MISSISSIPPI SPR-1(73), PART II

QUARTERLY PROGRESS REPORT

PERIOD: OCTOBER/ NOVEMBER/ DECEMBER 2013

FEDERAL FY2014 1ST QUARTER

Contents

State Study No. 170--Implement the 2002 Design Guide for MDOT (Phase II)

Principal Investigators: Harold Von Quintus, Chetana Rao
MDOT Project Monitor: William Barstis, P.E.

SP&R Funds Allocated: $1,237,838.26
SP&R to Date: $470,266.06
Non-SPR Allocated: $500,000.00
Non-SPR to Date: $512,434.72
Current Work Program: $289,537.54
Current Work Program Expenditures: $48,275.70

Date Started: October 1, 2003
Completion Date: December 31, 2013
Time Remaining: Time expired

Research Agencies: Applied Research Associates, Inc.—Transportation Sector and Research Division, Mississippi Department of Transportation

Objective:

Applied Research Associates, Inc.—Transportation Sector has finalized the development of the Mechanistic-Empirical Pavement Design Guide (MEPDG), previously referred to as the 2002 Pavement Design Guide, for design of new and rehabilitated structures through NCHRP Projects 1-37A and 1-40D. The MEPDG incorporates mechanistic-empirical based pavement design principles and allows highway agencies to develop cost-effective and reliable designs by systematically considering climate, material properties, construction variability, and traffic to predict pavement performance. This design process is a total departure from the process utilized in the current AASHTO design procedure, requiring the designer to make trial selection of materials and layer thicknesses and evaluating their performance under projected loadings over the design life of the pavement.

The objective of this study is to implement the MEPDG for Mississippi DOT. The following issues will be addressed in this study:

- Provide for training of MEPDG users and other stakeholders.
- Develop and execute a plan for securing the appropriate design input data on material and traffic characterization, and other design inputs.
- Conduct sensitivity analyses and make comparisons of MEPDG designs with Mississippi's current procedure.
- Develop and execute a plan for calibration of the MEPDG performance and distress models, defined as transfer functions.

Progress:

Project completed.

EEO and Title VI Information:

Employment Data for ARA Research Staff

Total Staff	Male					Female				
	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	Native Am
5	2	1		1					1	

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:	$ 111,210.45	**Completion Date:**	September 30, 2014
Current Work Program:	$98,764.21	**Time Remaining:**	9 months

Current Work Program Expenditures: $ 0.00

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, the collected annual crack survey of the twelve paving fabric research sections was analyzed to determine the rate of crack growth over time. The amount of crack reduction over time will be used to evaluate the effectiveness of the paving fabric systems to reduce reflective cracking. The test sections are surveyed annually following the construction.

Plans for Next Quarter:

During the next quarter, the analysis of crack survey data will be continued.

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, 2014
Current Work Program:	$ 3,000.00	**Time Remaining:**	9 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:

No work is planned for next quarter.

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
Expended to date: $ 14,900.00
Current Work Program: $ 5,500
Current Work Program Expenditures: $ 0
Date Started: October 1, 2005
Completion Date: December 31, 2014
Time Remaining: 12 months

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:
No work performed this quarter.

Plans for Next Quarter:
None

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
0									

State Study No. 206--Performance Specification For Chemically Stabilized Pavement Layers

Principal Investigator: Isaac Howard
MDOT Project Monitor: William Barstis, P.E.

Funds Allocated:	$239,703.00	**Date Started:**	January 10, 2008
Expended to Date:	$166,899.85	**Completion Date:**	December 31, 2013
Current Work Program:	$ 17,084.56	**Time Remaining:**	Time expired

Current Work Program Expenditures: $0.00

Research Agencies: Mississippi State University
Research Division, Mississippi Department of Transportation

Objective:

The proposed project will develop a performance specification for chemically treated pavement layers (lime, fly ash, and cement). A significant amount of laboratory testing of stabilized soils will be utilized, including previous stabilization research performed for MDOT. Numerical analysis will be performed using the finite element method to determine thresholds for the performance specification. MEPDG software will also be used to perform a sensitivity analysis.

Progress:

A draft final report has been submitted to MDOT for review.

Plans for Next Quarter:

Make any corrections requested by MDOT.

Employment Data for Mississippi State University Research Staff

Total	Male					Female				
Staff	White	Black	Hispanic	Asian	Native Am	White	Black	Hispanic	Asian	NativeAm
13	12					1				

State Study No. 211--Laboratory Testing And Evaluation Of Near Surface Properties Of Flexible Pavements Due To Bituminous Surface Treatments

Principal Investigator: Isaac Howard
MDOT Project Monitor: William Barstis, P.E.

Funds Allocated:	$330,000.00	**Date Started:**	October 1, 2008
Expended to Date:	$ 247,819.64	**Completion Date:**	December 31, 2013
Current Work Program:	$28,608.66	**Time Remaining:**	Time expired

Current Work Program Expenditures: $0.00
Research Agencies: Mississippi State University
Research and Materials Divisions, Mississippi Department of Transportation

Objective:

The project will test all emulsions that at present can be delivered into Mississippi for sealing activities. The end product will be a draft performance/material acceptance specification for chip and scrub seal activities. The project will also investigate the benefits of fog seals via wheel tracking of pavement slabs treated with fog seals.

Progress:

A draft final report has been submitted to MDOT for review

Plans for Next Quarter:

Make any corrections requested by MDOT.

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	Arabic	Native Am
12	8	0	1	0	0	2	0	0	1	0

State Study No. 223--I55 Integrated Diversion Traffic Management Benefit Study

Principal Investigator: Li Zhang
MDOT Project Monitor: James Watkins, P.E.

Funds Allocated: $152,810.00 **Date Started:** March 29, 2010
Expended to Date: $117,538.80 **Completion Date:** December 31, 2013 ext.
Current Work Program: $5,238.47 **Time Remaining:** Time expired
Current Work Program Expenditures: $0.00

Research Agency: Mississippi State University

Objective:

Integrating diversion traffic from a congested freeway with signal timing on parallel arterials could take advantage of the capacities of freeway and arterials, and therefore forms an Integrated Corridor Management strategy. The objective of this project is to evaluate the benefits of freeway congestion relief by utilizing corridor-wide capacity in the I-55 corridor. Possible strategies of a state-of-the-practice approach and a state-of-the-art approach will be proposed, then evaluated in a calibrated simulation environment. The state-of-the-practice approach would provide MDOT policymakers the information about the benefits that might be achieved under existing infrastructure, while the state-of-the-art approach would provide MDOT policymakers the information about the best possible benefits that can be achieved under the ICM approach.

Progress:

Project completed.

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. 228--Evaluating Alternative Mowing Regimen and the Use of Native Grasses & Wildflowers on Roadside Right-Of-Ways

Principal Investigators: John Guyton and Jeanne Jones
MDOT Project Monitor: Cindy Smith, P.E.

Funds Allocated:	$135,045.00	**Date Started:**	January 29, 2010
Expended to Date:	$97,718.47	**Completion Date:**	December 31, 2013
Current Work Program:	$13,980.79	**Time Remaining:**	Time expired

Current Work Program Expenditures: $3,979.40
Research Agency: Mississippi State University

Objective:

This three year project will determine if a limited mowing regimen is sufficient to make ROW maintenance more cost effective while increasing the beauty of Mississippi's ROWs. It will also identify additional propagules that may be useful in expediting the transition to natural ROWs and ascertaining motorist patience with the transition and perception of a more natural ROW.

This project will begin to showcase some of the following benefits:

- Reduce vegetation expenditures by an average of over $10-$20 on the acres not mowed,
- Slow the rate of spread of invasive plants which require bare soil and disturbance for spreading along road ROW,
- Obscure visibility of roadside litter and trash,
- Increase roadside beauty due to occurrence of wildflowers, native bunch grasses and native pollinators (butterflies and hummingbirds),
- Increase food plants for wildlife species of old fields, prairies and meadows and
- Provide nesting habitat for wild turkey, rabbits and other ground-nesting birds and small mammals while discouraging deer.

Progress:

Project completed.

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	3					1				

State Study No. 234—Evaluation of Short Statured Species for Rapid Establishment on Mississippi Roadsides

Principal Investigator: Barry Stewart, Ph.D.
MDOT Project Monitor: Dave Thompson, Cindy Smith

Funds Allocated: $ 213,482.00 **Start Date:** February 2, 2011
Expended to Date: $133,497.07 **Completion Date:** June 30, 2014
Current Work Program: $33,509.17 **Time Remaining:** 6 months
Current Work Program Expenditures: $0.00

Research Agencies: Mississippi State University

Objective:

Mowing of Mississippi roadsides is very expensive yet necessary to maintain safety and aesthetics. Newly constructed sites need to be quickly established with turf. The objective of this project is to evaluate seed mixes that can strike a balance between rapid establishment and reduced mowing. New mixes with lower stature plants will be compared to currently used standards. Some mixes will include species known to be unpalatable to deer. Hydroseeding is the preferred method for planting roadsides. Various hydraulic media will be evaluated for rapid establishment and compared to currently used standard carriers. Factorial plot arrangements will allow evaluation of seed mixes and hydraulic media in the same experiments. This testing will need to be conducted at two locations in spring and two locations in fall for two years. An additional six months will be required to finalize data collection.

An important step in reducing mowing will be to conduct an inventory survey on what species are currently growing on Mississippi roadways. This would determine the long-term outcome of plantings that occurred years earlier, give insight on species succession, and reveal what species are presently requiring mowing. This survey will be conducted during summer for one fiscal year and include both winter (end of season) and summer (early-mid season) species.

Progress

Monitoring of several experiments examining the germination and establishment of many species of used for roadside planting continued. Due to lack of rain we encountered some deplayed oil seed radish establishment. This is the first time we have encountered this. The experiment examines seeding rate of oil seed radish on the establishment of bemudagrass. As the rains came late (October) in the quarter, establishment really picked up. It will be interesting to see how well bermudagrass estblished in this experiment. We will see that next spring. Plant height, species composition and coverage continue to be monitored on all experiments. A paper for

was presented at the American Society of Agronomy meetings in Tampa, FL in November of 2013.

Plans for Next Quarter:

We will continue to monitor all field experiments,2 summer plantings, 2 fall plantings and 2 mulch studies for % plant cover and species compostion. We will begin preparing seed for one more roadside planting in May.

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. 245— Aggregate Absorption in HMA Mixtures

Principal Investigator: L. Allen Cooley, Ph.D., P.E.
MDOT Project Monitor: James Williams

Funds Allocated: $ 90,503.46 **Start Date:** June 1, 2012
Expended to Date: $ 40,613.24 **Completion Date:** December 31, 2013
Current Work Program: $58,414.24 **Time Remaining:** Time expired
Current Work Program Expenditures: $ 12,272.74

Research Agencies: Burns Cooley Dennis, Inc.

Objective:

Within the state of Mississippi, natural chert gravels are our source of native aggregates. The absorption characteristics of our gravels can range from relatively non-absorptive to very absorptive. Areas of our state that predominantly have high absorption aggregates routinely have HMA pavement layers that crack prematurely. Within this project, Burns Cooley Dennis will sample field projects in which aggregates of varying absorption characteristics are utilized. The research will involve conducting tests that will identify how much asphalt absorption takes place through the entire production and construction process.

Progress:

Project Complete

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. 246— Development of Laboratory Mix Design Procedures for RAP Mixes

Principal Investigator: L. Allen Cooley, Ph.D., P.E.
MDOT Project Monitor: Alex Middleton

Funds Allocated: $ 98,493.21 **Start Date:** June 1, 2012
Expended to Date: $ 16,809.78 **Completion Date:** December 31, 2013
Current Work Program: $ 70,952.02 **Time Remaining:** Time expired
Current Work Program Expenditures: $ 0.00

Research Agencies: Burns Cooley Dennis, Inc.

Objective:

Within this project, Burns Cooley Dennis will sample field projects in which RAP is incorporated within the mixture. Laboratory testing will be conducted on these samples to determine the amount of blending that occurs between the RAP binder and virgin binder. Testing will also be conducted on laboratory prepared mixtures, using the same materials, to determine the proper methodology for incorporating RAP into mixtures during mix design.

Progress:

Project Complete

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
6	6									

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:** 12 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 4 - BCD continued to analyze data and make shrinkage measurements.

Plans for Next Quarter:

Task 4 - BCD will continue to analyze data and make shrinkage measurements, and begin to draft a 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: $ 42,585.80 **Completion Date:** December 31, 2014
Current Work Program: $ 110,000.00 **Time Remaining:** 12 months
Current Work Program Expenditures: $0.00

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 three tasks. Task 10 began the quarter 25% complete and ended the quarter 33.55% complete due to durability activities. Task 15 began the quarter 50.18% complete and ended the quarter 55% complete due to management activities. Task 17 began the quarter 60% complete and ended the quarter 70% complete due to permeability and longitudinal joint activities.

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.

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	8									

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: $ 0 **Completion Date:** December 31, 2014
Current Work Program: $ 6,000.00 **Time Remaining:** 12 months
Current Work Program Expenditures: $ 0

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:

No work is planned for next 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
0										

State Study No. 252— Acceptable Vibrations on Green Concrete

Principal Investigator: Seamus Freyne
MDOT Project Monitor: Sean Ferguson

Funds Allocated: $ 79,907.78 **Start Date:** March 2, 2012
Expended to Date: $47,381.29 **Completion Date:** December 31, 2013
Current Work Program: $ 3,413.71 **Time Remaining:** Time expired
Current Work Program Expenditures: $ 0.00

Research Agencies: Burns Cooley Dennis, Inc.

Objective:

MDOT Specifications require concrete in pile shafts to reach compressive strength of 2,500 psi before additional piles are made within a radius of 30 feet, and the typical delay of 48 to 72 hours adds cost to a project that is passed on to the state. This study will determine the maximum vibrations green concrete can handle without detriment to ultimate performance.

Progress:

Project completed.

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	3					1				

State Study No. 255— A Synthesis Study of Noncontact Nondestructive Evaluation of Top-down Cracking in Asphalt Pavements

Principal Investigator: Waheed Uddin
MDOT Project Monitor: William Barstis, P.E.

Funds Allocated: $ 71,500.00 **Start Date:** June 18, 2012
Expended to Date: $ 30,898.21 **Completion Date:** December 31, 2013
Current Work Program: $ 34,422.15 **Time Remaining:** Time expired
Current Work Program Expenditures: $ 0.00

Research Agencies: University of Mississippi

Objective:

Top-down cracking in asphalt pavement has been reported in many states and European countries. Its mechanism and nondestructive evaluation methods are being investigated but a thorough review is needed to identify any noncontact evaluation technology that can expedite field surveys of top-down cracking without depending on cores. This proposed study will undertake intensive literature review and personal contacts worldwide in an effort to identify top-down cracking evaluation technologies that can be applied at highway speed. If a candidate technology is found then a pilot field study will be recommended in a follow up phase of the study. If no such noncontact evaluation technology is found for implementation at highway speed then a research needs statement will be prepared in the NCHRP format and recommended to pursue a national study to develop such technology. The potential value of the end result products and/or services to the Department will result in correctly identifying top-down cracking distress at expedited speed, using the data to correctly design MR&R strategies, and calibrating the MEPDG models for Mississippi. The savings will be in millions of dollars annually considering cost avoidance of coring and implementing better performing pavement maintenance and rehabilitation strategies. The study will be completed in one year.

Progress:

Project Complete.

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
3				2			1			

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: $ 0.00 **Completion Date:** December 31, 2014
Current Work Program: $ 74,731.50 **Time Remaining:** 12 months
Current Work Program Expenditures: $ 0.00

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 visitis 90% complete. We still plan to visit some intermodal plants. Taks 2: Mathematical model - 100% complete. Taks 6: Develop a visual demo - 10% 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. Taks 7.1 Quarterly Reports - 15% complete. The report we are submitting counts for 15% of the task.

Plans for Next Quarter:

Task 3: Developing a CPLEX model to solve the problem exactly. We plan to complete this task 100%. Task 4: Developing solution heuristics. We plan to comlete 30% of this task. Task 6: Develop the visual demo. We will continue working on the visual demo. We will complete an additional 20% of this task. Task 7.1. We will submit the quarterly report, and complete an additional 15% 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:** 12 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:

(1) Literature review and personal contacts were completed (Tasks 1 and 2). Furthermore, a recent nondestructive equipment study under SHRP-2 conducted at Auburn university test track was also reviewed and a participating equipment manufacturer was contacted. (2) Dr. Uddin with the assistance of new graduate PhD students and other student assistants completed a draft tech memo on synthesis of literature and noncontact nondestructive equipment research that is being incorporated in the draft final report (Tasks 3 and 6). (3) A short write-up was prepared for evidence of top down cracking on one highway site by examining cores extracted through courtesy of MDOT Research Division (Task 4).

Plans for Next Quarter:

Tasks 3 through 11 will be completed starting from submission of a draft final report including tech memo contents on literature review and findings from personal contacts will be compiled. It is expected that we will submit the draft report in the beginning of November with a follow up presentation to MDOT in Jackson in late November. The draft report will be revised using MDOT's comments and resubmitted including NCHRP problem statement for a second review in later part of December. Final report delivery is expected by the end of December 2013.

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
3				2			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: $ 0.00 **Completion Date:** December 31, 2014
Current Work Program: $100,000.00 **Time Remaining:** 12 months
Current Work Program Expenditures: $ 0.00

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:

(1) Literature review and personal contacts were completed (Tasks 1 and 2). Furthermore, a recent nondestructive equipment study under SHRP-2 conducted at Auburn university test track was also reviewed and a participating equipment manufacturer was contacted. (2) Dr. Uddin with the assistance of new graduate PhD students and other student assistants completed a draft tech memo on synthesis of literature and noncontact nondestructive equipment research that is being incorporated in the draft final report (Tasks 3 and 6). (3) A short write-up was prepared for evidence of top down cracking on one highway site by examining cores extracted through courtesy of MDOT Research Division (Task 4).

Plans for Next Quarter:

Tasks 3 through 11 will be completed starting from submission of a draft final report including tech memo contents on literature review and findings from personal contacts will be compiled. It is expected that we will submit the draft report in the beginning of November with a follow up presentation to MDOT in Jackson in late November. The draft report will be revised using MDOT's comments and resubmitted including NCHRP problem statement for a second review in later part of December. Final report delivery is expected by the end of December 2013.

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
3				2			1			

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: $ 0.00 **Completion Date:** December 31, 2015
Current Work Program: $38,000.00 **Time Remaining:** 24 months
Current Work Program Expenditures: $ 0.00

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:

(1) Literature review and personal contacts were completed (Tasks 1 and 2). Furthermore, a recent nondestructive equipment study under SHRP-2 conducted at Auburn university test track was also reviewed and a participating equipment manufacturer was contacted. (2) Dr. Uddin with the assistance of new graduate PhD students and other student assistants completed a draft tech memo on synthesis of literature and noncontact nondestructive equipment research that is being incorporated in the draft final report (Tasks 3 and 6). (3) A short write-up was prepared for evidence of top down cracking on one highway site by examining cores extracted through courtesy of MDOT Research Division (Task 4).

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EEO and Title VI Information:

Employment Data for Mississippi State University Research Staff

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3				2			1			