather Conditions with</td>
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<td>02-8: Intelligent Transportation Systems Applications to Ski Resorts in New England</td>
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<tr>
<td>Member Obligations 2003 = $5 X $100,000</td>
<td>500,000.00</td>
<td>1,008,585.27</td>
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<td>Coord/Adm. Of NETC Calendar Year 2003 = $124,258</td>
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<td>03-1: Ability of Wood Fiber Materials to Alterate Heavy Metals Associated with</td>
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<td>03-2: Field Studies of Concrete Containing Salts of an Alkylamine-Substituted Sulfonic</td>
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<td>03-3: Feasibility Study and Design of an Erosion Control Laboratory in New England</td>
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<td>03-3: Feasibility Study and Design of an Erosion Control Laboratory in New England</td>
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<td>04-1: Recycling Asphalt Pavements Containing Modified Binders - Phase I</td>
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<td>04-2: Driver-Cycle Movement Based Investigation for Improving Work Zone Safety</td>
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<td>04-3: Evaluating the Magnitude of Peak Flows for Steep Gradient Streams in New</td>
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<td>04-4: Determine the Effective PG Grade of Binder in Full Mixes</td>
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<td>Member Obligations 2004 = $5 X $100,000</td>
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<td>05-1: Developing the Realization Load-Displacement Curves for the Design of Drilled</td>
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<tr>
<td>05-1(FHA): Developing the Realization Load-Displacement Curves for the Design of Drilled</td>
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<td>05-2: Measurement of Work of Adhesion Between Paint and Metalized (Galvanized)</td>
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<td>05-2(FHA): Measurement of Work of Adhesion Between Paint and Metalized (Galvanized)</td>
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<td>05-3: Employing Graphic Aided Dynamic Message Signs to Assist Elder Drivers and</td>
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<td>05-3(FHA): Employing Graphic Aided Dynamic Message Signs to Assist Elder Drivers and</td>
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<td>05-4: Determining the Effective PG Grade of Binder in Full Mixes</td>
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<td>Member Obligations 2005 = $5 X $100,000</td>
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<td>1,008,585.27</td>
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<td>Coord/Adm. Of NETC Calendar Year 2005 = $130,528</td>
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<td>06-1: New England Verification of NCHRP 1-37A Mechanical-Empirical Pavement</td>
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<td>06-3: Establish Default Dynamic Modulus Values for New England</td>
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<td>06-5: Winter Severity Indices for New England</td>
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<td>Note: Maine 2007 Obligations = the 15th of April's 15th of the 15th of April</td>
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<td>Coord/Adm. Of NETC Calendar Year 2006 = $138,814</td>
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<td>07-1: Developing the Realization Load-Displacement Curves for the Design of Drilled</td>
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<td>07-2: Establish Dynamic Modulus Values for New England</td>
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<td>07-3: Winter Severity Indices for New England</td>
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<td>Member Obligations 2007 = $600,000</td>
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<td>Coord/Adm. Of NETC Calendar Year 2007 = $236,061</td>
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<td>Coord/Adm. Of NETC Calendar Year 2008 = $134,998</td>
<td>134,998.00</td>
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<td>07-1: Developing the Realization Load-Displacement Curves for the Design of Drilled</td>
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<td>Coord/Adm. Of NETC Calendar Year 2009 = $139,599</td>
<td>139,599.00</td>
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<td>07-1: Developing the Realization Load-Displacement Curves for the Design of Drilled</td>
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<td>Coord/Adm. Of NETC Calendar Year 2010 = $134,809</td>
<td>134,809.00</td>
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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., $48,047." (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.
REPORTS, PAPERS AND PRESENTATIONS

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

3. REPORTS, PAPERS, AND PRESENTATIONS 1988-1994:


“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 1995-2014:

Project No.  Title

N/A  Construction Costs Of New England Bridges  Reports:

      Papers and Presentations:

N/A  Tire Chips As Lightweight Backfill For Retaining Walls, Phase II: Full-Scale Testing  Reports:

      Papers and Presentations:

      “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.


Tire Chips As Lightweight Backfill For Retaining Walls, Phase II: Full-Scale Testing (cont’d):
Papers and Presentations (cont’d):


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

New England Vehicle Classification And Truck Weight Program, Phase I
Reports:
New England Vehicle Classification And Truck Weight Program, Phase I (cont’d):
Reports (cont’d):


Papers and Presentations:


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


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:


94-2 Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques (cont’d):
Papers and Presentations (cont’d):


94-3 Procedures For The Evaluation Of Sheet Membrane Waterproofing:
Reports:

Papers and Presentations: None
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.

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.

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.
96-3

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.


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):


A Portable Method To Determine Chloride Concentration On Roadway Pavements

Reports:

Papers and Presentations: None

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.
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:


Determining Properties, Standards And Performance Of Wood Material As An Erosion Control Mulch And As A Filter Berm

Reports:

Papers and Presentations:

Early Distress Of Open-Graded Friction Course (OGFC)

Reports:

Papers and Presentations: None

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.
99-1 Bridge Rail Transitions – Development and Crash Testing (cont’d):
Papers and Presentations:


99-2 Evaluation of Asphalitic Expansion Joints
Reports:

Papers and Presentations: None

99-3 Development Of Priority Based Statewide Scour Monitoring Systems In New England
Reports:

Papers and Presentations:

99-4 Quantifying Roadside Rest Area Usage
Reports:

Papers and Presentations:
Results from the rest-area research were included in a presentation by the PI: “The Efficacy and Use of Continuous Shoulder Rumble Strips: Engineering a Solution,” presented at the November 20-21, 2002 National Summit to Prevent Drowsy Driving, National Academy of Sciences, Washington, DC, November 21, 2002 (taped by C-SPAN. Summit also covered by CNN Live Today, CNN Live on Location, CBS Early Show, National Public Radio’s Market Place, and national radio network coverage by ABC, CBS, and AP as well as two stories by nationally syndicated health columnist Jane Brody of The New York Times).
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 Architektur 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:
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.

Performance and Effectiveness of a Thin Pavement Section Using Geogrids and Drainage Geocomposites in a Cold Region

Reports:

Papers and Presentations:

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

Reports:

Papers and Presentations: None

Advanced Composite Materials in New England's Transportation Infrastructure - Technology Transfer Phase 1: Selection of Prototype

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:


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. McDonnell, Polymer Composites.


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

Reports:

Papers and Presentations:

**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

Papers and Presentations:

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


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


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

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:
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.


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

Papers and Presentations:


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: None

Papers and Presentations: None

07-1 In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations Reports: None

Papers and Presentations: None

09-2 Effective Establishment of Native Grasses on Roadsides Reports: None

Papers and Presentations: None

09-3 Advanced Composite Materials: Prototype Development and Demonstration Reports: None

Papers and Presentations: None

10-3 Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology Reports: None

Papers and Presentations: None
13-1  Development of High Early Strength Concrete for Accelerated Bridge Construction Closure Pour Connections
Reports: None
Papers and Presentations: None

13-2  HMA Mixtures Containing Recycled Asphalt Shingles (RAS): Low Temperature and Fatigue Performance of Plant-Produced Mixtures
Reports: None
Papers and Presentations: None