

JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PROGRAM
FOR PROGRAM YEAR 2009-2011

May 23, 2009 – June 30, 2011

University of Connecticut

and

Connecticut Department of Transportation

JHR 09-319

April 2009

This research is sponsored by the Joint Highway Research Advisory Council (JHRAC) of the University of Connecticut and the Connecticut Department of Transportation and is carried out through the Connecticut Transportation Institute of the University of Connecticut.

The contents of this report reflect the view of the author(s) who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the University of Connecticut or the Connecticut Department of Transportation. This report does not constitute a standard, specification or regulation.

PREFACE

Connecticut Cooperative Highway Research Program with the University of Connecticut

On July 9, 1962, the Connecticut State Legislature established a continuing joint highway research program between the Connecticut Department of Transportation (Department) and the University of Connecticut (UConn). Section 13a-256 of the General Statutes, as amended, provides for continuing funding of this research program. The continuing agreement between the Department and UConn created the eight-member Joint Highway Research Advisory Council (JHRAC or Council) with complete authority over the research program. The Council consists of four members designated by the Commissioner of Transportation and four members designated by the President of the University of Connecticut.

The University maintains an informational Web site for the Connecticut Cooperative Highway Research Program through its Connecticut Transportation Institute (<http://www.cti.uconn.edu/chwrp/index.php>). You may freely view the site to learn about transportation research conducted under this research program.

TRANSPORTATION RESEARCH GOALS OF CCHRP

On September 19, 1972, in response to the 1969 merger and creation of a unified multimodal State Department of Transportation, Council revised its research goals, as follows:

Whereas the State is committed to create, maintain and operate a viable, safe and economical, transportation system, and, whereas the Joint Highway Research Advisory Council is authorized, under the “Agreement for a Continuing Cooperative Highway Research Program to be undertaken by the Connecticut Highway Department and the University of Connecticut,” to provide technical facilities and professional services to accomplish this commitment; the Council adopts the following goals:

- To improve and facilitate the movement of goods and services on the state system.
- To introduce improved materials and methods of operation for the design, construction, maintenance, and management of the state system.
- To increase the safety and convenience of the state system for the people of this state, and
- To minimize any undesirable environmental impact of existing and proposed transportation facilities on adjacent properties and communities.

Identifying, evaluating and researching transportation related problems shall achieve these goals. The results of various research projects are to be disseminated and implemented to effect beneficial changes in the State Transportation System.

TABLE OF CONTENTS

	Page
PREFACE	ii
TABLE OF CONTENTS	iii
2009-2011 WORK PLAN SUMMARY	iv
CONTINUING REGULAR PROJECTS TO BE FUNDED	1
06-10: Improving Surveying Accuracy and Efficiency in Connecticut: An Accuracy Assessment of GEOID03.....	2
07-5: Incorporating Wet Pavement Friction into Traffic Safety Analysis	4
08-1: Structure and Properties of Ionomer Modified Asphalts	6
08-5: Assessing and Quantifying Public Transportation Access	9
08-6: Experimental Testing of Controllable Damping Devices toward Extending the Lifespan of Existing Highway Bridges	11
APPENDIX: NEW REGULAR PROJECTS PENDING FUNDING*	1A
09-1: Design and Feasibility Study: Connecticut Transportation Planning Data, Phase II.....	2A
09-6: Preparation of the Implementation Plan of AASHTO Mechanistic- Empirical Pavement Design Guide (M-E PDG) in Connecticut	4A
09-7: National and In-state Review of Surface Treatments Techniques for Pavement Preservation in Connecticut	6A

* Projects approved to start should additional program funding become available

**2009-2011 WORK PLAN
SUMMARY OF PROJECTS TO BE FUNDED
JOINT HIGHWAY RESEARCH ADVISORY COUNCIL**

A. REGULAR PROJECTS

No.	Project Title	P.I.(s)	Est. Cost
06-10:	Improving Surveying Accuracy and Efficiency in Connecticut: An Accuracy Assessment of GEOID03	T. Meyer D. Massalski S. Fish	\$ 0
07-5:	Incorporating Wet Pavement Friction into Traffic Safety Analysis	J. Ivan N. Ravishanker	\$ 4,866 *
08-1:	Structure and Properties of Ionomer Modified Asphalts	R. Weiss	\$131,108 *
08-5:	Assessing and Quantifying Public Transportation Access	N. Lownes	\$ 90,266 *
08-6:	Experimental Testing of Controllable Damping Devices toward Extending the Lifespan of Existing Highway Bridges	R. Chistenson	\$ 66,559

(Program Professionals Cost = \$106,891 distributed among projects)

Total Regular Projects	\$292,799 *
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B. OTHER

09-100: Program Supplies	\$ 2,900
Program Contractuals	\$ 2,500
09-101: Vehicle Supplies	\$ 2,400
Vehicle Contractuals	\$ 2,633
Total Other	\$ 10,433

C. TOTAL REGULAR PROJECTS PLUS OTHER	\$303,232 *
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* Includes estimated carryover from 2008-09 for projects 07-5 (\$4,866), 08-1 (\$37,829), and 08-5 (\$19,000).

CONTINUING REGULAR PROJECTS TO BE FUNDED

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
FUNDED PROJECT DESCRIPTION**

PROJECT NUMBER: 06-10

PROJECT TITLE: Improving Surveying Accuracy and Efficiency in Connecticut: An Accuracy Assessment of GEOID03

PRINCIPAL INVESTIGATORS: Thomas Meyer, Steven Fish and Derek Massalski

PROJECT STATUS: Continuing

ANTICIPATED COMPLETION DATE: August 31, 2009

OBJECTIVES: To 1) evaluate GEOID03's performance throughout Connecticut; 2) provide the NGS staff responsible for geoid modeling with our GPS data that will be included in future geoid models; 3) highlight problem areas that may require additional attention to resolve; 4) create a local geoid model that will bring GEOID03 into acceptable levels of accuracy until such time as the Federal model meets Connecticut DOT criteria; and, 5) disseminate these results via the World-Wide-Web and continuing education seminars

ACCOMPLISHMENTS TO DATE:

Task I: *Reconnaissance*
100% Complete

Task II: *Cooperation Recruitment*
100% Complete

Task III: *Preparation Work*
100% Complete

Task IV: *Occupation Planning*
100% Complete

Task V: *GPS-on-Benchmark Occupations*
100% Complete

Task VI: *Analysis*
70% Complete

WORK PROPOSED:

Task VI: *Analysis*

Task VII: *Reporting and Outreach*

WORK SCHEDULE:

Task	2009							2010				
	J	J	A	S	O	N	D	J	F	M	A	M
VI												
VII												

**BUDGET
Project 06-10**

Budget		Total
Salaries and Wages:		\$0
Program Professionals	\$0	
Fringe:		\$0
Program Professionals	\$0	
TOTAL		\$0

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
FUNDED PROJECT DESCRIPTION**

PROJECT NUMBER: 07-5

PROJECT TITLE: Incorporating Wet Pavement Friction into Traffic Safety Analysis

PRINCIPAL INVESTIGATORS: John N. Ivan and Nalini Ravishanker

PROJECT STATUS: Continuing

ANTICIPATED COMPLETION DATE: August 31, 2009

OBJECTIVE:

To conduct a statistical analysis of the association between wet pavement friction and road safety experience, controlling for pertinent roadway characteristics

ACCOMPLISHMENTS TO DATE:

Task I: *Convene Technical Advisory Committee
30% Complete*

Task II: *Obtain and Prepare “Found Data”
100% Complete*

Task III: *Select “Random Data” Locations
95% Complete*

Task IV: *Collect Wet Friction Data for “Random Data” Locations
100% Complete*

Task V: *Perform Statistical Analysis
20% Complete*

WORK PROPOSED:

Task VI: *Interpret and Report Findings*

WORK SCHEDULE:

Task	2009							2010				
	J	J	A	S	O	N	D	J	F	M	A	M
VI												

**BUDGET
Project 07-5**

Budget		Total
Salaries and Wages:		\$3,467
Program Professionals	\$0	
Principal Investigator John Ivan (.27 summer month)	\$3,467	
Fringe:		\$829
Program Professionals	\$0	
Principal Investigator (23.9%)	\$829	
Supplies:		\$300
Travel:		\$270
In-State	\$0	
Out-of-State	\$270	
TOTAL		\$4,866

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
FUNDED PROJECT DESCRIPTION**

PROJECT NUMBER: 08-1

PROJECT TITLE: Structure and Properties of Ionomer Modified Asphalts (IMAs)

PRINCIPAL INVESTIGATOR: Robert A. Weiss

PROJECT STATUS: Continuing

ANTICIPATED COMPLETION DATE: May 22, 2010

OBJECTIVE: To develop improved binders based on ionomers for polymer modified asphalts, especially for low temperature applications

ACCOMPLISHMENTS TO DATE:

Task I: *Choose and Acquire Commercial Ionomers
100% Complete*

Task IV: *Preparation of Ionomer/Asphalt Blends
80% Complete*

Task V: *Preparation of Superpave Ionomer Modified Asphalts
40% Complete*

WORK PROPOSED:

Task I: *Synthesis of Sulfonated EPDM Ionomers*

Task II: *Synthesis of Sulfonated SBC Ionomers*

Task III: *Preparation of Ionomer/Asphalt Blends*

Task IV: *Preparation of Superpave Ionomer Modified Asphalts*

Task V: *IMA Structure Characterization (Thermal Analysis, Microscopy, X-ray Analysis)*

Task VI: *Viscoelastic Characterization of IMAs*

Task VII: *Measure IMA Properties (Low Temperature Cracking, Load Fatigue Cracking, High-Temperature Deformation Resistance)*

Task VIII: *Preparation of IMA/Aggregate Composites*

Task IX: *Testing IMA/Aggregate Composites: Adhesion and Fracture*

Task X: *Reports/Technical Papers*

WORK SCHEDULE:

Task	2009							2010				
	J	J	A	S	O	N	D	J	F	M	A	M
I	█											
II	█											
III	█							█	█			
IV	█									█	█	█
V	█											
VI	█							█	█	█	█	█
VII	█							█	█	█	█	█
VIII				█								
IX				█								
X									█	█	█	

**BUDGET
Project 08-1**

Budget		Total
Salaries and Wages:		\$100,866
Program Professionals	\$31,925	
Principal Investigator		
Robert Weiss (1 summer month)	\$21,743	
Other Researcher – Technician		
A. John DaDalt (12 months @ 9.14%)	\$5,000	
Graduate Assistant (Level II)		
Ying Shi (3 summer months @ 50%)	\$6,699	
Ying Shi (2 semesters @ 100%)	\$21,101	
Graduate Assistant (Level I)		
TBD (3 summer months @ 50%)	\$6,366	
TBD (2 semesters @ 41.5%)	\$8,032	
Fringe:		\$30,242
Program Professionals	\$16,747	
Principal Investigator (23.9%)	\$5,197	
Other Researcher (36.0%)	\$1,800	
Graduate Assistant (summer @ 6.7%, AY @ 19.3%)	\$6,498	
TOTAL		\$131,108

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
FUNDED PROJECT DESCRIPTION**

PROJECT NUMBER: 08-5

PROJECT TITLE: Assessing and Quantifying Public Transportation Access

PRINCIPAL INVESTIGATOR: Nicholas E. Lownes

PROJECT STATUS: Continuing

ANTICIPATED COMPLETION DATE: August 31, 2010

OBJECTIVES: To 1) investigate the current state of the practice of quantifying public transportation access; 2) develop the best method for quantifying public transportation access in Connecticut's unique transit system, accommodating spatial, temporal, and travel demand coverage; 3) apply this method to selected Connecticut public transportation corridors as a pilot study; and, 4) make recommendations regarding the use of the method in public transportation project selection and design.

ACCOMPLISHMENTS TO DATE:

Task I: *Technology Scan*
85% Complete

Task II: *Technology Testing: First Wave*
70% Complete

Task III: *Technology Testing: Second Wave*
15% Complete

WORK PROPOSED:

Task IV: *O-D Survey of Transit Operators*

Task V: *Create Spatial Availability Transit Planning Map*

Task VI: *Establish Threshold Values for TAI*

Task VII: *Apply TAI GIS Tool*

Task VIII: *Phase I & II Final Report*

WORK SCHEDULE:

Task	2009							2010							
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
IV	■	■	■	■											
V	■	■	■	■	■										
VI				■	■	■	■	■	■	■					
VII					■	■	■	■	■	■	■	■	■	■	■
VIII													■	■	■

**BUDGET
Project 08-5**

Budget		Total
Salaries and Wages:		\$68,599
Program Professionals	\$21,980	
Principal Investigator		
Nicholas Lownes (1 summer month, 2009)	\$8,168	
Nicholas Lownes (.5 summer month, 2010)	\$4,288	
Graduate Assistant (Level I)		
Sha Al Mamun (3 summer months, 2009 @ 50%)	\$6,366	
Sha Al Mamun (2 semesters @ 100%)	\$20,054	
Sha Al Mamun (2.2 summer months, 2010 @ 50%)	\$4,668	
Student Labor (300 hrs, summer 2009 @\$10.25/hr)	\$3,075	
Fringe:		\$19,101
Program Professionals	\$11,530	
Principal Investigator (23.9% S09, 21.7% S10)	\$2,883	
Graduate Assistant (6.7% S09, 19.3% AY, 6.8% S10)	\$4,614	
Student Labor (2.4%, S09)	\$74	
Supplies:	\$266	\$266
Travel:		\$1,300
In State	\$300	
Out-of-State	\$1,000	
Contractuals:		\$1,000
TOTAL		\$90,266

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
FUNDED PROJECT DESCRIPTION**

PROJECT NUMBER: 08-6

PROJECT TITLE: Experimental Testing of Controllable Damping Devices toward Extending the Lifespan of Existing Highway Bridges

PRINCIPAL INVESTIGATOR: Richard E. Christenson

PROJECT STATUS: Continuing

ANTICIPATED COMPLETION DATE: May 22, 2010

OBJECTIVE: To fundamentally advance the state-of-the-art in highway bridge control and monitoring by: 1) experimentally verifying the application of controllable MR dampers to reduce the maximum stresses in a highway bridges due to heavy truck traffic; and, 2) demonstrating experimentally methodologies to utilize the controllable damping devices for enhanced bridge monitoring.

ACCOMPLISHMENTS TO DATE:

Task I: *Establish a Research Advisory Committee
100% Complete*

Task II: *Design and Fabricate Magneto-Rheological Damper Fixtures
60% Complete*

Task III: *Implement Real-time Hybrid Tests of Controlled/Monitored System
20% Complete*

WORK PROPOSED:

Task IV: *Identify Additional Bridges in Connecticut Considered for Hybrid Testing*

Task V: *Develop and Validate the Analytical Models of Additional Bridges*

Task VI: *Design Control and Monitoring Strategies*

Task VII: *Implement Real-Time Hybrid Testing on the Newly Identified Bridges*

Task VIII: Prepare Draft Final Report and Final Report

WORK SCHEDULE:

Task	2009							2010				
	J	J	A	S	O	N	D	J	F	M	A	M
IV	█											
V	█			█								
VI				█								
VII								█				
VIII										█		

**BUDGET
Project 08-6**

Budget		Total
Salaries and Wages:		\$47,416
Program Professionals	\$16,207	
Principal Investigator		
Richard Christenson (1 summer month)	\$10,108	
Graduate Assistant (Level II)		
Zhaoshuo Jiang (2 semesters @ 100%)	\$21,101	
Fringe:		\$14,990
Program Professionals	\$8,502	
Principal Investigator (23.9%)	\$2,416	
Graduate Assistant (19.3% AY)	\$4,072	
Supplies:		\$800
Travel:		\$3,156
Out-of-State	\$3,156	
Contractuals:		\$197
TOTAL		\$66,559

APPENDIX: NEW REGULAR PROJECTS PENDING

Projects approved to start should additional program funding become available

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
PENDING PROJECT DESCRIPTION**

PENDING PROJECT NUMBER: 09-1

PROJECT TITLE: Design and Feasibility Study: Connecticut Transportation Planning Data, Phase II

PRINCIPAL INVESTIGATOR: Nicholas E. Lownes and Eric D. Jackson

PROJECT STATUS: New Pending

OBJECTIVE: To utilize and build upon the first phase of this research project, which investigated the needs of Connecticut's state planners for travel data, evaluated different methodologies to collect this data, and implemented a trial run of a Web-based household survey instrument. Further refinement of the Web survey methodology, full-scale deployment of the survey instrument, and development of a methodology for obtaining a statistically representative dataset will form the core of the second phase of research.

WORK PROPOSED:

- Task I:** *Travel Survey Revisions*
 - *Correct and Clarify Original Survey*

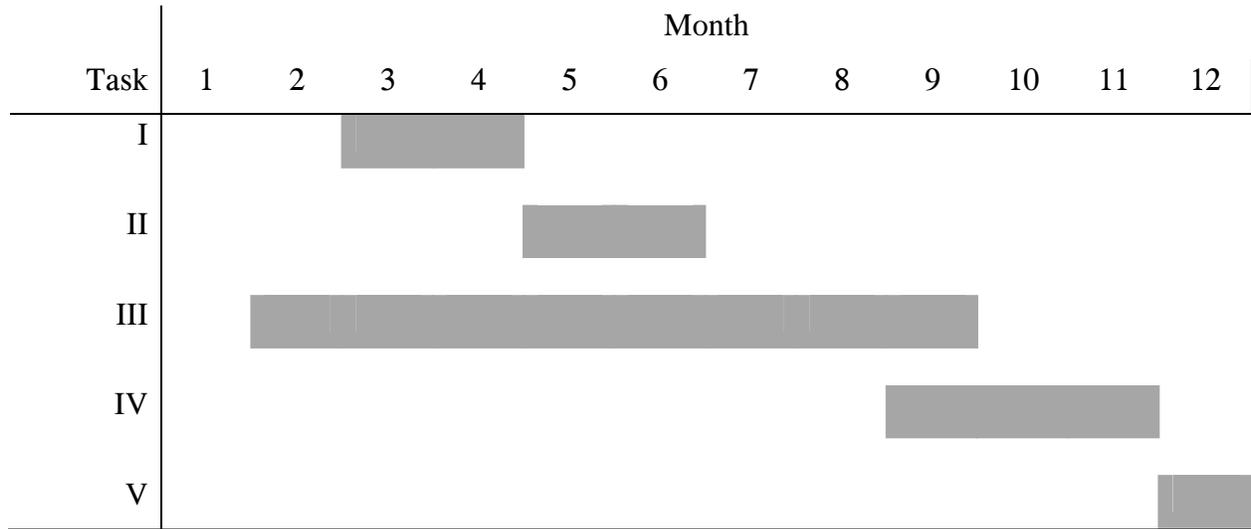
- Task II:** *Bias Reduction*
 - *Review and Evaluate Alternative Survey Methods to Reduce Bias*

- Task III:** *Web Survey Development*
 - *Identify/Develop Web-based Survey Management System*
 - *Test and Obtain Feedback on Survey Design and Operation*

- Task IV:** *Full-scale Deployment*
 - *Small Group Pilot Test and Feedback on Performance*
 - *Large Group Pilot Test to Establish Hardware Requirements*

- Task V:** *Technology Transfer*
 - *Presentations to Display Functioning Survey*
 - *Prepare Draft Final Report and Final Report*

12-MONTH WORK SCHEDULE:



ESTIMATED COST TO COMPLETE :

\$46,681

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
PENDING PROJECT DESCRIPTION**

PROJECT NUMBER: 09-6

PROJECT TITLE: Preparation of the Implementation Plan of AASHTO Mechanistic-Empirical Pavement Design Guide (M-E PDG) in Connecticut

PRINCIPAL INVESTIGATOR: Adam M. Zofka and James M. Mahoney

PROJECT STATUS: New Pending

OBJECTIVE: To 1) prepare a comprehensive implementation plan of M-E PDG in Connecticut for asphalt pavements; 2) identify short and long-term needs for complete and efficient adaptation of the pavement design guide; and 3) help familiarize local engineers with the M-E PDG

WORK PROPOSED:

Task I: *Conduct Literature Review*

Task II: *Evaluate Design Inputs and Distress Prediction Models in M-E PDG*

Task III: *Determine Typical M-E PDG Inputs for Connecticut*
- Traffic Volumes, Pavement Features, Site Conditions

Task IV: *Perform Sensitivity Analysis*
- Prepare M-E PDG Input Files
- Run M-E PDG Software

Task V: *Perform Statistical Analysis and Rank the Design Inputs*
- Perform ANOVA
- Rank and Group Inputs in Order of Significance

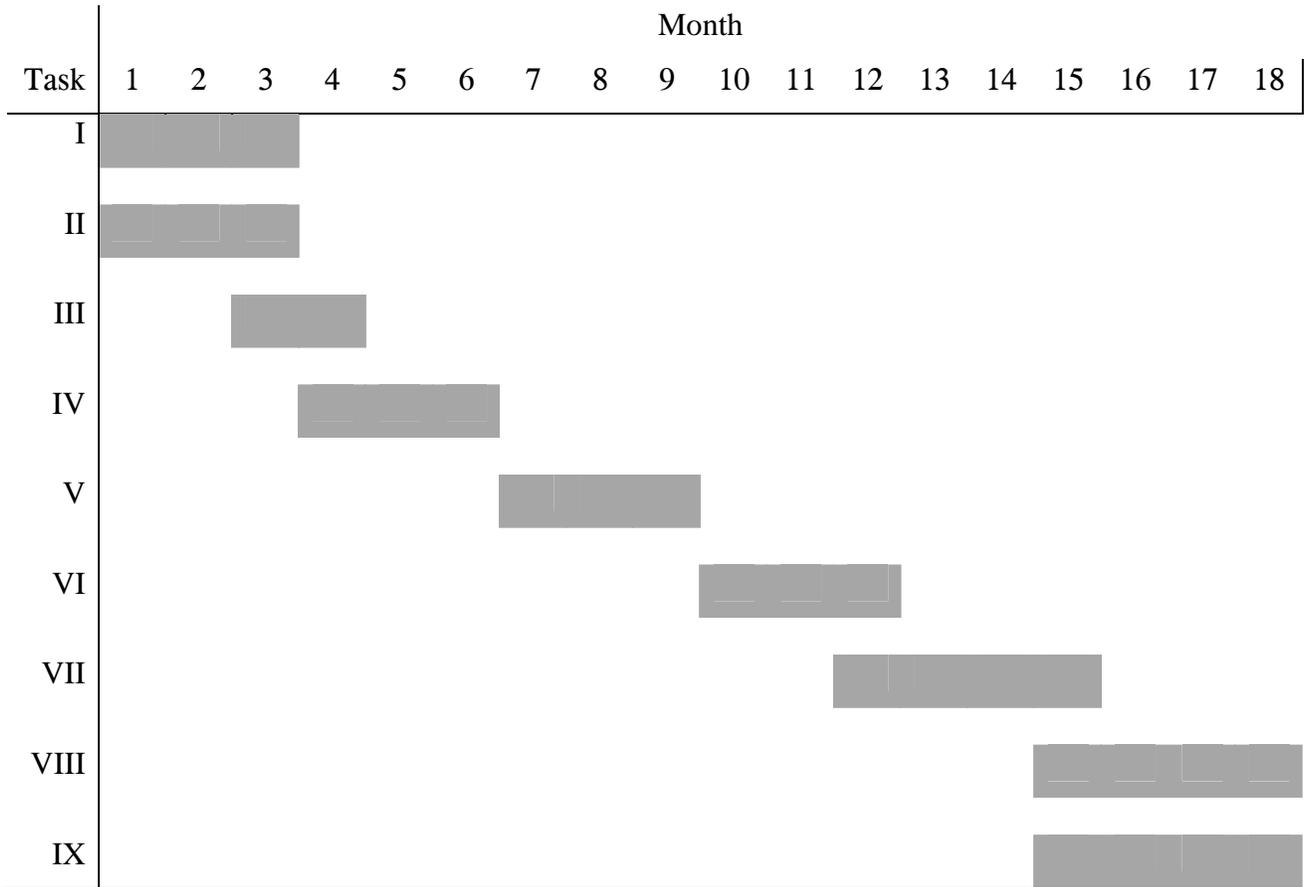
Task VI: *Establish Data Needs for Target Input Level*
- Determine Testing Protocols Needed to Obtain Target Input Levels
- Review Current ConnDOT Data Resources and Determine Needs

Task VII: *Performance Predictions and Data Needs for Local Calibration*
- Identify Sites with Good Performance Data
- Run M-E PDG with Default Coefficients
- Compare Predictions with Performance Data
- Recommend "Calibration Sites"; Evaluate ARAN Data for Calibration

Task VIII: *Prepare M-E PDG Implementation Plan for Connecticut*

Task IX: *Prepare Draft Final Report and Final Report*

18-MONTH WORK SCHEDULE:



ESTIMATED COST TO COMPLETE :

\$80,348

**JOINT HIGHWAY RESEARCH ADVISORY COUNCIL
WORK PLAN FOR MAY 23, 2009-JUNE 30, 2011
PENDING PROJECT DESCRIPTION**

PROJECT NUMBER: 09-7

PROJECT TITLE: National and In-state Review of Surface treatments Techniques for Pavement Preservation in Connecticut

PRINCIPAL INVESTIGATOR: Adam M. Zofka and James M. Mahoney

PROJECT STATUS: New Pending

OBJECTIVE: To review and identify surface treatment activities that can be potentially applied as part of a pavement preservation system to the state roadway network in Connecticut.

WORK PROPOSED:

- Task I:** *Conduct Literature Review*
 - *Review Field Studies; Identify Promising Techniques*

- Task II:** *Perform In-state Survey*
 - *Create Online Survey; Analyze Results; Build Database*

- Task III:** *Prepare Selection Matrix and Software*
 - *Update Existing Decision Matrix; Prepare Software Application*

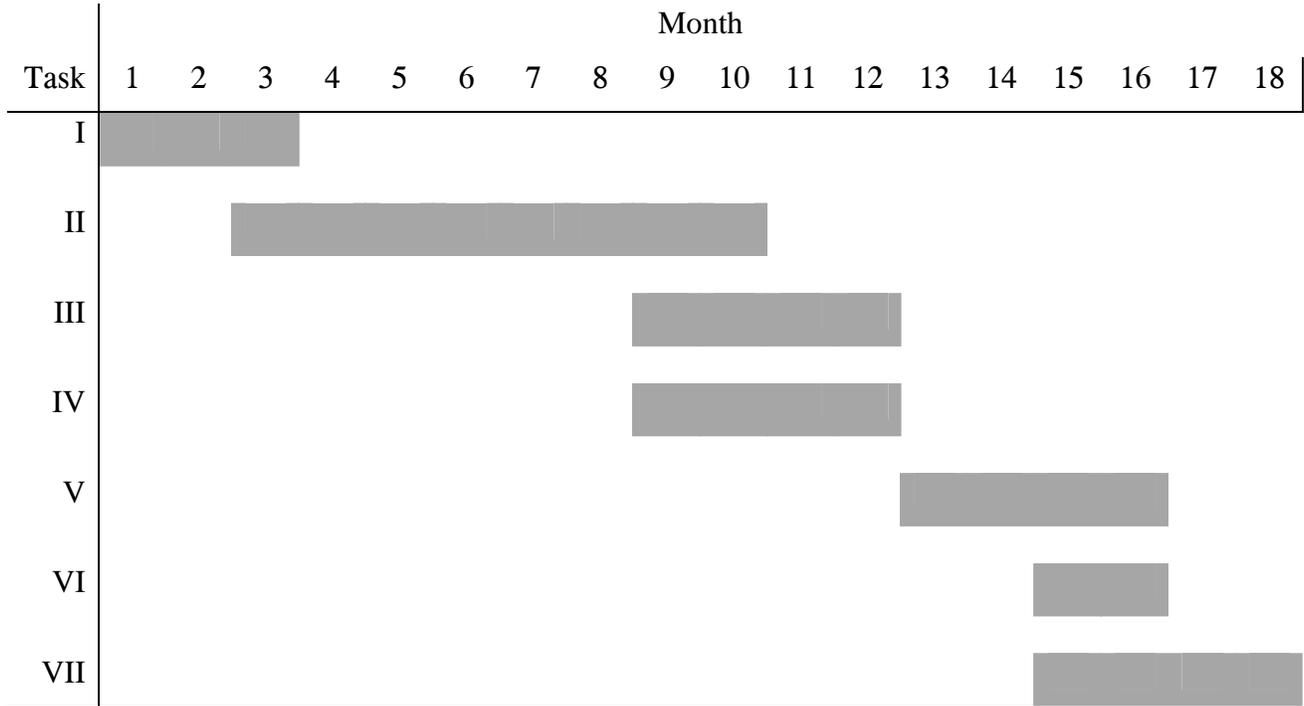
- Task IV:** *Prepare Field Study*
 - *Select Locations; Prepare Experimental Designs*

- Task V:** *Construct Test Sections*
 - *Evaluate Pavement Before and After Surface Treatments*

- Task VI:** *Prepare Performance Evaluation Plan*
 - *Prepare Plan for Evaluation (Distresses, Visual, Friction)*

- Task VII:** *Prepare Draft Final Report and Final Report*

18-MONTH WORK SCHEDULE:



ESTIMATED COST TO COMPLETE :

\$81,024