MISSISSIPPI SPR-1(73), PART II

QUARTERLY PROGRESS REPORT

PERIOD: JULY/ AUGUST/ SEPTEMBER 2014

FEDERAL FY2014 4TH QUARTER

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State Study No. 184--Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking

Principal Investigator: Farshad Amini

Funds Allocated:	$218,224.00	**Date Started:**	October 1, 2005
Expended to Date:	$ 141,083.92	**Completion Date:**	September 30, 2015
Current Work Program:	$98,764.21	**Time Remaining:**	12 months

Current Work Program Expenditures: $ 29,873.47

Research Agency: Jackson State University

Objective:

The formation of reflective cracking of pavement overlays has confronted highway engineers for many years. Stress-relieving interlayers, such as paving fabrics, have been used in an attempt to reduce or delay reflective cracking. The primary objective of this project is to conduct a long-term monitoring of the paving fabric interlayer systems to evaluate its effectiveness and performance. A comprehensive testing, monitoring, and analysis program is planned, where twelve 500-ft pavement sections of a two-lane highway are constructed, and then monitored for seven years. Particular attention is directed towards investigating the influence of overlay thickness on long-term performance. A comparison between the performance of paving fabric treatment systems for milled and non-milled surfaces, as well as a comparison between the performance of paving fabrics on sealed and non-sealed surfaces are reported. In addition, a cost-benefit analysis is performed to develop total life cycle costs for each section.

Progress:

During the last quarter, further analysis of crack survey data for the twelve paving fabric research sections was conducted to determine the rate of crack growth over time. The crack survey data is needed to determine the amount of crack reduction over time.

Plans for Next Quarter:

During the next quarter, the seventh annual crack survey will be conducted.

EEO and Title VI Information:
Employment Data for Research Staff

Total	Male					Female			
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian
1	1								

State Study No. 185--In-House Support To State Study No. 184 - Long-Term Field Monitoring And Performance Of Paving Fabric Interlayer Systems To Reduce Reflective Cracking

Principal Investigator: Cindy Smith, P.E.

Funds Allocated:	$ 30,000.00	**Date Started:**	October 1, 2005
Expended to Date:	$ 16,086.88	**Completion Date:**	September 30, 2015
Current Work Program:	$ 3,000.00	**Time Remaining:**	12 months

Current Work Program Expenditures: $463.79

Research Agency: Research Division, Mississippi Department of Transportation

Objective:

This study will be conducted to support the proposed study "Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking."

The required tasks include:

- FWD field testing and evaluation of requisite overlay of proposed pavement for inclusion in Phase II study.
- Operation of the MDOT profiler to obtain video images of the pavement surface one time prior to construction of the twelve test sections and nine times subsequent to construction.
- Mapping of cracks on the video logs for submission to Jackson State University.
- Traffic control will be required to facilitate FWD testing by MDOT and pavement coring operations by Burns, Cooley, & Dennis, Inc.
- Review of one construction report, three progress reports, and one final report.

Progress:

No work was performed this quarter.

Plans for Next Quarter:

Perform final distress survey of pavement control and test sections.

State Study No. 186--Consultant Support To State Study No. 184 – Long – Term Field Monitoring And Performance Of Paving Fabric Interlayer Systems To Reduce Reflective Cracking

Principal Investigator: Randy Ahlrich, P.E.
MDOT Project Monitor: Cindy Smith, P.E.

Funds Allocated: $ 20,400.00 **Date Started:** October 1, 2005
Expended to date: $ 14,900.00 **Completion Date:** December 31, 2015
Current Work Program: $ 5,500 **Time Remaining:** 15 months
Current Work Program Expenditures: $ 0.00

Research Agencies: Burns, Cooley & Dennis, Inc.
Research Division, Mississippi Department of Transportation

Objective:

This project will provide consultant support to the proposed study "Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking." The required tasks include:

- Provide guidance on selection of paving fabric.
- Provide guidance regarding paving fabric construction for inclusion in construction bid documents.
- Monitor construction of test sections.
- Perform requisite coring of pavement test sections.
- Review the construction report, three progress reports and the final report.

Progress:
Consultant performed final coring of field test sections.

Plans for Next Quarter:
No work planned.

EEO and Title VI Information:
Employment Data for Burns Cooley & Dennis, Inc. Research Staff

Total				Male				Female	
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
1	1								

State Study No. 247— Influence of Cementitious Materials on Shrinkage of Bridge Deck Concrete

Principal Investigator: Robert Varner
MDOT Project Monitor: James Williams

Funds Allocated: $ 99,843.50 **Start Date:** March 13, 2012
Expended to Date: $ 27,680.00 **Completion Date:** December 31, 2014
Current Work Program: $ 29,076.02 **Time Remaining:** 3 months
Current Work Program Expenditures: $ 0.00

Research Agencies: Burns Cooley Dennis, Inc.

Objective:

BCD proposes to test thirty concrete mixtures to determine the influence of source of portland cement and source fly ash on shrinkage and cracking of concrete bridge decks. Six sources of portland cement will be selected and used to develop six mixtures with 100 percent portland cement. Four sources of Class C and Class F fly ash will be selected and combined with one of the sources of portland cement to develop twenty-four mixtures using fly ash to replace portland cement. Replacement rates for fly ash will be 15%, 20%, and 25%.

Progress:

Task 5 - BCD worked on draft final report.

Plans for Next Quarter:

Task 5 - BCD will provide MDOT with a draft final report and final report.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
2	2									

State Study No. 250— Full Depth Reclamation for High Traffic Applications

Principal Investigator: Isaac Howard
MDOT Project Monitor: James C. Watkins

Funds Allocated: $ 291,975.80 **Start Date:** January 17, 2012
Expended to Date: $ 67,923.30 **Completion Date:** December 31, 2014
Current Work Program: $ 110,000.00 **Time Remaining:** 3 months
Current Work Program Expenditures: $25,337.50

Research Agencies: Mississippi State University

Objective:

The proposed study will characterize properties of FDR that are important to design, construction and performance in high traffic applications. Historically FDR has been more commonly used in lower traffic applications and a study of the nature proposed could not be identified with materials similar to those native to Mississippi. The proposed study is aimed at providing design, construction, and performance guidance for FDR layers in high traffic applications, which have different behavioral conditions than low traffic applications.

Progress:

Progress was made on eight tasks. Wheel tracking (Task 6) began 10% complete and ended 25% complete. Strength vs. time (Task 7) began 55% complete and ended 62% complete. Traffic opening (Task 9) began 25% complete and ended 90% complete. Durability (Task 10) began 55% complete and ended 75% complete. Analysis (Task 12) began 46.88% and ended 55.37% complete. Quarterly reporting (Task 14) began 49% complete and ended 55% complete. Management (Task 15) began 61% complete and ended 67% complete. Longitudinal joint evaluation (Task 17) began 70% complete and ended 80% complete.

Plans for Next Quarter:

Plans for next quarter are envisioned to focus on Tasks 5 through 12. These tasks include gradation variability, wheel tracking, strength versus time, strength variability, traffic opening, and durability. Management activities (Tasks 14 and 15) are planned to continue in the next quarter. Some work related to Task 17 may also occur during the quarter.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
14	13					1				

State Study No. 251— In-House Support to Full-Depth Reclamation for High-Traffic Applications

Principal Investigator: William Barstis

Funds Allocated: $ 6,000.00 **Start Date:** January 17, 2012
Expended to Date: $ 1,529.52 **Completion Date:** December 31, 2014
Current Work Program: $ 6,000.00 **Time Remaining:** 3 months
Current Work Program Expenditures: $1,529.52

Research Agencies: MDOT

Objective:

This study will provide in-house support to the Full-Depth Reclamation for High-Traffic Applications. This item will fund traffic control and MDOT staff time for the study.

Progress:

No work was performed this quarter.

Plans for Next Quarter:

Any follow-up activities at the request of MSU.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
0										

State Study No. 259— Analyzing the Impact of Intermodal-Related Risk to the Design and Management of Biofuel Supply Chain

Principal Investigator: Xiaopeng Li
MDOT Project Monitor: Cindy Smith, P.E.

Funds Allocated: $ 99,642.00 **Start Date:** October 23, 2013
Expended to Date: $ 22,913.86 **Completion Date:** December 31, 2014
Current Work Program: $ 74,731.50 **Time Remaining:** 3 months
Current Work Program Expenditures: $ 22,913.86

Research Agencies: Mississippi State University

Objective:

The objective of this proposal is to design decision-support tools for identifying biorefinery locations that ensure a cost-efficient and reliable supply chain. We will build mathematical models which take into consideration the benefits (such as, accessibility to different modes of transportation), as well as, the risk associated with locating a refinery near an intermodal facility. The goal is to design biofuel supply chains that not only perform well under normal conditions but also maximally hedge against losses of not having access to cost-efficient transportation modes because of disruptions at intermodal facilities. The outcomes of this project are on-line with the mission of the Intermodal Planning Division of MDOT to promote and support intermodal transportation by providing technical assistance which aims to improve and increase the usability of existing intermodal facilities. Through our experiments we will identify under what conditions locating a biofuel plant near an intermodal facility is advisable; and what are the benefits/costs of such a decision. These results can be used to encourage biofuel plants to use intermodal facilities/transportation and make their investments accordingly. The biofuels industry seems to have a bright future in Mississippi due to the abundance amount of biomass in the form of agricultural residues, forest products, and forest residues. Other factors, such as, low wages, non-unionized labor, and incentive packages offered by the state, impact a company's decision to locate in Mississippi. These tools can be used to help biofuel plant make better facility locations decisions; which in turn will contribute to their success.

Progress:

Task 1: Literature review and site visits 100% complete. We still plan to visit some intermodal plants. Taks 2: Mathematical model - 100% complete. task 3: CPLEX Algorithm - 100% complete. task 4: Customized Algorithm -100% complete. Task 5: Case Study -100% complete task 6: Develop a visual demo - 70% complete. The team has been working on developing a website where the interactive tool will reside. The following is the website we have created: http://biofuel.msstate.edu/. Building this interactive tool is a challenging task. Therefore, we have started working on it to give

ourselves the time we need to complete it. Task 7 Reports 50% complete. The report we are submitting counts for 20% of the task.

Plans for Next Quarter:

Task 6: Develop the visual demo. We will continue working on the visual demo. We will complete this task. Task 7. We will submit the final report, and complete an additional 50% of this task.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
4				2		1			1	

State Study No. 260— Guidelines for PCC Inputs to AASHTOWARE Pavement ME Design

Principal Investigator: Chetana Rao
MDOT Project Monitor: William Barstis, P.E.

Funds Allocated: $22,500.00 **Start Date:** December 19, 2013
Expended to Date: $ 0.00 **Completion Date:** December 31, 2014
Current Work Program: $18,000.00 **Time Remaining:** 3 months
Current Work Program Expenditures: $ 0.00

Research Agencies: Rao Research and Consulting, LLC

Objective:

This proposal is submitted for MDOT to consider developing a formal report on PCC materials data necessary for AASHTOWare PAVEMENT ME Design. A detailed problem statement highlighting the project objective, and a work plan to accomplish the objectives are presented in this proposal. Under SS 177, MDOT conducted a comprehensive test program to determine ME pavement design PCC material inputs for mix designs covering a wide range of materials available in Mississippi. Results from this project are expected to be used in the materials library that MDOT plans to develop to support MEPDG implementation. The results contain test data for 20 mixes and include results for the following properties determined from the listed test procedures:

- Modulus of Rupture or Flexural Strength – ASTM C 78
- Compressive Strength – ASTM C 39
- Modulus of Elasticity – ASTM C 469
- Tensile Strength – ASTM C 469
- CTE – AASHTO TP-60
- Concrete Shrinkage – ASTM C 157
- Unit Weight – ASTM C 138
- Poisson's Ratio – ASTM C 469

These results have not been formally published by MDOT so far. It will be immensely useful to summarize these data in a report so it can be used in the future implementation of the ME Design procedure. For the measurement of CTE AASHTO has revised the TP-60 test procedure to the T336 procedure which results in more accurate CTE values. The T336 procedure corrects the assumption made for the CTE of the calibration specimen in the TP 60 procedure. The SS 177 CTE values are being corrected under the SS 170 study, which is producing a stand-alone document on the CTE corrections. The report developed in the proposed study will include the corrected CTE

values. Additionally, the availability of such a comprehensive and complete set of materials database also provides a great opportunity to develop level 2 correlations for use in MEPDG.

Progress:

Administrative Tasks:

-None.

Technical Tasks:

No technical tasks were completed in this quarter.

Plans for Next Quarter:

The project team will:

- MDOT is expected to provide PCC test results for the report during this quarter.

- Prepare a draft version of the final report.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
1									1	

State Study No. 261— Turbidity Monitoring and Equipment Evaluation at MDOT Construction Sites

Principal Investigator: Bobby Moseley
MDOT Project Monitor: Cindy Smith, P.E.

Funds Allocated: $124,999.64 **Start Date:** October 23, 2013
Expended to Date: $ 49,528.95 **Completion Date:** December 31, 2014
Current Work Program: $100,000.00 **Time Remaining:** 3 months
Current Work Program Expenditures: $ 49,528.95

Research Agencies: Thompson Engineering

Objective:

MDOT has collected some initial data on turbidity levels in receiving streams due to run-off from construction projects. However, the results of the initial study (State Study 225) identified other areas where additional data is needed. The goal of this research project is to expand the current limited baseline turbidity conditions at select construction sites and to evaluate differing turbidity monitoring equipment under differing site conditions. Data, following initial site selection and site visits with MDOT, will be collected using MDEQ and EPA protocols as guidance.

Progress:

Completed data collection, ship rental equipment, begin data analysis and report preparation.

Plans for Next Quarter:

Prepare Report.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
8	6					2				

State Study No. 262— Evaluation of the WatchDog Weather Station to Reduce Drift from MDOT Spray Trucks

Principal Investigator: John Byrd
MDOT Project Monitor: Cindy Smith, P.E.

Funds Allocated: $77,748.00 **Start Date:** September 23, 2013
Expended to Date: $ 23,146.07 **Completion Date:** December 31, 2015
Current Work Program: $38,000.00 **Time Remaining:** 15 months
Current Work Program Expenditures: $ 23,146.07

Research Agencies: Mississippi State University

Objective:

Weather conditions that cause right of way herbicide drift onto sensitive adjacent crops can be avoided if wind speed and direction relative to the spray truck can be accurately monitored during applications.

Progress:

Researcher did not provide quarterly report.

Plans for Next Quarter:

Researcher did not provide quarterly report.

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
5	3					2				

State Study No. 266— Field Aging Effects on Asphalt Mixed at Different Temperatures and Hauled Different Distances

Principal Investigator: Isaac L. Howard
MDOT Project Monitor: Alex Middleton

Funds Allocated: $150,000.00 **Start Date:** March 1, 2014
Expended to Date: $ 0.00 **Completion Date:** December 31, 2016
Current Work Program: $ $32,142.86 **Time Remaining:** 27 months
Current Work Program Expenditures: $ 0.00

Research Agencies: Mississippi State University

Objective:

With all the options available to produce and place asphalt pavement in present day, a study into the field aging of these materials needs to be performed. Field aging has always been one of the biggest uncertainties in asphalt pavement performance, and with the widespread use of warm mix technologies, there are more aging questions than ever. This study is very timely, and if performed now can be conducted for less cost by leveraging the investment of a previous study.

Progress:

Progress was made on task 3. Task 3 began 0% complete, and ended 18.877% complete.

Plans for Next Quarter:

Plans for the next quarter are to work on tasks 1 to 3 (literature review, laboratory testing, and field testing)

EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
4	4									