ANNUAL REPORT

For Calendar Year 2011

NEW ENGLAND TRANSPORTATION CONSORTIUM

NETCR90 **December 2011**

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

NEW ENGLAND TRANSPORTATION CONSORTIUM

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William Ahearn, Materials & Research Engineer
Vermont Agency of Transportation

COORDINATOR

Gerald M. McCarthy
University of Massachusetts Dartmouth

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A. 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 Massachusetts, Dartmouth (UMass-D), with the Connecticut Department of Transportation (ConnDOT) 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: ConnDOT; Massachusetts Department of Transportation; Maine Department of Transportation; New Hampshire Department of Transportation (NHDOT); Rhode Island Department of Transportation (RIDOT); Vermont Agency of Transportation (VAOT); and, FHWA.

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

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

the administration of the NETC program.

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

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

In 1994, ConnDOT stated its intention to participate in NETC and offered to act as Lead Agency. During Federal Fiscal Year (FFY) 1994, FHWA assumed the Lead Agency designation to facilitate the transition process. MIT and AASHTO exited NETC, effective FFY1994. ConnDOT entered NETC, effective FFY1995, and was the Lead Agency until the Vermont Agency of Transportation assumed the responsibility in March 2010.

B. 2011 HIGHLIGHTS

1. THE FOLLOWING NETC-FUNDED TRANSPORTATION RESEARCH PROJECTS, VALUED AT $567,678 WERE ACTIVE AT NEW ENGLAND STATE UNIVERSITIES IN 2011:

a) UNIVERSITY OF CONNECTICUT: $267,751

- Dr. Ramesh Malla: "Sealing of Small Movement Bridge Expansion Joints - Phase II Field Installation and Monitoring" - $75,000
- James Mahoney:
  1) "Recycling Asphalt Pavements Containing Modified Binders" - $82,751
  2) "Establish Default Dynamic Modulus Values for New England" - $110,000

b) UNIVERSITY OF MAINE: $100,000

- Dr. Thomas Sanford: "Develop Base Resistance Load Displacement Curves for the Design of Drilled Shaft Rock Sockets"

c) UNIVERSITY OF MASSACHUSETTS AMHERST: $100,000

- Dr. John Collura: "Evaluation and Implementation of Traffic Simulation Models for Work Zones"

d) UNIVERSITY OF MASSACHUSETTS DARTMOUTH: $99,927

- Dr. Walaa Mogawer: "NETC Research Challenge – 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"

e) UNIVERSITY OF NEW HAMPSHIRE: $150,295

- Dr. Jo-Sias Daniel: "New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design"

f) 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"

2. TECHNOLOGY TRANSFER:

a) REQUESTS FOR INFORMATION AND TECHNICAL ASSISTANCE:
The NETC Coordinator's office responded to the following requests:

- **Vermont Agency of Transportation, Structures Section:** Technical assistance re: selection of bolts to be used with the NETC Bridge Rail
- **Federal Highway Administration, Structures PDP:** Copy of final report for NETC 05-1: "Develop Base resistance Load Displacement Curves for the Design of Drilled Shaft Rock Sockets"
- **Victaulic Corporation:** State DOT contacts interested in the use of non-metallic material for bridge construction
- **George Roberts Co.:** How to obtain multiple state over-limit truck permits

b) 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:
  - **NETC 02-6 Phase II: "Sealing of Small Movement Bridge Expansion Joints – Phase 2: Field Demonstration and Monitoring"**
  - **NETC 04-1: "Recycling Asphalt Pavements Containing Modified Binders"**
  - **NETC 05-1: "Development of Supplemental Resistance Method for the Design of Drilled Shaft Rocket Sockets"**
  - **NETC 06-3: "Establishing Default Dynamic Modulus Values for New England"**

- **Technical Papers and Presentations:**
  - **"Laboratory Evaluation, Field Application, and Monitoring of a Silicone Foam Sealant Bonded to Various Bridge Expansion Joint Headers", Swanson, B.J., (2011), M.S. Thesis, Department of Civil and Environmental Engineering, University of Connecticut, Storrs, CT.**
  - **"Laboratory Evaluation of a Silicone Foam Sealant Bonded to Various Header Materials Used in Bridge Expansion Joints", Malla, R.B., Swanson, B.J., and Shaw, M.T., Construction and Building Materials – An International Journal, (published on-line http:dx.doi.org/10.1016/j.conbuildmat.2011.04.050; May 26, 2011).**
  - **"Laboratory Testing, Field Installation, and Monitoring of a Silicone Foam Sealant for Bridge Expansion Joints", Swanson, B.J., Malla, R.B., and Shaw, M.T., Bridge Engineering, ASCE, Reston Va. (In review).**

3 OTHER:

a) NEW LEAD AGENCY:

- Proposals for providing coordination services for the Consortium were accepted and evaluated. The Transportation Research Center at the University of Vermont was selected to provide the coordination services.

b) PROJECTS UNDER FHWA AGREEMNTS:

- The FHWA CT-DIV office will continue to assist with the following studies officially started by the previous NETC lead state agency (CT DOT) that are not yet finished but for contractual reasons could not be given time extensions by the state of Connecticut: NETC 03-6, NETC 05-5, NETC 06-1. The funding to complete these 3 studies is presently reserved in SPR-3 (089).

C. PROGRESS OF ACTIVE PROJECTS

PROJECT NUMBER: 02-6 (Phase 2)

PROJECT TITLE: Sealing of Small Movement Bridge Expansion Joints - Phase II: Field Demonstration and Monitoring

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Ramesh B. Malla, PI, and Montgomery Shaw, Co-PI, University of Connecticut

STATUS: Completed

AGREEMENT TERM: 8/1/2008 – 7/31/2011

ANTICIPATED COMPLETION: N/A

PROJECT OBJECTIVES:
The main objective of this NETC 02-6 (Phase 2) project is to test the behavior of the silicone foam sealant under various in-field conditions, make any necessary changes, and evaluate its performance while on an operating highway bridge in order to determine its cost effectiveness and durability. The project involves pre-field laboratory testing, field installation, post installation monitoring, report preparation, and specification preparation.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:
All tasks were completed

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:
"Laboratory Evaluation of a Silicone Foam Sealant for Field Application of Bridge Expansion Joints," Malla, R.B., Swanson, B., and Shaw M.T., Proceedings of the 2010 SEM Annual Conference & Exposition, SEM, Bethel, CT, 12 pages, June 2010.

"Development and Installation of Foam Sealant for Small Movement Bridge Expansion Joints," Malla, R.B., Swanson, B., and Shaw M.T., Poster presentation to the Proceedings, 27th Annual International Bridge Conference, Pittsburgh, PA, June 6-9, 2010.

"Laboratory Evaluation, Field Application, and Monitoring of a Silicone Foam Sealant Bonded to Various Bridge Expansion Joint Headers," Swanson, B.J., (2011), M.S. Thesis, Department of Civil and Environmental Engineering, University of Connecticut, Storrs, CT, 128 pages.

“Laboratory Evaluation of a Silicone Foam Sealant Bonded to Various Header Materials used in Bridge Expansion Joints,” Malla, R.B., Swanson, B.J., and Shaw, M.T., “Construction and Building Materials – An International Journal, (published on-line http://dx.doi.org/10.1016/j.conbuildmat.2011.04.050 ; May 26, 2011).

"Laboratory Testing Field Installation, and Monitoring of a Silicone Foam Sealant for Bridge Expansion Joints," Swanson, B.J., Malla, R.B., and Shaw, M.T., J. Bridge Engineering, ASCE, Reston, VA. (In Review).

“Sealing of Small Movement Bridge Expansion Joints - Phase 2: Field Demonstration and Monitoring,” Malla, R.B., Shaw, M., Swanson, B., and Gionet, T., July 31, 2011, NETCR86.

PROJECT NUMBER: 03-6

PROJECT TITLE: 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

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Walaa S. Mogawer, PI, UMass Dartmouth; Jo Sias Daniel, Co-PI, University of New Hampshire

STATUS: Continuing

AGREEMENT TERM: 10/1/2009 – 9/30/2011

ANTICIPATED COMPLETION: 2/1/2012

PROJECT OBJECTIVES:

- Define and compare thin lift overlay maintenance mixes and surface treatments currently used in the New England States.
- Evaluate the thin lift overlay maintenance mixes and surface treatments currently used in the New England States and compare to those currently used worldwide.
- Determine the current New England DOT procedures for picking rehabilitation methodologies.
- Perform and evaluate non-destructive testing to better determine the optimum time to apply surface treatments or thin lift overlay mixes to the existing pavements in order to properly prioritize rehabilitation projects.
- Evaluate the benefits and drawbacks of using PMA thin lift mixes versus surface treatments with lab testing.
- Evaluate the cost comparisons between PMA thin lift mixes and surface treatments.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:

1. Thin lift mixtures prepared with six binders (modified and unmodified) using two sources of aggregates (crushed stone and gravel) were fabricated and delivered to UNH for evaluating the thermal cracking characteristics of the mixtures.

2. The low temperature cracking of the aforementioned mixtures were measured using the Asphalt Concrete Cracking Device (ACCD) at UMass Dartmouth.

3. The University of New Hampshire (UNH) began evaluating the thermal cracking characteristics of the thin lift mixtures prepared with six binders (unmodified and polymer modified) using two sources of aggregates. UNH is testing these mixtures in accordance with AASHTO T322 “Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device” and the low temperature cracking properties of the mixtures are being determined from an analysis program (LTStress).

4. Commenced evaluation of the cracking characteristics of the thin lift mixtures using the Texas Overlay tester in accordance with Texas Specification Tex-248-F.

5. University of New Hampshire (UNH) continued evaluations of the thermal cracking characteristics of the thin lift mixtures and subsequent low temperature cracking properties determination from an analysis program (LTStress).

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011: None

PROJECT NUMBER: 04-1 (Phase 2)

PROJECT TITLE: Recycling Asphalt Pavements Containing Modified Binders - Phase 2

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): James Mahoney, Connecticut Transportation Institute, University of Connecticut

STATUS: Completed

AGREEMENT TERM: 8/23/2007 – 9/30/2009

ANTICIPATED COMPLETION: N/A

PROJECT OBJECTIVES:
Phase 2

The objectives of the second Phase of this project will attempt to address incompatibilities that may arise when RAP is used in a new HMA pavement that contains a virgin modified asphalt binder. This Phase of the project will also provide guidance as to the proper amount of RAP that can be added to the HMA without causing problems. In addition, the interaction of polyphosphoric acid modified virgin asphalts and the aggregates in the RAP will also be tested to determine if there is a negative impact on the HMA mixes performance.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:
The research team completed the final report and submitted the final report to NETC. All tasks were completed.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:
"Laboratory Evaluation of HMA Containing RAP and PMB," Zofka A., Bernier A., Mahoney J., and Zinke S., presented at NEAUPG Annual Meeting Poster Session, October 6-7, 2010, Saratoga, New York.

"Laboratory Evaluation of HMA Containing RAP and PMB," Zofka A., Bernier A., Mahoney J., and Zinke S., presented at ASCE 1st T&DI Green Streets & Highways Conference Poster Session, November 14-17, 2010, Denver, Colorado**.**

"Laboratory Evaluation of Rutting Susceptibility of Polymer-Modified Asphalt Mixtures Containing Recycled Pavements," Bernier, A., Zofka, A., and Yut, I., submitted to Construction and Building Materials, October 2011.

"Recycling Asphalt Pavements Containing Modified Binders," Mahoney, J., Zinke, S., DaDalt, J., Zofka, A., Bernier, A. and Yut, I., March 3, 2011, NETCR66.

PROJECT NUMBER: 05-1

PROJECT TITLE: Development of Supplemental Resistance Method for the Design of Drilled Shaft Rock Sockets

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Thomas C. Sanford, University of Maine

STATUS: Completed

AGREEMENT TERM: 1/1/2010 – 3/31/2011

ANTICIPATED COMPLETION: N/A

PROJECT OBJECTIVES:
The objective of this study is to produce a drilled shaft design method for evaluating the now unused side shear or end bearing to supplement the AASHTO allowable load. The magnitude of unused side shear or end bearing corresponding to the AASHTO allowable load will be the magnitude that occurs at the same shaft movement as the allowable load. This method should reflect different rock socket geometry and different rock properties typical of New England. The method should be based on past load tests and be robust and easy-to-use.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:
All tasks were completed.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:
"Development of Supplemental Resistance Method for the Design of Drilled Shaft Rock Sockets," Sandford, T.C., McCarthy, J., and Bussiere, J., March 31, 2011, NETCR83.

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

AGREEMENT TERM: 4/22/2010 – 8/22/2011

ANTICIPATED COMPLETION: 2/1/2012

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 NOVEMBER 30, 2011:

The third phase of the research work was conducted according to the Work Plan. The objective of this phase is to fabricate and test 16 painted test panels that use zinc rich epoxy paint as the primer layer. The purpose is to provide a reference data set for comparison with the other 4 groups of coated panels fabricated and tested in the first two phases of this research project. 2
This group of panels was produced during the period of 6/20/2011 to 6/30/2011 at Boyd Coatings Research. The16 steel test panels were blast cleaned according to SSPC-SP10 near-white blast cleaning, followed by spray painting of zinc rich primers for 4 different paint systems specified in the Work Plan. After the top coatings (polyurethane) were cured for three weeks, we performed pull-off strength tests and X-cut adhesion tests. A preliminary conclusion from our test data is that the paint adhesion to steel is very good for 3 out of 4 paint systems, and has moderately good performance for 1 of the paint systems. We concluded that the average pull-off strength of the previously tested 4 groups of test panels are comparable with the zinc rich primer coated test panels tested in this phase of study. The full details will be reported in the next Technical Committee meeting and in the first draft of the final report.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:

"Measurement of Adhesion Properties Between Topcoat Paint and Metalized / Galvanized Steel With Surface Energy Measurement Equipment," Paper # CET-25, Yang, S.C., Lee, K.W., Lu, C., and Mirville, M., Presented at the US-Korea Conference on Science, Technology, and Entrepreneurship (UKC2010), Seattle, Washington, August 14, 2010.

PROJECT NUMBER: 06-1

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

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): Jo Sias Daniel, PI, University of New Hampshire; Ghassan R. Chehab, Co-PI, Pennsylvania State University

STATUS: Continuing

AGREEMENT TERM: 10/1/2009 - 9/30/2011

ANTICIPATED COMPLETION: 2/1/2012

PROJECT OBJECTIVES:

- Determine the design and data collection methods, material tests, and testing equipment currently in use by each state.
- Identify the Level 2 and Level 3 design guide inputs for which regional or local values are required.
- Provide state specific recommendations on implementation of the MEPDG including changes in data collection & measurement, equipment needs, training, and anticipated benefits.
- Provide specific recommendations for regional and local calibration of the MEPDG by identifying appropriate field test & monitoring sites, data to be collected, and perform local calibrations if appropriate field data is available.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:

1. Finalized the M-E PDG sensitivity analysis for Level 3 in Massachusetts.

Table 1. Ranking of Input Variable Significance for MA Level 3 Sensitivity Analysis.

	Bottom-Up Cracking	Top-Down Cracking	AC Rutting	Total Rutting	IRI
Most Significant Variable	HMA thickness	HMA thickness	Operational speed	Operational speed	Initial IRI
	HMA air voids	Operational speed	HMA binder grade	HMA binder grade	HMA CTC
	Traffic distribution	HMA air voids	Climate	Traffic distribution	Subgrade type/modulus
	Operational speed	Traffic distribution	Traffic distribution	HMA thickness	Operational speed
	HMA binder grade	HMA binder grade	AADTT value	Climate	HMA binder grade
Least Significant Variable	AADTT value	Subgrade type/modulus	HMA mix gradation	AADTT value	Traffic distribution

2. Prepared the final draft of sensitivity analyses in Vermont (Level 2 and 3), New York (Level 3) and Massachusetts (Level 3).
3. Prepared state specific conclusions and recommendations.
4. Prepared recommendations for future work.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:

"Sensitivity of MEPDG Level 2 and 3 Inputs Using Statistical Analysis Techniques for New England States," Ayyala, D., Chehab, G. R., and Daniel, J. S., accepted for publication in the Transportation Research Record 2010.

"Sensitivity of RAP Binder Grade on Performance Predictions in the MEPDG," Daniel, J. S., Cehab, G. R., and Ayyala, D., Journal of the Association of Asphalt Pavement Technologists, Vol. 78, 2009, pp. 352-376.

"Sensitivity of RAP Binder Grade on Performance Predictions in the MEPDG," Presentation by Jo Sias Daniel to the Association of Asphalt Paving Technologists Annual Meeting, March 2009.

PROJECT NUMBER: 06-3

PROJECT TITLE: Establishing Default Dynamic Modulus Values for New England

PRINCIPAL INVESTIGATOR(S) & UNIVERSITY(S): James Mahoney, PI, University of Connecticut

STATUS: Completed

INITIAL AGREEMENT DATE: 7/1/2008 – 4/30/2010

ANTICIPATED COMPLETION: N/A

PROJECT OBJECTIVES: RESEARCH OBJECTIVE:
The objective of this research is to test commonly used HMA mixtures throughout New England to determine their respective moduli. The results of this testing will be:

- Used to determine if there is a significant difference between dynamic modulus values for materials from throughout the region.
- Used to compare the dynamic modulus of lab produced mixes and plant produced mixes.
- Compared against the master curves derived by performing the reduced testing as outlined by Bonaquist and Christensen. This will reduce the number of temperatures as well as the number of frequencies tested. If this process correlates well with the full set testing master curves, it will reduce the amount of time required to conduct the testing.
- Compared against the predicted moduli obtained by using the Witczak Predictive Model and the Hirsh Model. If there is a strong correlation between the tested and predicted values then this would provide a reasonable value for the dynamic modulus for most HMA designs in the 2002 Pavement Design Guide.

PROGRESS/ACCOMPLISHMENTS THROUGH NOVEMBER 30, 2011:
All tasks were completed.

REPORTS/PAPERS PUBLISHED, PRESENTATIONS MADE RELATING TO THIS PROJECT FROM THE START OF THE PROJECT THROUGH NOVEMBER 30, 2011:
"Evaluation of Dynamic Modulus of Typical Asphalt Mixtures in Northeast U.S Region," Li, J., Zofka, A., Yut, I., Jackson, E., and Mahoney, J., Paper submitted to Road Materials and Pavement Design, December 2010.

"Establishing Default Dynamic Modulus Values for New England," Jackson, E., Jingcheng, L., Zofka, A., Iliya, Y., and Mahoney, J., April 11, 2011, NETCR85.

D. FINANCIAL STATUS OF PROJECTS ACTIVE DURING 2011

D.1 FINANCIAL STATUS OF ACTIVE PROJECTS:

Table 1: Financial Status of Projects Active During 2011
(As of November 30, 2011)

NO.	PROJECT TITLE, PI, UNIVERSITY	APPROVED BUDGET	INVOICES APPROVED FOR PAYMENT	PROJECT BALANCE
02-6 Phase 2	Sealing of Small Movement Bridge Expansion Joints - Phase II: Field Demonstration and Monitoring, *R. Malla, M. Shaw, University of Connecticut*	$75,000.00	$74,558.62	$441.38
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, *W. Mogawer, University of Massachusetts Dartmouth, J. Daniel, University of New Hampshire* (under FHWA agreement)	$45,842.00	Available from FHWA-CT Division Office	Available from FHWA-CT Division Office
04-1 Phase 2	Recycling Asphalt Pavements Containing Modified Binders - Phase 2, *J. Mahoney, University of Connecticut*	$82,751.00	$82,750.99	$0.01
05-1	Development of Supplemental Resistance Method for the Design of Drilled Shaft Rock Sockets, *T. Sandford, University of Maine* (under FHWA agreement)	$47,755.00	$47,755.00	$0.00
05-5	Measurement of Adhesion Properties Between Topcoat Paint and Metallized/Galvanized Steel with Surface Energy Measurement Equipment, *S. Yang, K. W. Lee, University of Rhode Island* (under FHWA agreement)	$20,012.00	Available from FHWA-CT Division Office	Available from FHWA-CT Division Office
06-1	New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design Guide with Level 2 & 3 Inputs, *J. Daniel, University of New Hampshire* (under FHWA agreement)	$68,085.00	Available from FHWA-CT Division Office	Available from FHWA-CT Division Office
06-3	Establishing Default Dynamic Modulus Values for New England, *J. Mahoney, University of Connecticut*	$109,787.00	$109,787.00	$0.00

D.2 NETC FUND BALANCE

As of November 16, 2011

ITEM	OBLIGATION	ENCUMB/ EXPEND.	INVOICE	CUM. BALANCE
Unexpended Balance of NETC funds from AASHTO				
as of 6/5/95 (Per AASHTO memo 12/4/95)				132,777.07
Member Obligations 1994 = 6 X $75,000	450,000.00			582,777.07
Coord./Admin. of NETC: Calendar Year 1995 Bdgt. = $73042		58,761.32	FINAL	524,015.75
Continued Projects:				
- Construction Costs of New England Bridges-Phase II		39,500.00	FINAL/CLOSED	484,515.75
- Tire Chips as Lightweight Backfill-Phase II: Full-Scale Testing				
(Supplemental Funding)		16,000.00	FINAL/CLOSED	468,515.75
- Bridge Rail Crash Test - Phase II: Sidewalk-Mounted Rail		134,127.00	FINAL/CLOSED	334,388.75
- New England Vehicle Classification and Truck Weight Program		6,752.57	FINAL/CLOSED	327,636.18
Member Obligations 1995 = 7 X $75,000	525,000.00			852,636.18
"95" Project Series:				
95-1: Use of Tire Chips/Soil Mixtures to Limit Pavement Damage				
of Paved Roads		75,000.00	FINAL/CLOSED	777,636.18
95-2: Suitability of Non-Hydric Soils for Wetland Mitigation		39,867.70	FINAL/CLOSED	737,768.48
95-3: Implementation and Evaluation of Traffic Marking Recesses				
for Application of Thermoplastic Pavement Markings				
on Modified Open Graded Mixes		120,812.12	FINAL/CLOSED	616,956.36
95-5: Buried Joints in Short Span Bridges		61,705.61	FINAL/TERM.	555,250.75
95-6: Guidelines for Ride Quality Acceptance of Pavements		106,124.00	FINAL/CLOSED	449,126.75
"94" Project Series:				
94-1: Structural Analysis of New England Subbase Materials and				
Structures		110,057.38	FINAL/CLOSED	339,069.37
94-2: Nondestructive Testing of Reinforced Concrete Bridges				
Using Radar Imaging Techniques		224,901.80	FINAL/CLOSED	114,167.57
Member Obligations 1996 = 6 X $75,000	450,000.00			564,167.57
Coord./Admin.of NETC: Calendar Year 1996; Bdgt. = $75,000		69,123.85	FINAL	495,043.72
Member Allocations 1997 = 6 X $75,000	450,000.00			945,043.72
Coord./Admin. of NETC: Calendar Year 1997; Bdgt. = $82,494		77,244.35	FINAL	867,799.37
"94" Project Series:				
94-3: Procedures for The Evaluation of Sheet Membrane Waterproofing		67,002.00	FINAL/CLOSED	800,797.37
Note: Project administered by VAOT under TPF Project No. SPR-3				
94-4: Durability of Concrete Crack Repair Systems		72,036.04	FINAL/TERM.	728,761.33
"96" Project Series:				
96-1: SUPERPAVE Implementation		60,139.25	FINAL/CLOSED	668,622.08
96-2: Optimizing GPS Use in Transportation Projects		27,008.81	FINAL/TERM.	641,613.27
96-3: Effectiveness of Fiber Reinforced Composites as Protective				
Coverings for Bridge Elements, etc.		135,000.00	FINAL/CLOSED	506,613.27
T2 (per 12/2/97 Adv. Committee Mtg.) for 1998 = $10,000		9,551.06	FINAL	497,062.21
Coord./Admin. of NETC: Calendar Year 1998; Bdgt = $73,021		80,422.65	FINAL	416,639.56
Refund Check (No. 15-663337), for CY '98 Management of NETC, from	336.00			416,975.56
UConn OSP; Ref. 7/19/00 letter to J. Sime from J. Devereux, UConn OSP				
Member Obligations 1998 = 6 X $75,000	450,000.00			866,975.56
"97" Project Series:				
97-1: A Portable Method for Determining Chloride Concentration on	*Phase 1*	96,669.50	FINAL/CLOSED	770,306.06
Roadway Pavements	*Phase 2*	90,667.79	FINAL/CLOSED	679,638.27
97-2: Performance Evaluation & Economic Analysis		108,318.73	FINAL/CLOSED	571,319.54
of Durability Enhancing Admixtures, etc.				
97-3: Determining Properties, Standards & Performance	*Phase 1*	27,779.64	FINAL/CLOSED	543,539.90
of Wood Waste Compost, etc.:	*Phase 2*	16,074.30	FINAL/CLOSED	527,465.60
Alloc. to ConnDOT for Constr. Costs of Test Site (Approved 1/21/99 Ballot)		10,700.00		516,765.60
97-4: Early Distress of Open-Graded Friction Course		57,495.71	FINAL/CLOSED	459,269.89
Travel Tech. Comm. (Aug. 98 tel. poll) for 1998 = $5,000		0.00		459,269.89

D.2 NETC FUND BALANCE

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ITEM	OBLIGATION	ENCUMB/ EXPEND.	INVOICE	CUM. BALANCE
Member Obligations 1999 = 6 X $75,000	450,000.00			909,269.89
Coord./Admin. of NETC: Calendar Year 1999:				909,269.89
- Administration = $77,666				
-Technology Transfer & Technical Committee				
Travel = $20,400				
-Total =$98,066		79,101.20	FINAL	830,168.69
"99" Project Series:				
99-1: Bridge Rail Transitions		240,000.00	FINAL/CLOSED	590,168.69
99-2: Evaluation of Asphaltic Expansion Joints		62,234.76	FINAL/CLOSED	527,933.93
99-3: Bridge Scour Monitoring Systems		78,523.32	FINAL/CLOSED	449,410.61
99-4: Quantifying Roadside Rest Area Usage		44,857.00	FINAL/CLOSED	404,553.61
99-6: The Effects of Concrete Removal Operations on Adjacent Concrete That Is to Remain		96,008.36	FINAL/CLOSED	308,545.25
Member Obligations 2000 = 6 X $100,000	600,000.00			908,545.25
Coord./Admin. of NETC: Calendar Year 2000:		91,899.37	FINAL	816,645.88
- Administration = $ 85,788				
- Technology Transfer & Technical Committee				
Travel =$ 16,800				
- Total =$102,588				
"00" Project Series:				816,645.88
00-1: Ground-Based Imaging and Data Acquisition Systems for Roadway Inventories in New England - A Synthesis of Practice		31,251.92	FINAL/CLOSED	785,393.96
00-2: Evaluation of Permeability of Superpave Mixes		95,499.16	FINAL/CLOSED	689,894.80
00-3: Composite Reinforced Timber Guard Rail - Phase I: Design, Fabrication and Testing		81,989.38	FINAL/CLOSED	607,905.42
00-4: Falling Weight Deflectometer Study		100,000.00	FINAL/CLOSED	507,905.42
00-5: Guard Rail Testing - Modified eccentric Loading Terminal at NCHRP 350 TL2		61,287.00	FINAL/CLOSED	446,618.42
00-6: Implementation of Visualization Technologies to Create Simplified Presentations Within Highway agencies to be Used at Public Hearings		74,914.49	FINAL/CLOSED	371,703.93
00-7: A Complete Review of Incident Detection Algorithms and Their Deployment: What Works and What Doesn't		45,369.45	FINAL/CLOSED	326,334.48
00-8: Performance and Effectiveness of A Thin Pavement Section Using Geogrids and Drainage geocomposites in A Cold Region		150,000.00	FINAL/CLOSED	176,334.48
Member Obligations 2001 = 6 X $100,000	600,000.00			776,334.48
Coord./Admin. of NETC: Calendar Year 2001:		104,385.35	FINAL	671,949.13
- Administration = $89,448				
- Technology Transfer & Technical Committee				
Travel = $16,800				
- Total = $106,248				
"01" Project Series:				
01-1: Advanced Composite Materials for New England's Transportation Infrastructure		47,559.27	FINAL/CLOSED	624,389.86
01-1: Advanced Composite Materials for New England's Transportation Infrastructure - Technology Transfer Phase I		25,286.18	FINAL/CLOSED	599,103.68
01-2: Development of A Testing Protocol for Quality Control/Quality Assurance of Hot Mix Asphalt		80,000.00	FINAL/CLOSED	519,103.68
01-3: Design of Superpave HMA for Low Volume Roads		120,324.15	FINAL/CLOSED	398,779.53
01-6: Field Evaluation of A New Compaction Device		49,944.50	FINAL/CLOSED	348,835.03
Member Obligations 2002 = 6 X $100,000	600,000.00			948,835.03
NY DOT Obligation = $52,500	52,500.00			1,001,335.03
Coord./Admin. Of NETC: Calendar Year 2002		109,207.12	FINAL	892,127.91

D.2 NETC FUND BALANCE

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ITEM	OBLIGATION	ENCUMB/ EXPEND.	INVOICE	CUM. BALANCE
"02" Project Series:				
02-1: Relating Hot Mix Asphalt Pavement Density to Performance		103,260.73	FINAL/CLOSED	788,867.18
02-2: Formulate Approach for 511 Implementation in New England Phase 1		48,158.19	FINAL/CLOSED	740,708.99
02-2: Formulate Approach for 511 Implementation in New England Phase 2		32,813.16	FINAL/CLOSED	707,895.83
02-3: Establish Subgrade Support Values (Mr) for Typical Soils in New England		79,936.86	FINAL/CLOSED	627,958.97
02-5: Determination of Moisture Content of De-Icing Salt at Point of Delivery		19,679.99	FINAL[2] /CLOSED	608,278.98
02-6 : Sealing of Expansion Joints - Phase 1		74,982.81	FINAL/CLOSED	533,296.17
02-7: Calibrating Traffic Simulation Models to Inclement Weather Conditions with Applications to Arterial Coordinated Signal Systems		74,037.57	FINAL/CLOSED	459,258.60
02-8: Intelligent Transportation Systems Applications to Ski Resorts in New England		54,724.71	FINAL/CLOSED	404,533.89
Member Obligations 2003 = 6 X $100,000	600,000.00			1,004,533.89
NY DOT Obligation = $40,000	40,000.00			1,044,533.89
Coord./Admin. Of NETC Calendar Year 2003 = $124,258		118,855.19	FINAL	925,678.70
"03" Project Series:				
03-1: Ability of Wood Fiber Materials to Attenuate Heavy Metals Associated with Highway Runoff		70,690.16	FINAL/CLOSED	854,988.54
03-2: Field Studies of Concrete Containing Salts of An Alkenyl-Substituted Succinic Acid		133,385.33	FINAL/CLOSED	721,603.21
03-3: Feasibility Study and Design of An Erosion Control Laboratory in New England		20,682.70	FINAL/CLOSED	700,920.51
03-3: Feasibility Study and Design of An Erosion Control Laboratory in New England Phase 2		13,135.80	FINAL/CLOSED	687,784.71
03-4: Measuring Pollutant Removal Efficiencies of Storm Water Treatment Units		80,000.00	FINAL/CLOSED	607,784.71
03-5: Evaluation of Field Permeameter As A Longitudinal Joint Quality Control Indicator		77,318.43	FINAL/CLOSED	530,466.28
03-6: Fix It First: Utilizing the Seismic Property Analyzer & MMLS to Develop Guidelines for the Use of Polymer Modified Thin Lift HMA vs. Surface Treatments; ***Cont'd as 03-6 (FHWA)***		54,085.45	FINAL	476,380.83
03-6 **(FHWA):** Fix It First: Utilizing the Seismic Property Analyzer & MMLS to Develop Guidelines for the Use of Polymer Modified Thin Lift HMA vs. Surface Treatments		45,842.00		430,538.83
03-7 (Alt.): Basalt Fiber Reinforced Polymer Composites		64,092.29	FINAL/CLOSED	366,446.54
Member Obligations 2004 = 6 X $100,000	600,000.00			966,446.54
NY DOT Obligation = $52,000	52,000.00			1,018,446.54
Coord./Admin. Of NETC Calendar Year 2004 = $126,559		113,012.87	FINAL	905,433.67
"04" Project Series:				
04-1: Recycling Asphalt Pavements Containing Modified Binders - Phase I		27,166.58	FINAL	878,267.09
04-1: Recycling Asphalt Pavements Containing Modified Binders - Phase II		82,750.99	FINAL/CLOSED	795,516.10
04-2: Driver-Eye-Movement-Based Investigation for Improving Work Zone Safety		70,387.66	FINAL/CLOSED	725,128.44
04-3: Estimating the Magnitude of Peak Flows For Steep Gradient Streams in New England; ***Cont'd as 04-3 (FHWA)***		98,025.49	FINAL	627,102.95
04-3 **(FHWA)** : Estimating the Magnitude of Peak Flows For Steep Gradient Streams in New England		21,978.00	FINAL/CLOSED	605,124.95
04-4: Determining the Effective PG Grade of Binder in RAP Mixes		130,876.00	FINAL/CLOSED	474,248.95
04-5: Network-Based Highway Crash Prediction Using Geographic Information Systems		129,020.04	FINAL/CLOSED	345,228.91
Member Obligations 2005 = 6 x $100,000	600,000.00			945,228.91
NY DOT Obligation = $50,000	50,000.00			995,228.91
Coord./Admin. Of NETC Calendar Year 2005 = $130,528		128,934.25	FINAL	866,294.66
"05" Project Series:				
05-1: Develop Base Resistance Load-Displacement Curves for The Design of Drilled Shaft Rock Sockets; ***Cont'd as 05-1 (FHWA)***		52,155.25	FINAL	814,139.41
05-1 **(FHWA)** : Develop Base Resistance Load-Displacement Curves for The Design of Drilled Shaft Rock Sockets		47,755.00	FINAL/CLOSED	766,384.41
05-2 Enhancing the Reflectivity of Concrete Barriers Phase 1		48,090.00		718,294.41
05-2: Enhancing the Reflectivity of Concrete Barriers, Phase 2: Full-Scale Barrier Selection & Evaluation		72,000.00		646,294.41

D.2 NETC FUND BALANCE

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ITEM	OBLIGATION	ENCUMB/ EXPEND.	INVOICE	CUM. BALANCE
05-3: Analysis of Roundabout Operational Characteristics Utilizing Microscopic Simulation Modeling		75,000.00		571,294.41
05-5: Measurement of Work of Adhesion Between Paint and Metalized/Galvanized Steel		104,987.55	FINAL	466,306.86
05-5 **(FHWA)** : Measurement of Work of Adhesion Between Paint and Metalized/Galvanized Steel		20,012.00		446,294.86
05-6: Employing Graphic-Aided Dynamic Message Signs to Assist Elder Drivers' Message Comprehension ***Continued as 05-6 (FHWA)***		46,712.74	FINAL	399,582.12
05-6 **(FHWA)** : Employing Graphic-Aided Dynamic Message Signs to Assist Elder Drivers' Message Comprehension		13,278.00	FINAL/CLOSED	386,304.12
05-7: Warrants for Exclusive Left Turn Lanes at Unsignalized Intersections and Driveways Phase I; ***Cont'd as 05-7 Phase II***		92,000.36	FINAL	294,303.76
05-7: Warrants for Exclusive Left Turn Lanes at Unsignalized Intersections and Driveways Phase II		7,431.26	FINAL/CLOSED	286,872.50
05-8: Evaluation of Alternative Traffic Simulation Models, Including CA4PRS for Analysis of Traffic Impacts of Highway Construction, Reconstruction and Rehabilitation: ***Con't as 05-8 (FHWA)***		94,964.22	FINAL	191,908.28
05-8 **(FHWA)** : Evaluation of Alternative Traffic Simulation Models, Including CA4PRS for Analysis of Traffic Impacts of Highway Construction, Reconstruction and Rehabilitation		5,035.00	FINAL/CLOSED	186,873.28
Member Obligations 2006 = 5 x $100,000 (no ME DOT allocation)	500,000.00			686,873.28
Note: Maine 2006 Obligation as of 11/06/06 per Peabody 11/30/06 email	100,000.00			786,873.28
Coord./Admin. Of NETC Calendar Year 2006 = 131,814		100,718.92	FINAL	686,154.36
"06" Project Series:				
06-1: New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design Guide With Level 2 & 3 Input ***Cont'd as 06-1 (FHWA)***		82,209.78	FINAL	603,944.58
06-1 **(FHWA)** : New England Verification of NCHRP 1-37A Mechanistic-Empirical Pavement Design Guide With Level 2 & 3 Input		68,085.00		535,859.58
06-2: Infrastructure Management Systems Enhancement and Integration to Suppo True Integrated Management Decision-Making				535,859.58
Note : Project dropped at June 30 2010 Adv. Comm. Mtg.				
06-3 Establish Default Dynamic Modulus Values for New England		109,787.00	FINAL/CLOSED	426,072.58
06-4 Preventative Maintenance and Timing of Applications		200,000.00		226,072.58
06-5 Winter Severity Indices for New England		73,639.62	FINAL/CLOSED	152,432.96
Note : Project terminated at June 30 Adv. Comm. Mtg.				
Member Obligations 2007 = 600,000	600,000.00			752,432.96
Coord./Admin. Of NETC Calendar Year 2007 = 136,061		122,644.79	FINAL	629,788.17
"07" Project Series:				
07-1 In-Place Response Mechanisms of Recycled Layers Due to Temperature and Moisture Variations		150,000.00		479,788.17
07-2 Exploring the Potential of Intelligent Intersections Deployment in New England		100,000.00		379,788.17
07-3 Determining Optimum Distance for a Lane Drop Downstream from a Signalized Intersection		100,000.00		279,788.17
07-4 Reliable Travel Time Estimation to Support Real-Time System Management Information. *Note : Project dropped at June 30, 2010 Adv. Comm. Mtg.*				279,788.17
Member Obligations 2008 = 600,000	600,000.00			879,788.17
NY DOT Obligation (72,000+8,000)	80,000.00			959,788.17
Coord./Admin. Of NETC Calendar Year 2008 = 134,998		131,509.90	FINAL	828,278.27
08-2 Evacuation Modeling to Assist Hazard Management and Response in Urban and Rural Areas of New England		160,000.00		668,278.27
08-3 Best Management Practices for the Invasive Polygonum Cuspidatum (Japanese Knotweed) Along Transportation Corridors		140,000.00		528,278.27

D.2 NETC FUND BALANCE

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ITEM	OBLIGATION	ENCUMB/ EXPEND.	INVOICE	CUM. BALANCE
08-4 NETC Research Implementation Survey & Synthesis (Rev. from $35,000 to $60,000 NETC Adv. Comm. Mtg 5/21/09)		60,000.00		468,278.27
08-5 NETC/UVM-UTC Transportation Research Challenge: Commute Rideshare, etc.		50,000.00		418,278.27
02-6 Phase II Sealing of Small Mvmnt Bridge Expan Joints - Field Inst. & Mntrng		74,558.62	FINAL/CLOSED	343,719.65
08-6 (Alt.) Interaction Between Salinity, Soil Quality and Amendments in Roadside Plantings		75,000.00		268,719.65
Member Obligations 2009 = 600,000	600,000.00			868,719.65
NYSDOT Obligation	50,000.00			918,719.65
Coord./Admin. Of NETC Calendar Year 2009 (Approved) = 139,309		131,157.45	FINAL	787,562.20
08-1 Applying the Highway Safety Manual in New England		120,000.00		667,562.20
09-1 Active Structural Control of Cantilevered Support Structures:				
Phase 1		150,000.00		517,562.20
Phase 2		100,000.00		417,562.20
09-2 Effective Establishment of Native Grasses on Roadsides		90,000.00		327,562.20
09-3 Advanced Composite Materials: Prototype Development and Demonstration		48,847.00	***See Note 3***	278,715.20
Member Obligations 2010 = 600,000	600,000.00			878,715.20
NYSDOT Obligation	50,000.00			928,715.20
Coord./Admin. Of NETC Calendar Year 2010 (Approved) = 134,809		127,097.21	FINAL	801,617.99
10-1 A Field Evaluation of SuperPave Hot Mix Asphalt Pavement Containing 30% RAP		180,000.00		621,617.99
10-2 Synthesis of Practice: Electronic Bridge Inspection Document Management Systems		70,000.00		551,617.99
10-3 Field Evaluation of Corrosion Protection on Bridges with A Spray Application of Disodium Tetrapropenyl Succinate (DSS)		100,000.00		451,617.99
10-4 Low Temperature and Moisture Susceptibility of RAP Mixtures with Warm Mix Technology		150,000.00		301,617.99
Member Obligations 2011 = 600,000	600,000.00			901,617.99
Coord./Admin. Of NETC Calendar Year 2011 (Approved) = 133,793		133,793.00		767,824.99

Notes:

1 ***= Member FFY allocations are obligated between October 1 and December 31***

2 ***= A credit of $6,599.70 for NETC's overpayment to UConn for CY 2004 NETC Management was applied, by UConn, to the 'Indirect Cost' for project 02-5. Therefore although the total expenditures of the project were $26,279.69 the amount paid by NETC was $19,679.99***

3 = ***Per minutes of NETC Adv. Comm. Mtg. 5/12/08: "It was agreed that since the encumbered amount for NETC 05-7 was incorrectly shown in the Fund Balance Report*** (April 30, 2008)***as $70,000 and the correct amount is $100,000, the amount of funding to be allocated for the third ranked problem statement for the FFY 09 research program (NETC 09-3) would be set at the amount of the revised unencumbered fund balance remaining*** (at that time)***after the allocation of funds for NETC 09-1 and NETC 09-2, i.e., $48,847."***

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.***

E. REPORTS, PAPERS AND PRESENTATIONS

E.1 POLICIES AND PROCEDURES:

"Policies and Procedures, New England Transportation Consortium," July 1995.
"Policies and Procedures, New England Transportation Consortium," April 2002.

E.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 2004," December 2005, NETCR59
"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

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

"The Development of a Common Regional System for Issuing Permits for Oversize and Overweight Trucks Engaged in Interstate Travel," Humphrey, T.F., May 1986.

"Agreement to Implement a Common Set of Procedures for Issuing Permits for Nondivisible Oversize and Overweight Trucks Engaged in Interstate Travel," The New England Transportation Consortium, October 1988.

"The New England Transportation Consortium, Round One Activities," Humphrey, T.F., and Maser, K.R., MIT, December 1988.

"New Technology for Bridge Deck Assessment - Phase I Final Report," Vols. I and II, Maser, Kenneth R., MIT Center for Transportation Studies, October 1989.

"Handbook for Use by the Trucking Industry to Implement The NETC Common Truck Permit Procedures for Certain Nondivisible Oversize/Overweight Vehicles Traveling on State Highways," MIT Center for Transportation Studies, January 1989.

"Bridge Rail Design and Crash Worthiness - Final Report," Elgaaly, M., Dagher, H., and Kulendran, S., University of Maine, May 1989.

E.3 NETC REPORTS, PAPERS, AND PRESENTATIONS 1988-1994 (cont'd):

"New England Transportation Consortium, Operational Procedures," Humphrey, T.F., November 1991.

"Wetlands: Problem & Issues," Shuldiner, P.W., University of Massachusetts, August 1990.

"Development of a Uniform Truck Management System," Vols. I and II, Lee, K.W., and McEwen, E.E., University of Rhode Island. July 1990.

"A Study of STAA Truck Safety In New England - Phases I & II," MIT, November 1991.

"New Technology for Bridge Deck Assessment - Phase II Final Report," MIT, May 1990.

"Rail Service In New England," Martland, C.P. Little, and Alvaro, A.E., MIT Center for Transportation Studies, April 1992.

"CMA Degradation and Trace Metals in Roadside Soil," Ostendorf, D.W., Palaia, T.A., and Zutell, C.A., University of Massachusetts, March 1993.

"Tire Chips as Lightweight Backfill for Retaining Walls - Phase I," Humphrey, D., Sandford, T.C., Cribbs, M.M., Gharegrat, H.G., and Manion, W.P., University of Maine, August 1992.

"Cooperative Regional Transportation Research Programs Underway in New England," Humphrey, T.F., and Sussman, J.M., International Congress on Technology and Technology Exchange, June 1989.

"Uniformity Efforts in Oversize/Overweight Permits," Humphrey, T.F., NCHRP Synthesis, No. 143, Transportation Research Board, 1988.

"Implementation of a Uniform Truck Permit System by the New England Transportation Consortium," Humphrey, T.F., AASHTO 1987 Annual Meeting Proceedings, pp. 84-90, 1987.

"Advantages of Oversize/Overweight Truck Permit Uniformity," AASHTO 1990 Annual Meeting Proceedings, pp. 83-85, 1990.

"Crash Worthiness of Bridge Rails," Dagher, H., Elgaaly, M., and Kulendran, S., Proceedings, Fourth Rail Bridge Centenary Conference, Heriot-Watt University, Edinburgh, Scotland, August 1990.

E.3 NETC REPORTS, PAPERS, AND PRESENTATIONS 1988-1994 (cont'd):

"Principles of Radar and Thermography for Bridge Deck Assessment," Maser, R., and Roddis, W.M.K., ASCE Journal of Transportation Engineering, Vol. 116, No. 5, Sept./Oct. 1990.

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

"CMA Degradation in Roadside Soil: Acetate Microcosms," Ostendorf, D.W., Pollock, S.J., De Cheke, M.E., and Palaia, T.A., Transportation Research Record, No. 1366, pp. 41-43, 1992.

"Aerobic Degradation of CMA in Roadside Soils: Field Simulations from Soil Microcosms," Ostendorf, D.W., Pollock, S.J., De Cheke, M.E., and Palaia, T.A, Journal of Environmental Quality, Vol. 22, pp. 229-304, 1993.

"Shear Strength and Compressibility of Tire Chips for Use as Retaining Wall Backfill," Humphrey, D.N., Sandford, T.C., Cribbs, M.M., and Manion, W.P., Transportation Research Record No. 1422, pp. 29-35, Transportation Research Board, National Research Council Washington, D.C., 1993.

"Tire Chips as Lightweight Subgrade Fill and Retaining Wall Backfill," Humphrey, D.N., and Sandford, T.C., Proceedings of the Symposium on Recovery and Effective Reuse of Discarded Materials and By-Products for Construction of Highway Facilities, pp. 5-87 to 5-99, Federal Highway Administration, Washington, D.C., 1993.

E.4 REPORTS, PAPERS AND PRESENTATIONS 1995-2011:

Project No. **Title**

N/A **Construction Costs Of New England Bridges**

Reports:

"Construction Costs of New England Bridges," Alexander, J.A., Dagher, H. and James, S., November 1996, NETCR1.

Papers and Presentations:

"Construction Costs of New England Bridges," Alexander, J., Dagher, H. and James, S. Presented at the Annual Maine Transportation Conference, December 7, 1995.

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

Reports:

"Tire Chips As Lightweight Backfill For Retaining Walls - Phase II," Tweedie, Jeffrey J., Humphrey, Dana N., and Sandford, T.C., March 11, 1998, NETCR8.

Papers and Presentations:

"Tire Shreds as Lightweight Retaining Wall Backfill-Active Conditions," Humphrey, D. Submitted for publication in the ASCE Journal of Geotechnical and Geoenvironmental Engineering.

"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 Subgrade and Retaining Wall Backfill," by Humphrey, D.N. and Sandford, T.C. Symposium on Recovery and Effective Reuse of Discarded Materials and By-Products for Construction of Highway Facilities, FHWA, Denver, Colorado, October 19-22, 1993.

"Use of Tire Chips as Subgrade Insulation and as Lightweight Fill for Highway Construction," Humphrey, D.N. Presented at the 18th Annual Meeting of the Asphalt Recycling and Reclaiming Association, Pompano Beach, Florida, February 23-26, 1994.

"Use of Tire Chips in Highway Construction," Humphrey, D.N. Presented to the New England Environmental Expo, Boston, Massachusetts, May 9, 1995.

N/A **Tire Chips As Lightweight Backfill For Retaining Walls, Phase II: Full-Scale Testing (cont'd):**

Papers and Presentations (cont'd):

"Use of Tire Chips in Highway Construction," Humphrey, D.N. Presented to the AASHTO Region 1 RAC Meeting, Portland, Maine, May 23, 1995.

"Tire Chips for Highway Construction," Humphrey, D.N. Presented to the Northeast Recycling Council in Sturbridge, Massachusetts on December 8, 1995.

"Tire Chips: A New Road Building Geomaterial," Humphrey, D. Presented at the Conference on Waste and Recycled Materials in the Transportation Infrastructure, held in conjunction with the 75th Annual Meeting of the Transportation Research Board, January 7, 1996.

"Use of Tire Chips in Civil Engineering." Presented at the 76th Annual Meeting of the Rubber Association of Canada, March 7, 1996.

"Civil Engineering Uses for Scrap Tires," Humphrey, D. Presented at Scrap Tire '96 held in Chicago, Illinois on August 16, 1996.

"Full Scale Field Trials of Tire Chips as Lightweight Retaining Wall Backfill-At Rest Conditions," Tweedie, J.J., Humphrey, D.N., and Sandford, T.C., Transportation Research Board No. 1619, Transportation Research Board, Washington, D.C., p. 64-71, 1998.

"Tire Shreds as Retaining Wall Backfill, Active Conditions," Tweedie, J.J., Humphrey, D.N., and Sandford, T.C, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 124, No. 11, Nov., pp.1061-1070, 1998.

"Highway Applications of Tire Shreds," Humphrey, D. A 7-hour short course presented in each of the six New England States, 1998.

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

N/A **New England Vehicle Classification And Truck Weight Program, Phase I**

Reports:

"New England Vehicle Classification and Truck Weight Program, Technical Report No. 1: Toward the Development of a Vehicle Classification Program for New England," Collura, J., Chan, D., Evans, E., Kelly, S., Hosmer, T., and Shuldiner, P., April 1996.

N/A **New England Vehicle Classification And Truck Weight Program, Phase I (cont'd):**

Reports (cont'd):

"New England Vehicle Classification and Truck Weight Program, Technical Report No. 2: Toward the Development of a Truck Weight Program for New England," Collura, J., Chan, D., Evans, E., Kelly, S., Hosmer, T., and Shuldiner, P., April 1996.

"New England Vehicle Classification and Truck Weight Program, Technical Report No. 3: Supplemental Analysis of Truck Weight Data Collection at SHRP Continuous Count Stations," Collura, J., Chan, D., Evans, E., Kelly, S., Hosmer, T., and Shuldiner, P., April 1996.

"New England Vehicle Classification and Truck Weight Program, Phase I," Collura, J., Chan, D., Evans, E., Kelly, S., Hosmer, T. and Shuldiner, P., April 1996, NETCR2.

Papers and Presentations:

"An Analysis of Vehicle Class and Truck Weight Patterns in New England," Collura, J. and Orloski, F. Presented at the 1994 National Traffic Data Acquisition Conference, Rocky Hill, Connecticut, September 18-22, 1994.

"New England Vehicle Classification and Truck Weight Program," Collura, J. and Orloski, F. Presented to the Transportation Research Board's Highway Traffic Monitoring Committee, Annual Meeting of the Transportation Research Board, Washington, D.C., January 1995.

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

Reports:

"NETC 2-Bar Curb-Mounted Bridge Rail Design - Plans and Specifications." Revised January 1997.

"NETC 4-Bar Sidewalk-Mounted Bridge Rail Design - Plans and Specifications." January 1997.

"Crash Testing and Evaluation of the NETC 2-Bar Curb-Mounted Bridge Rail," Mak, K.K., and Menges, W.L., February 1998, NETCR10.

"Full-Scale Crash Evaluation of the NETC 4-Bar Sidewalk Steel Bridge Railing," Kimball, C.E., and Mayer, J.B., March 1999, NETCR14.

Papers and Presentations: None

94-1 **Structural Analysis Of New England Subbase Materials And Structures**

Reports:

"Structural Analysis of New England Subbase Materials and Structures," Lee, K.W., Huston, M.T., Davis, J., Vajjhalla, S., June 30, 2001, NETCR26.

Papers and Presentations:

"Structural Analysis of New England Subbase Materials and Structures," Davis, J. Presented at the Rhode Island Transportation and Civil Engineering Forum, Kingston, Rhode Island, October 23, 1996.

"Structural Analysis of New England Subbase Materials and Structures." Presented at the Northeast Graduate Student Symposium on Applied Mechanics, University of Rhode Island, April 26, 1997.

"Structural Analysis of New England Subbase Materials and Structures." Presented at the Rhode Island Transportation and Civil Engineering Forum, University of Rhode Island, October 15, 1997.

"Structural Analysis of New England Subbase Materials and Structures," Davis, J., Huston, M., and Lee, K.W. Presented at the 1998 Annual Transportation Research Board Meeting.

"Structural Properties of New England Subbase Materials of Flexible Pavements." Presented at the 5th International Conference on the Bearing Capacity of Roads and Airfields, July 8, 1998.

"Structural Properties of New England Subbase Materials of Flexible Pavements." Presented at the 5th International Conference on the Bearing Capacity of Roads and Airfields on July 8, 1998.

"Characterization of Subbase Materials of Flexible Pavements With and Without Reclaimed Asphalt Pavement," Lee, K.W., Davis, J., and Vajjhalla, S. Presented at the 1999 World Congress for Korean Scientists and Engineers, July 7, 1999.

"Characterization of Subbase Materials of Flexible Pavements With and Without Reclaimed Asphalt Pavement," Lee, K.W., Davis, J. and Vajjhalla, S. Presented at the 12th Rhode Island Transportation Forum, University of Rhode Island, October 15, 1999.

94-2 **Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques**

Reports:

"Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques," Huston, D., Fuhr, P., Maser, K. and Weedon, W., July 1, 2002, NETCR 19.

Papers and Presentations:

"Bridge Deck Structural Monitoring Techniques," Huston, D. Presented at the New England State Materials Engineer Association Conference, Burlington, Vermont, October 9, 1996.

"Bridge Deck Evaluation with Ground Penetrating Radar," Huston, D., Maser, K., Weedon, W., Fuhr, P.L., and Adam, C., Structural Health Monitoring, Chang F., Editor, Technomic Publishing, pp. 91-109, Proceedings of the International Workshop on Structural Health Monitoring, Stanford, California, September 1997.

"Ground Penetrating Radar for Nondestructive Evaluation of Concrete Bridge Decks," Adam, C., M.S. Thesis, Department of Mechanical Engineering University of Vermont, September 1997.

"Bridge Deck Evaluation with Ground Penetrating Radar," Huston, D., Master, K., Hu, J.Q., Weedon, W., and Adam, C., Proceedings of the GPR '98 7th International Conference on Ground-Penetrating Radar, The University of Kansas, Lawrence, KS, May 27-30, 1998.

"Bridge Deck Evaluation with Ground Penetrating Radar," Huston, D., Hu, J.Q, Pelczarski, N, and Esser, B., Proceedings Second International Conference on Structural Health Monitoring, Stanford University, September 1999.

"GIMA Antenna Design for Ground Penetrating Radar in Concrete NDE Application," Hu J.Q., Huston, D. and Fuhr, P. SPIE paper 3670-63, SPIE Conference On Sensory Phenomena and Measurement Instrumentation for Smart Structures and Materials, Newport Beach, CA, March 1999.

"Ground Penetrating Radar for Concrete Bridge Health Monitoring Applications," Huston, D, Hu, J.Q., Maser, K., Weedon, W., and Adam, C. SPIE 3587-23, Proceedings SPIE NDE Techniques for Aging Infrastructure and Manufacturing, Newport Beach, CA, March 1999.

"Electromagnetic Interrogation of Structures," Huston, D. Fourth Army Research Office on Smart Structures, State College, PA, August 1999.

94-2 **Nondestructive Testing of Reinforced Concrete Bridges Using Radar Imaging Techniques (cont'd):**

Papers and Presentations (cont'd):

"GIMA Ground Penetrating Radar System For Infrastructure Health Monitoring," Huston, D.R., Hu, J.Q, Maser, K., Weedon, W., and Adam, C. Journal of Applied Geophysics 43, 2000, pp. 39-146.

"Good Impedance Match Antenna (GIMA) Design and Its Applications for Ground Penetrating Radar In Concrete Structures NDE Applications," Hu, J. M.S. Thesis, Department of Mechanical Engineering, University of Vermont, March, 2000.

"Damage Assessment in Roadways with Ground Penetrating Radar," Huston, D., Pelczarski, N., Esser, B., Maser, K., and Weedon, W. SPIE Conference on Nondestructive Evaluation and Health Monitoring of Aging Infrastructure, 3995A-55, Newport Beach CA, March 2000.

"Damage Detection in Roadways with Ground Penetrating Radar," Huston, D.R., Pelczarski, N., Esser, B., and Master, K. GPR 2000, 8th International Conference on Ground Penetrating Radar," Gold Coast, Australia, May 2000.

"Wireless Inspection of Structures Aided by Robots," Huston D.R., Pelczarski N., Esser B., Gaida G., Arms S. and Townsend C. SPIE Symposium on NDE for Health Monitoring and Diagnostics, 4337-24, Newport Beach CA, March 2001.

"Inspection of Bridge Columns and Retaining Walls with Electromagnetic Waves," Huston D.R., Pelczarski N., and Key C. SPIE Symposium on Smart Systems for Bridges, Structures, and Highways, 4330-09, Newport Beach, CA, March 2001.

"Wireless Electromagnetic Interrogation of Structures," Huston D., Pelczarski N., Fuhr P., Arms S., and Esser B. (Tentatively accepted) Smart Materials and Structures, April 2001.

"Adaptive Sensors and Sensor Networks for Structural Health Monitoring," Huston D. SPIE 4512-24, Symposium on Complex Adaptive Structures, Hutchinson Island, FL, June 2001.

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

Reports:

"Procedures for the Evaluation Sheet Membrane Waterproofing," Korhonen, C.J., Buska, J.S., Cortez, Edel R., and Greatorex, Alan R., August 1999, NETCR13.

Papers and Presentations: None

94-4 **Durability Of Concrete Crack Repair Systems:**

Reports: None

Papers and Presentations:

"Durability of Concrete Crack Repair, Projects," Robinson, J. Presented at the University of Rhode Island Graduate Seminar Series, Kingston, RI, November 19, 1997.

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

95-1 **Use Of Tire Chip/Soil Mixtures To Limit Frost Heave And Pavement Damage Of Paved Road**

Reports:

"Use of Tire Chip/Soil Mixtures to Limit Frost Heave and Pavement Damage of Paved Roads," Brian, K.L., and Humphrey, D. N., June 2000, NETCR12.

Papers and Presentations:

"Laboratory and Field Measurement of the Thermal Conductivity of Tire Chips for Use as Subgrade Insulation," Humphrey, D., Chen, L.H. and Eaton, R. A paper submitted to the Transportation Research Board for presentation at the session on "Properties of Unconventional Aggregates" at the Annual Meeting of the Transportation Research Board, Washington, D.C., January 1997.

"Highway Applications of Tire Shreds," Humphrey, D. A 7-hour short course presented in each of the six New England States, 1998.

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

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

95-2 **Suitability Of Non-Hydric Soils For Wetland Mitigation**

Reports:

"Suitability of Non-Hydric Soils for Wetland Mitigation," Brannaka, L.K. and Evans, C.V., February 28, 1997, NETCR5.

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:

"Implementation and Evaluation of Traffic Marking Recesses for Application of Thermoplastic Pavement Markings on Modified Open Graded Friction Course," Lee, K.W., Cardi, S.A., and Corrigan, S., July 2000, NETCR23.

Papers and Presentations:

"Implementation and Evaluation of Traffic Marking Recesses for Application of Thermoplastic Pavement Markings on Modified Open Graded Mixes," Lee, K.W. Presented at the Rhode Island Transportation and Civil Engineering Forum, Kingston, Rhode Island, October 23, 1996.

"Implementation and Evaluation of Traffic Marking Recesses for Application of Thermoplastic Pavement Markings on Modified Open-Graded Mixes," Lee, K.W. Presented at the Rhode Island Transportation and Civil Engineering Forum, University of Rhode Island, October 15, 1997.

95-5 **Buried Joints In Short Span Bridges**

Reports: None

Papers and Presentations:

"State of the Art Study of Bridge Joint Systems in New England," Tsiatas, and Chandrasekaran, S. Submitted for presentation at the Annual Meeting of the Transportation Research Board, Washington, D.C., January 1997.

95-6 **Guidelines For Ride Quality Acceptance Of Pavements**

Reports:

"Guidelines for Ride Quality Acceptance of Pavements," Collura, J., El-Korchi, T., Black K., Chase, M. and Li, J., April 1997, NETCR 6.

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:

"Effectiveness of High Strength Composites as Structural and Protective Coatings for Structural Elements," Balaguru, P., and Lee, K.W., May 2001, NETCR28.

Papers and Presentations:

"Inorganic Matrices for Composites," NSF Workshop on Composites, Hanover, NH, March 15, 1998.

"Behavior of Geopolymer Reinforced with Various Types of Fabrics," SAMPE 1998, Anaheim, CA, May 1998.

"Use of Ferrocement Theory for Analysis of High Strength Composites," Ferrocement VI, Ann Arbor, MI, June 1998.

"Advances in Composites," National University of Singapore, July 19, 1998.

"Effectiveness of Fiber Reinforced Composites as Structural and Protective Covering Bridge Elements Exposed to Deicing-Salt Chlorides," Visiting Scholar Lecture, Transportation Forum, University of Rhode Island, October 15, 1999.

"Advanced High Strength Fiber Composites," U.S.-Germany Workshop, Maiz, Germany, May 16-19, 1999.

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

"Inorganic Coatings for Transportation Infrastructures," Geopolymer Conference, St. Quentin, France, July 2, 1999.

"State-of-the-Art: Fiber Reinforced Concrete," NSF Faculty Workshop, Northwestern University, Evanston, IL, July 21, 1999.

"Recent Advances in High Strength Composites and Applications for Repair and Rehabilitation," 6th International Conference on Structural Failure, Durability, and Retrofitting, Singapore, September 15, 2000.

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

Papers and Presentations (cont'd):

"Durability of Carbon Composites Made With Inorganic Matrix," Garon, R., and Balaguru, P., "SAMPE", November 2000, pp. 34-43.

"Inorganic Matrix - High Strength Fiber Composites," University of Missouri, Rolla, July 27, 2000.

"Comparison of Inorganic and Organic Matrices for Strengthening of Reinforced Concrete Beams," Kurtz, S., and Balaguru, P., Journal of Structural Engineering ASCE, V 127, January 2001, pp. 35-42.

"Durability of High Strength Composite Repairs under Scaling Conditions," Garon, R., and Balaguru, P., Proceedings of Third International Conference on Concrete Under Severe Conditions, Vancouver, Canada, June 2001.

97-1 **A Portable Method To Determine Chloride Concentration On Roadway Pavements**

Reports:

"A Portable Method to Determine Chloride Concenteration on Roadway Pavements," Garrick, N., Nikolaidis, N., P. and Luo, J, September 2002, NETCR17.

Papers and Presentations: None

97-2 **Performance Evaluation And Economic Analysis Of Combinations Of Durability Enhancing Admixtures (Mineral And Chemical) In Structural Concrete For The Northeast U.S.A**

Reports:

"Performance Evaluation and Economic Analysis of Combinations of Durability Enhancing Admixtures (Mineral and Chemical) in Structural Concrete for the Northeast U.S.A.," Civjan, S.A., LaFave, J.M., Lovett, D., Sund, D.J., Trybulski, J., February 2003, NETCR 36.

Papers and Presentations:

"Performance Evaluation of Durability Enhancing Admixtures (Mineral and Chemical) in Structural Concrete," Sund, D., Report in Partial Fulfillment of Master of Science in Civil Engineering Degree, Department of Civil and Environmental Engineering, University of Massachusetts, Amherst, September, 1999.

97-2 **Performance Evaluation And Economic Analysis Of Combinations Of Durability Enhancing Admixtures (Mineral And Chemical) In Structural Concrete For The Northeast U.S.A (cont'd):**

Papers and Presentations:

"On the Use of Combinations of Durability Enhancing Admixtures (Mineral and Chemical) in Structural Concrete," Lafave, J.M., Lovett, D., and Civjan, S.A., ACI Fall Convention, Toronto, Ontario, Canada, October 15-21, 2000.

"Performance Evaluation of Combinations of Durability Enhancing Admixtures in Concrete - Review and Experimental Program," Report in Partial Fulfillment of Master of Science in Civil Engineering Degree, Lovette, D., Department of Civil and Environmental Engineering, University of Massachusetts, Amherst, February, 2001.

97-3 **Determining Properties, Standards And Performance Of Wood Material As An Erosion Control Mulch And As A Filter Berm**

Reports:

"Performance Specifications for Wood Waste Materials as an Erosion Control Mulch and as a Filter Berm," Demars, K.R., Long, R.P., Ives, J.R. April 2000, NETCR20.

Papers and Presentations:

"Compost Applications for Erosion Control: New and Improved Methods," K. Demars. Presented at the Conference on 'Putting Compost in the Specs: Practical Applications for Erosion Control', Wrentham Development Center, Wrentham, MA, October 8, 2002.

97-4 **Early Distress Of Open-Graded Friction Course (OGFC)**

Reports:

"Early Distress in Open-Graded Friction Course," Stephens, J.E., Mahoney, J., Dougan, C.E., July 1999, NETCR16.

Papers and Presentations: None

99-1 **Bridge Rail Transitions – Development and Crash Testing**

Reports:

"NCHRP Report 350 Testing and Evaluation of NETC Bridge Rail Transitions," Dean C. Alberson, C. Eugene Buth, Wanda L. Menges, and Rebecca R. Haug, Texas Transportation Institute, Texas A&M University, January 2006, NETCR 53.

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:

"NETC Bridge Rail Transitions," by Dean C. Alberson and Wanda L. Menges, Concord, New Hampshire, December 13, 2005.

"Summary of NCHRP Report 350," by Dean C. Alberson, Concord, New Hampshire, December 13, 2005.

99-2 **Evaluation of Asphaltic Expansion Joints**

Reports:

"Evaluation of Asphaltic Expansion Joints," Mogawer, W.S., November 2004, NETCR 50.

Papers and Presentations: None

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

Reports:

"Development of Priority Based Statewide Scour Monitoring Systems in New England," Ho, C.T., Di Stasi, J.M., August 2, 2001, NETCR24.

Papers and Presentations:

"Real-Time Bridge Scour Assessment and Warning," Di Stasi, J.M. and Ho, C.L., Proceedings of International Symposium: Technical Committee No. 33 on Scour of Foundations. Melbourne, Australia, pp. 337-352.

99-4 **Quantifying Roadside Rest Area Usage**

Reports:

"Quantifying Roadside Rest Area Usage," Garder, P. and Bosonetto, N., November 27, 2002, NETCR 38.

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).

99-6 **Analytical and Experimental Investigation Of The Effects Of Concrete Removal Operations On Adjacent Concrete That Is To Remain**

Reports:

"Analytical and Experimental Investigation of the Effects of Concrete Removal Operations on Adjacent Concrete That is to Remain," Masih, R., Wang, T. and Forbes, A., January 15, 2002, NETCR 29.

Papers and Presentations:

"Enhancing the Students' Learning Process Through Interaction Project Between Academia and Industry." Presented and published in the Abstract of ASEE 2000 at the University of Massachusetts, Lowell, April 2000.

"The Effect of Powerful Demolition Equipment on the Remaining Part of the Concrete Bridge," Masih, R. Presented and published in the proceedings of the Second International Conference on Computational Methods for Smart Structures and Material. Madrid, June 2000.

"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 Anwedungen der Informatik in Architectur und Bauwesen, Germany, June 2000

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

00-1 **Ground-Based Imaging And Data Acquisition Systems For Roadway Inventories In New England - A Synthesis Of Practice**

Reports:

"Ground-Based Image and Data Acquisition Systems for Roadway Inventories in New England – A Synthesis of Highway Practice," Hancock, K. and Degray, J., August 2002, NETCR 30.

Papers and Presentations: None

00-2 Evaluation Of Permeability Of Superpave Mixes

Reports:

"Evaluation of Permeability of Superpave Mixes," Mogawer, W., Mallick, R., Teto, M. and Crockford, C., July 3, 2002, NETCR34.

Papers and Presentations:

"An Alternative Approach to Determination of Bulk Specific Gravity and Permeability of Hot Mix Asphalt (HMA)," Bhattacharjee, S., Mallick, R. and Mogawer, W. Submitted to International Journal of Pavement Engineering.

A Presentation, by W. Mogawer, to the Northeast Asphalt User Producer Group Meeting, October 18, 2001, Albany, New York.

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

Reports:

"Design, Fabrication and Preliminary Testing of a Composite Reinforced Timber Guardrail," Davids, W., Botting, J., March 31, 2004, NETCR 39.

Papers and Presentations: None

00-4 Portable Falling Weight Deflectometer Study

Reports:

"Portable Falling Weight Deflectometer Study," Steinert, B., Humphrey, D., Kestler, M., March 11, 2005, NETCR52.

Papers and Presentations: None

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

Reports:

"Guardrail Testing Modified Eccentric Loader Terminal (MELT) at NCHRP 350 TL-2," Alberson, D., Menges, W. and Haug, R., July 2002, NETCR35.

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:

"Effective Visualization Techniques for the Public Presentation of Transportation Projects," Garrick, N.W., Minutti, P., Westa, M., Luo, J., Bishop, M., July 2005, NETCR 48.

Papers and Presentations:

"Effective Visualization Techniques for the Public Presentation of Transportation Projects," Luo, J., MS Thesis, University of Connecticut, August 2002.

00-7 **A Complete Review of Incident Detection Algorithms and Their Deployment: What Works and What Doesn't**

Reports:

"A Complete Review of Incident Detection Algorithms & Their Deployment: What Works and What Doesn't," Parkany, E., Xie C., February 7, 2005, NETCR 37.

Papers and Presentations:

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

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

Reports:

"Performance and Effectiveness of a Thin Pavement Section Using Geogrids and Drainage Geocomposites in a Cold Region," Helstrom, C.L., Humphrey, D.N., and Labbe, J.M., August 2007, NETCR60.

Papers and Presentations:

"Geogrid Reinforced Pavement Structure in a Cold Region," Helstrom, C.L., Humphrey, D.N., and Hayden, S.A., Proceedings of the 13th International Conference on Cold Regions Engineering, ASCE, Orono, Maine, 12 pp., 2006.

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

Reports:

"Advanced Composite Materials for New England's Transportation Infrastructure: A Study for Implementation and Synthesis of Technology and Practice," Breña, S.F., Civjan, S.A., and Goodchild, M., May 2006, NETCR62.

Papers and Presentations: None

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

Reports:

"Advanced Composite Materials in New England's Transportation Infrastructure – Technology Transfer Phase 1: Selection of Prototype," Breña, F., and Civjan, S.A., November 1, 2009, NETCR77.

Papers and Presentations: None

01-2 **Development of a Testing Protocol for QC/QA of Hot Mix Asphalt**

Reports:

"Development of a Testing Protocol for QC/QA of Hot Mix Asphalt (HMA)," Mogawer, W.S., Mallick, R., February 5, 2004, NETCR 43.

Papers and Presentations:

"An Evaluation of Use of Rapid Triaxial Test In Quality Control of Hot Mix Asphalt (HMA)," Mogawer, W. S., Presented at the 82nd Annual Meeting of the Transportation Research Board, January 12-16, 2003, Washington DC.

01-3 **Design of Superpave HMA for Low Volume Roads**

Reports:

"Design of Superpave HMA for Low Volume Roads," Mogawer, W.S., Mallick, R., December 31, 2004, NETCR 51.

Papers and Presentations:

"Development of Mix Design Criteria for Low Traffic Volume Hot Mix Asphalt Roads," Nanagiri, Y.V., Mallick, R., Mogawer, W.S. Proceedings of the Annual Meeting of the Canadian Technical Asphalt Association, November 2003.

01-6 **Field Evaluation of a New Compaction Monitoring Device**

Reports:

"Field Evaluations of A New Compaction Monitoring Device," Miller, H.J., June 26, 2003, NETCR 42.

Papers and Presentations: None

02-1 **Relating Hot Mix Asphalt Pavement Density to Performance**

Reports:

"Relating Hot Mix Asphalt Pavement Density to Performance," Mogawer, W.S., Daniel, J.S., and Austerman, A.J., April 1, 2010, NETCR76.

Papers and Presentations:

"Evaluation of the Effects of HMA Density on Mixture Fatigue and Rutting Performance," Mogawer, W.S., Northeast Asphalt User/Producer Group (NEAUPG) Annual Meeting, South Portland, Maine, October 8, 2009.

"Evaluation of the Effects of Hot Mix Asphalt Density on Mixture Fatigue Performance, Rutting Performance and MEPDG Distress Predictions," Mogawer, W.S., Austerman, A.J., Daniel, J.S., Fujie, Z., and Bennert, T., International Journal of Pavement Engineering, 2011.

02-2 **Formulate Approach for 511 Implementation in New England**

Reports:

"Formulate Approach for 511 Implementation in New England," Shuldiner, P., Loane, G., and Knapick, R., October 2005, NETCR44.

Papers and Presentations: None

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

Reports:

"Establish Subgrade Support Values for Typical Subs in New England," Malla, R. B., and Joshi, S., April 2006, NETCR57.

Papers and Presentations:

"Resilient Modulus Prediction Models for Some New England Subgrade Soils," Malla, R. and Joshi, S., Electronic Proceedings of the 2005 Joint ASCE/ASME/SES Conference on Mechanics and Materials (McMat 2005), Baton Rouge, LA, June 1-3, 2005.

"Resilient Modulus of Subgrade Soils A-1-b, A-3, an A-7-6 using LTPP Data: Prediction Models with Experimental Verification," Joshi, Shraddha, and Malla, R., Proceedings, ASCE GeoCongress 2006, (Atlanta, GA, Feb. 26-March 01, 2006), ASCE, Reston, VA; Feb. 2006, 6p (CD ROM).

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

Reports:

"Determination of Moisture Content of Deicing Salt at Point of Delivery," Long, R.P., Demars, K.R., and Balunaini, U., March 2004, NETCR 45.

Papers and Presentations: None

02-6 **Sealing of Small Movement Bridge Expansion Joints**

Reports:

"Sealing of Small Movement Bridge Expansion Joints," Malla, R.B., Shaw, M.T., Shrestha, M.R. and Boob, S., June 2006, NETCR58.

Papers and Presentations:

"Silicone Foam Sealant for Bridge Expansion Joints," Malla R. B., Shaw M. T., Shrestha M. R., Boob S., McMat 2005 Mechanics and Materials Conference Baton Rouge, Louisiana, June 1-3, 2005.

"Experimental Evaluation of Mechanical characteristics of Silicone Foam Sealant for Bridge Expansion Joints," Malla R. B., Shaw M. T., Shrestha M. R., Boob S., 2005 Society for Experimental Mechanics Annual Conference Portland, Oregon, June 7-9, 2005.

"Development and Experimental Evaluation of Silicone Foam Sealant For Small Bridge Expansion Joints," Matu Shrestha, M.S. Thesis, Dept. of Civil & Environmental Engineering, University of Connecticut, Storrs, CT, September 2005.

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

Reports:

"Sealing of Small Movement Bridge Expansion Joints - Phase 2: Field Demonstration and Monitoring," Malla, R.B., Shaw, M., Swanson, B., and Gionet, T., July 31, 2011, NETCR86.

Papers and Presentations:

"Laboratory Evaluation of a Silicone Foam Sealant for Field Application of Bridge Expansion Joints," Malla, R.B., Swanson, B., and Shaw M.T., Proceedings of the 2010 SEM Annual Conference & Exposition, SEM, Bethel, CT, 12 pages, June 2010.

"Development and Installation of Foam Sealant for Small Movement Bridge Expansion Joints," Malla, R.B., Swanson, B., and Shaw M.T., Poster presentation to the Proceedings, 27th Annual International Bridge Conference, Pittsburgh, PA, June 6-9, 2010.

"Laboratory Evaluation, Field Application, and Monitoring of a Silicone Foam Sealant Bonded to Various Bridge Expansion Joint Headers," Swanson, B.J., (2011), M.S. Thesis, Department of Civil and Environmental Engineering, University of Connecticut, Storrs, CT, 128 pages.

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"Laboratory Testing Field Installation, and Monitoring of a Silicone Foam Sealant for Bridge Expansion Joints," Swanson, B.J., Malla, R.B., and Shaw, M.T., J. Bridge Engineering, ASCE, Reston, VA. (In Review).

02-7 **Validating Traffic Simulation Models to Inclement Weather Travel Conditions with Applications to Arterial Coordinated Signal Systems**

Reports:

"Validating Traffic Simulation Models to Inclement Weather Travel Conditions with Applications to Arterial Coordinated Signal Systems," Sadek, A., El-Dessouki, W., November 2004, NETCR 47.

Papers and Presentations:

"Inclement Weather and Traffic Flow at Signalized Intersections: A Case Study from Northern New England," Agbolosu-Amison, S.J., Sadek, A.W., and El-Dessouki, W., (2003). Tentatively accepted for publication in the Journal of the Transportation Research Board.

"Impact of Inclement Weather on Traffic Signal Operations in New England," Agbolosu-Amison, S.J., Sadek, A.W., (2003). Presented to the Vermont Chapter of the Institute of Transportation Engineers, Montpelier, Vermont.

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02-8 **Intelligent Transportation Systems Applications to Ski Resorts in New England**

Reports:

"Intelligent Transportation Systems Applications to Ski Resorts in New England," Sadek, A., March 2004, NETCR 46.

Papers and Presentations:

"Addressing Ski Resort Transportation Problems with Intelligent Transportation Systems Applications," Knapick, R.J., and Sadek, A.W., (2003). Abstract submitted to the Institute of Transportation Engineers District One Meeting, Burlington, VT.

03-1 **Ability of Wood Fiber Materials to Attenuate Heavy Metals Associated with Highway Runoff**

Reports:

"Ability of Wood Fiber Materials to Attenuate Heavy Metals Associated with Highway Runoff", MacKay, A.A., July 16, 2008, NETCR65.

Papers and Presentations: None

03-2 **Field Studies of Concrete Containing Salts of an Alkenyl-Substituted Succinic Acid**

Reports:

"Field Studies of Concrete Containing Salts of an Alkenyl-Substituted Succinic Acid," Civjan, Scott A., and Crellin, Benjamin, June 30, 2008, NETCR73.

Papers and Presentations:

"Hycrete – DSS An Innovative Admixture for Concrete: An Update on NETC 03-2," Civjan, Scott A., and Crellin, Benjamin, 16th Annual NE Materials and Research Meeting Concord, NH. June 7, 2005.

"Hycrete Concretes: An Update on NETC 03-2," Civjan, Scott A., and Crellin, Benjamin, Connecticut DOT, November 2, 2005.

"A New Admixture to Mitigate Corrosion Problems," Civjan, S.A., and Crellin, B.J., Concrete International, Volume 28, No. 8, Pp. 78-82.

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

Reports:

"Feasibility Study of an Erosion Control Laboratory in New England," Long, R.P., and Demars, K.R., December 2004, NETCR 49.

Papers and Presentations: None

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

Reports:

"Design Considerations for a Prototype Erosion Control Testing Plot," Long, R.P., and Demars, K.R., December 2005, NETCR 56.

Papers and Presentations: None

03-4 **Measuring Pollutant Removal Efficiencies of Stormwater Treatment Units**

Reports:

"Measuring Pollutant Removal Efficiencies of Stormwater Treatment Units," Zhang, X., September 27, 2005, NETCR54.

Papers and Presentations:

"Evaluation of Pathogenic Indicator Bacteria in Structural BMPs," Zhang, X. and Lulla, M., to be published in the Journal of Environmental Science and Health, Volume A41 (November 2006).

"Distribution of Pathogenic Indicator Bacteria in Structural BMPs," Zhang, X. and Lulla, M. to be published in the Journal of Environmental Science and Health, Volume A41 (August 2006).

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

Reports:

"Evaluation of a Field Permeameter as a Longitudinal Joint Quality Indicator", Daniel, J.S., Mallick, R.B., and Mogawer, W.S., April 20, 2007, NETCR64.

Papers and Presentations:

"Development of a Longitudinal Joint Permeameter as a QC/QA Tool for HMA Pavements," Daniel, J.S., a Presentation to the Petersen Asphalt Research Conference, Cheyenne, WY, June 2005.

"Longitudinal Joint Permeameter: New Non-Destructive Pavement Joint Test," Daniel, J.S., a Presentation to the North East Asphalt User/Producer Group Meeting, Burlington, VT, October 2005.

"Longitudinal Joint Permeameter: Non-Destructive Test for QC," Daniel, J.S., a presentation to PennDOT Bituminous Technician Certification Program, March 14, 2006.

"Development and Evaluation of a Field Permeameter as a Longitudinal Joint Quality Indicator," Mallick, R.B., and Daniel, J.S., International Journal of Pavement Engineering, Vol. 7, No. 1, March 2006. pp. 11-21.

03-7 **Basalt Fiber Reinforced Polymer Composites**

Reports:

"Basalt Fiber Reinforced Polymer Composites," Parnas, R., Shaw, M., and Liu, Q., August 2007, NETCR63.

Papers and Presentations:

"Preliminary Investigation of Basalt Fiber Composite Properties for Applications in Transportation," Liu, Q., Shaw, M.T., Parnas, R.S., McDonnell, A., Transportation Research Board Annual Meeting, January 2005, Washington, D.C., Paper 05-1117, Session 487.

"Investigation of Basalt Fiber Composite Mechanical Properties for Applications in Transportation," Q. Liu, M.T. Shaw, R.S. Parnas and A.M. McDonnell, Polymer Composites, 27(1), 41-48, 2006.

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

"Basalt Fiber Reinforced Polymer Composites," Q. Liu, R.S. Parnas, M.T. Shaw, A.M. McDonnell, SAMPE, Seattle, WA, November 2005.

"New Set-up for Permeability Measurement," Q. Liu, R.S. Parnas, SAMPE, Seattle, WA, November 2005.

04-1 Phase2 **Recycling Asphalt Pavements Containing Modified Binders - Phase 2**

Reports:

"Recycling Asphalt Pavements Containing Modified Binders," Mahoney, J., Zinke, S., DaDalt, J., Zofka, A., Bernier, A. and Yut, I., March 3, 2011, NETCR66.

Papers and Presentations:

"Laboratory Evaluation of HMA Containing RAP and PMB," Zofka A., Bernier A., Mahoney J., and Zinke S., presented at NEAUPG Annual Meeting Poster Session, October 6-7, 2010, Saratoga, New York.

"Laboratory Evaluation of HMA Containing RAP and PMB," Zofka A., Bernier A., Mahoney J., and Zinke S., presented at ASCE 1st T&DI Green Streets & Highways Conference Poster Session, November 14-17, 2010, Denver, Colorado**.**

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

Reports:

"Driver-Eye-Movement-Based Investigation for Improving Work-Zone Safety," Fisher, D.L., Knodler, M., and Muttart, J., January 28, 2009, NETCR71.

Papers and Presentations:

"Human Factors: Understanding & Evaluating Driver Response," Muttart, J.W., Anne Arundel County Police Special Operations Building, Sponsored by the Maryland Association of Traffic Accident Investigators, Hanover, MD. March 20 - 23, 2006.

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

"Using Event Data Recorder Information for Driver Response Research and Intelligent Transportation Systems in Rear End Collision," Muttart, J.W., CDR Users Conference, Dallas, TX. February 13, 2006.

"Human Factors: Understanding & Evaluating Driver Response," Muttart, J.W., Canadian Association of Traffic Accident Investigators & Reconstructionists, Fredericton, NB, Canada. July 10 - 13, 2006.

"Driving Simulator Evaluation of Situational Awareness during Hands-Free Communication," Muttart, J.W., New England Institute of Transportation Engineers Technology Day, Amherst, MA. July 20, 2006.

"Accounting for Moderate Driver Distractions in Work Zones," Muttart, J.W., Factors, Formulae, Forensic, Technology, & Training Conference, Houston, TX. September 17, 2006.

"Driving Simulator Evaluation of Driver Performance during Hands-Free Cell Phone Operation in a Work Zone: Driving without a Clue," Muttart, J., Fisher, D. L., and Pollatsek, A., (January 2007), Presentation given at the 86th Transportation Research Board Annual Meeting, TRB, National Research Council, Washington, D.C.

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

Reports:
"Estimating the Magnitude of Peak Flows for Steep Gradient Streams in New England," Jacobs, J., November 17, 2010, NETCR81.

Papers and Presentations:
2006 Maine Water Conference, Augusta, ME, March 22, 2006, Poster presentation.

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

Reports:
"Determining the Effective PG Grade of Binder in RAP Mixes," Daniel, J.S. and Mogawer, W.S., January 2010, NETCR78.

Papers and Presentations:
"The Impact of RAP on the Volumetric, Stiffness, Strength and Low Temperature Properties of HMA," Krishna Swamy, A., Mitchell, L.F., Hall, S.J., and Daniel, J.S., Journal of Materials in Civil Engineering.

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

Reports:
"Network-Based Highway Crash Prediction Using Geographic Information Systems," Ivan, J.N., Gårder, P.E., Bindra, S., Jonsson, B.T., Shin, H., Deng, Z., June 2007, NETCR67.

Papers and Presentations:
"A Procedure for Allocating Zonal Attributes to a Link Network in a GIS Environment," Jonsson, T., Deng, Z., Ivan, J.N., presented at 85th TRB Annual meeting, Jan. 2006, Paper No.: 06-2561.

"Using Land Use Data to Estimate Exposure for Improving Road Accident Prediction," Jonsson, T., Ivan, J.N., Zhang, C., presented at 32nd Annual Traffic Records Forum, Palm Desert CA, Aug. 3, 2006.

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

Reports:
"Development of Supplemental Resistance Method for the Design of Drilled Shaft Rock Sockets," Sandford, T.C., McCarthy, J., and Bussiere, J., March 31, 2011, NETCR83.

Papers and Presentations: None

05-5 **Measurement of Adhesion Properties Between Topcoat Paint and Metalized/Galvanized Steel with Surface Energy Measurement Equipment**

Reports: None

Papers and Presentations:

"Measurement of Adhesion Properties Between Topcoat Paint and Metalized / Galvanized Steel With Surface Energy Measurement Equipment," Paper # CET-25, Yang, S.C., Lee, K.W., Lu, C., and Mirville, M., Presented at the US-Korea Conference on Science, Technology, and Entrepreneurship (UKC2010), Seattle, Washington, August 14, 2010.

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

Reports:

"Employing Graphic-Aided DMS to Assist Elder Drivers' Message Comprehension," Wang, J.H. and Clark, A. Y., December 30, 2010, NETCR82.

Papers and Presentations:

"Improving Elder Drivers Comprehension of Dynamic Message through a Human Factors Study," Clark, A., Wang, J.H., Maier-Speredelozzi, V., and Collyer, C., Proceedings of the 12th International Conference on Industrial Engineering – Theory, Application, and Practice, p.747-753, 2007.

"Assisting Elder Drivers' Comprehension of Dynamic Message Signs," Clark, A.T., Wang, J.H., Maier-Speredelozzi, V., and Collyer, C.E., Proceedings of the 87th Annual Meeting of Transportation Research Board, Paper No. 08-2276, p.1-16, CD-ROM, 2008.

"Age Effect on Driver Comprehension of Messages Displayed on Dynamic Message Signs," Wang, J.H., Clark, A.Y., and Maier-Speredelozzi, V., Proceedings of IIE Research Conference, Paper No. 307, p.1-6, CD-ROM, 2008.

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," Ivan, J.N., Sadek, A.W., Hongmei, Z., and Surang, R., February 12, 2009, NETCR72.

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.

"Safety Effects of Exclusive Left Turn Lanes at Unsignalized Intersections and Driveways," Zhou, H., Ivan, J. and Sadek, A., Transportation Research Board Annual Meeting; Paper No. 09-2000, Washington, DC, Jan. 2009.

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

Reports:

"Evaluation and Implementation of Traffic Simulation Models for Work Zones," Collura, J., June 18, 2010, NETCR80.

Papers and Presentations:

"Using Simulation Models to Assess the Impacts of Highway Work Zone Strategies: Case Studies Along Interstate Highways in Massachusetts and Rhode Island," Moriarty, K.D., Collura, J., Knodler Jr., M.A., Daiheng, N., and Heaslip, K., Paper presented at the TRB Annual Meeting in January 2008.

"Using Simulation Models to Assess the Impacts of Highway Work Zone Strategies," Collura, J., Heaslip, K., Moriarty, K., Wu, F., Khanta, R., and Berthaume, A., Paper presented at the TRB Annual Meeting in January 2010.

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

Reports: None

Papers and Presentations:

"Sensitivity of MEPDG Level 2 and 3 Inputs using Statistical Analysis Techniques for New England States," Ayyala, D., Chehab, G. R., and Daniel, J. S., accepted for publication in the Transportation Research Record 2010.

"Sensitivity of RAP Binder Grade on Performance Predictions in the MEPDG," Daniel, J. S., Cehab, G. R., and Ayyala, D., Journal of the Association of Asphalt Pavement Technologists, Vol. 78, 2009, pp. 352-376.

"Sensitivity of RAP Binder Grade on Performance Predictions in the MEPDG," Presentation by Jo Sias Daniel to the Association of Asphalt Paving Technologists Annual Meeting, March 2009.

06-3 **Establishing Default Dynamic Modulus Values for New England**

Reports:

"Establishing Default Dynamic Modulus Values for New England," Jackson, E., Jingcheng, L., Zofka, A., Iliya, Y., and Mahoney, J., April 11, 2011, NETCR85.

Papers and Presentations: None