86-01

U.S. Department of Transportation
Federal Highway Administration

MISSISSIPPI DIVISION

100 West Capitol Street, Suite 1062
Jackson, Mississippi 39269
(601) 965-4215 / (601) 965-4231 FAX
In Reply Refer To: POST-MS

August 11, 2010

Mr. Larry L. Brown, Executive Director
Mississippi Department of Transportation (MDOT)
Post Office Box 1850
Jackson, Mississippi 39215-1850

Dear Mr. Brown:

Subject: SPR Part II Research Work Program (SPR-1(59)) for the Fiscal Period FY 2011, October 1, 2010 to September 30, 2011

In response to the August 9, 2010 request, we have reviewed the Department's SPR Part II Research Work Program (SPR-1(59)) for the Fiscal Period FY 2011, and have determined that the Department is in compliance with the requirements of 23 CFR 420, Subpart B. Approval of the SPR Part II Research Work Program (SPR-1(59)) for the Fiscal Period FY 2011 the State of Mississippi is granted.

If you have any questions, please contact Mr. Jeffrey Schmidt at 601-965-4222.

Sincerely yours,

Jeffrey A. Schmidt

Andrew H. Hughes
Division Administrator

cc: Ms. Melinda McGrath, 65-01
Mr. Randy Battey, 71-01
Mr. James Watkins, 86-01

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Melinda L. McGrath
Deputy Executive Director/
Chief Engineer

Brenda Znachko
Deputy Executive Director/
Administration

MDOT
MISSISSIPPI DEPARTMENT OF TRANSPORTATION

Larry L. "Butch" Brown
Executive Director

Steven K. Edwards
Director
Office of Intermodal Planning

Willie Huff
Director
Office of Enforcement

P. O. Box 1850 / Jackson, Mississippi 39215-1850 / Telephone (601) 359-7001 / FAX (601) 359-7110 / GoMDOT.com

August 9, 2010

Mr. Andrew H. Hughes
Division Administrator
Federal Highway Administration
666 North Street, Suite 105
Jackson, MS 39202-3199

Dear Mr. Hughes:

SUBJECT: **SPR Part II Research Work Program (SPR-1(59)) for the Fiscal Period FY 2011, October 1, 2010 to September 30, 2011**

The Research Division met with the MDOT Research Advisory Committee (RAC) on August 9, 2010 to discuss and approve the FY 2011 research budget. Mr. Doug MacDonald from your office attended this meeting. Three (3) copies of the MDOT RAC approved Research Work Program for FY 2011 is attached for your information and approval. This proposed program includes an estimated FHWA SPR Part II funding allocation for FY 2011. Your prompt review and approval of this document is requested.

If there are any questions concerning the program, please contact me at telephone number 359-7650.

Sincerely,

James C. Watkins, P.E.
State Research Engineer

Attachment
pc: Central File w/attachment
FY 2011 Work Program file w/attachment

Melinda L. McGrath
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August 9, 2010

Mr. Andrew H. Hughes
Division Administrator
Federal Highway Administration
666 North Street, Suite 105
Jackson, MS 39202-3199

Dear Mr. Hughes:

SUBJECT: **Certification of SPR-1(59) Research Work Program (FY 2011) in Accordance with 23 CFR 420.209(c)**

In accordance with 23 CFR 420.209(c), the following certification is submitted to assist in your approval of MDOT's Research Work Program for FY 2011:

> **"I, James Watkins, State Research Engineer of the State of Mississippi, do hereby certify that the State is in compliance with all requirements of 23 U.S.C. 505 and its implementing regulations with respect to the research, development, and technology transfer program and contemplate no changes in statutes, regulations or administrative procedures which would affect such compliance."**

Sincerely,

James C. Watkins, P.E.
State Research Engineer
Mississippi Department of Transportation

Mississippi
Department of Transportation

RESEARCH WORK PROGRAM
SPR-1(59), Part II
L56E

For the Fiscal Period
October 1, 2010 to September 30, 2011

Prepared by the
Mississippi Department of Transportation
RESEARCH DIVISION

In Cooperation with the
U.S. Department of Transportation
Federal Highway Administration

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

LINE ITEM	STDY NO.	STUDY TITLE	BUDGET PROGRAM / EXPENDITURES LAST YR	TOTAL EXPENDITURES TO DATE / TOTAL STUDY BUDGET	STARTED / COMPLETION DATE	PRINCIPAL INVESTIGATOR FTC
1	N/A	LONG-TERM PAVEMENT PERFORMANCE (LTPP)	$2,000	$1,534		JAMES C. WATKINS
			$1,534	$0		
2	N/A	IMPLEMENTATION OF RESEARCH PROJECTS	$190,000	$177,960		JAMES C. WATKINS
			$147,303	$0		
3	N/A	TECHNOLOGY TRANSFER	$100,000	$77,010		JAMES C. WATKINS
			$63,213	$0		
4	N/A	PAVEMENT MANAGEMENT	$320,000	$206,556		CINDY SMITH
			$182,469	$0		
5	N/A	NETWORK LEVEL PAVEMENT FRICTION TESTING	$100,000	$109,829		GARY BROWNING
			$95,373	$0		
6	N/A	INFORMATION AND DATA COLLECTION TECHNOLOGY	$110,000	$111,278		REGINALD JENKINS
			$95,588	$0		
7	N/A	MINOR RESEARCH STUDIES	$25,000	$25,000	10/1/2009	JAMES C. WATKINS
			$2,088	$25,000	9/30/2010	
8	170	IMPLEMENT THE 2002 DESIGN GUIDE FOR	$190,768	$604,419	3/1/2004	CHETANA RAO
		MDOT (PHASE II)	$31,104	$907,663	6/30/2012	
9	171	IN-HOUSE SUPPORT TO STATE STUDY 170	$123,101	$226,899	3/1/2004	WILLIAM F. BARSTIS
			$8,106	$350,000	6/30/2012	
10	180	EVALUATION OF PAVEMENT MARKING MATERIALS	$4,000	$70,836	10/1/2005	CINDY SMITH
			$2,718	$90,000	12/31/2010	
11	181	STRUCTURAL CHARACTERIZATION OF ASPHALT	$26,424	$73,573	10/1/2005	L. ALLEN COOLEY, JR.
		DRAINAGE COURSE LAYERS	$0	$100,000	12/31/2010	
12	184	LONG-TERM FIELD MONITORING AND	$2,400	$67,421	10/1/2005	FARSHAD AMINI
		PERFORMANCE OF PAVING FABRIC INTERLAYER	$2,686	$218,224	9/30/2014	
		TO REDUCE REFLECTIVE CRACKING				
13	185	IN-HOUSE SUPPORT TO STATE STUDY NO. 184	$3,812	$14,752	10/1/2005	CINDY SMITH
		- LONG-TERM FIELD MONITORING AND	$0	$30,000	9/30/2014	
		PERFORMANCE OF PAVING FABRIC INTERLAYER				
		SYSTEMS TO REDUCE REFLECTIVE CRACKING				
14	186	CONSULTANT SUPPORT TO STATE STUDY NO.	$0	$19,251	10/1/2005	RANDY AHLRICH
		184 - LONG-TERM FIELD MONITORING AND	$0	$20,400	9/30/2014	
		PERFORMANCE OF PAVING FABRIC INTERLAYER				
		SYSTEMS TO REDUCE REFLECTIVE CRACKING				
15	206	PERFORMANCE SPECIFICATION FOR	$60,000	$0	10/1/2007	ISAAC HOWARD
		CHEMICALLY STABILIZED LAYERS	$0	$239,703	12/31/2013	
16	207	OPEN GRADED FRICTION COURSE FOR HMA PAVEMENTS	$100,515	$53,240	10/1/2007	TOM WHITE
			$24,164	$135,000	9/30/2011	

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

LINE ITEM	STDY NO.	STUDY TITLE	BUDGET PROGRAM / EXPENDITURES LAST YR	TOTAL EXPENDITURES TO DATE / TOTAL STUDY BUDGET	STARTED / COMPLETION DATE	PRINCIPAL INVESTIGATOR FTC
17	208	EFFECT OF COARSE AGGREGATE CLEANLINESS	$100,000	$101,068	10/1/2007	ISAAC HOWARD
		& MOISTURE CONTENT ON HMA PERFORMANC	$21,016	$275,000	12/31/2011	
18	210	EMERGENCY EVACUATION STUDY FOR THE	$37,978	$18,779	10/1/2008	FENG WANG
		GREATER JACKSON AREA (DYNASMART-P	$7,399	$59,544	6/30/2011	
		DEVELOMENT)				
19	211	LABORATORY TESTING AND EVALUATION OF	$100,000	$54,428	10/1/2008	ISAAC HOWARD
		NEAR SURFACE PROPERTIES OF FLEXIBLE	$36,398	$330,000	12/31/2011	
		PAVEMENTS DUE TO BITUMINOUS SURFACE TREATMENTS				
20	212	UTILIZATION OF RAP IN	$56,201	$94,414	10/1/2008	ISAAC HOWARD
		CONSTRUCTION-PHASE II:HIGH RAP SURFACE COURSE	$53,705	$115,000	12/31/2010	
21	213	PERFORMANCE EVALUATION OF ROUNDABOUTS	$37,617	$40,767	10/1/2008	WAHEED UDDIN
		FOR TRAFFIC DELAY AND CRASH REDUCTION	$40,767	$70,920	12/31/2010	
		OXFORD, MS				
22	215	INTEGRATED KUDZU CONTROL ON MISSISSIPPI ROADSIDES	$16,500	$12,566	10/1/2008	MARK WEAVER
			$4,547	$50,215	3/30/2012	
23	216	SHRINKAGE AND DURABILITY STUDY OF	$3,187	$75,114	10/1/2008	ROBERT VARNER
		BRIDGE DECK CONCRETE	$3,864	$78,301	12/31/2010	
24	217	STRAIN RESISTANT, EXTENDED PERFORMANCE	$73,000	$11,178	10/1/2008	TOM WHITE
		PAVEMENTS, AN ALTERNATE TO SUBDRAINAG	$11,178	$225,000	12/31/2012	
25	218	IN-HOUSE SUPPORT TO STATE STUDY NO. 217	$31,634	$457	10/1/2008	MATT STRICKLAND
			$0	$40,000	12/31/2012	
26	221	EVALUATION OF MDOT'S DISTRESS	$60,211	$0	10/1/2009	FENG WANG
		THRESHOLDS FOR MAINTAINED PAVEMENT PROJECTS	$0	$120,421	12/31/2011	
27	222	BEST PRACTICES OF MDOT'S SURVEY	$28,610	$385	10/1/2009	TULIO SULBARAN
		OPERATION, ORGANIZATION & TECHNOLOGY	$385	$131,217	12/31/2011	
		IMPLEMENTATION				
28	223	I55 INTEGRATED DIVERSION TRAFFIC	$100,000	$2,471	10/1/2009	LI ZHANG
		MANAGEMENT BENEFIT STUDY	$24,791	$152,810	12/31/2012	
29	225	TURBIDITY MONITORING AT SELECT CONSTRUCTION SITES	$80,000	$0	10/1/2009	THAD HOPPER
			$0	$94,000	12/31/2010	
30	226	ENVIRONMENTAL MANAGEMENT PLAN	$84,000	$0	10/1/2009	THAD HOPPER
		DEVELOPMENT FOR MDOT LABORATORI	$0	$93,000	12/31/2010	
31	227	VARIABILITY OF CEMENT TREATED LAYERS IN	$41,000	$309	10/1/2009	ROBERT VARNER
		MDOT ROAD PROJECTS	$309	$79,979	6/30/2011	
32	228	EVALUATING ALTERNATIVE MOWING REGIMEN	$44,489	$7,221	10/1/2009	JOHN GUYTON
		AND THE USE OF NATIVE GRASSES AND	$7,221	$135,044	12/31/2013	
		WILDFLOWERS ON ROADSIDE RIGHT OF WAYS				

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

LINE ITEM	STDY NO.	STUDY TITLE	BUDGET PROGRAM / EXPENDITURES LAST YR	TOTAL EXPENDITURES TO DATE / TOTAL STUDY BUDGET	STARTED / COMPLETION DATE	PRINCIPAL INVESTIGATOR FTC
33	229	INSTRUMENTATION & COMPUTATIONAL	$100,000	$0	10/1/2009	WEI ZHENG
		MODELING FOR EVALUATION OF BRIDGE	$0	$150,000	9/30/2012	
		ACROSS WATERWAYS				
34	231	OPTIMIZING MISSISSIPPI AGGREGATES FOR	$16,000	$22,633	10/1/2009	ROBERT VARNER
		CONCRETE BRIDGE DECKS	$22,633	$97,479	6/30/2011	
35	232	DEVELOPMENT OF CLIMATE DATA INPUT FILES	$22,000	$0	1/29/2010	DENNIS TRUAX
		FOR THE MECHANISTIC-EMPIRICAL PAVEMENT	$0	$65,180	12/31/2010	
		DESIGN GUIDE (MEPDG)				
		FY 2011 NEW 80/20% STUDIES				
36	234	EVALUATION OF SHORT STATURED SPECIES	$128,736	$0	10/1/2010	GREGG MUNSHAW
		FOR RAPID ESTABLISHMENT ON MISSISSIPPI	$0	$213,482	6/30/2013	
		ROADSIDES				
37	235	TRIPLE-BOTTOM LINE ASSESSMENT OF FUTURE	$44,867	$0	10/1/2010	TULIO SULBARAN
		MISSISSIPPI INTERMODAL FACILITY	$0	$140,875	6/30/2013	
38	236	EXPANSIVE SOIL (YAZOO CLAY) CHARACTERIZATION	$135,000	$0	10/1/2010	LANDRIS T. LEE
			$0	$180,000	6/30/2013	
39	237	DEVELOPMENT OF SUSTAINABLE HIGHWAY	$45,000	$0	10/1/2010	LIN LI
		CONSTRUCTION RATING SYSTEM	$0	$95,000	6/30/2013	
40	238	EVALUATION OF CRUSHED CONCRETE BASE STRENGTH	$67,154	$0	10/1/2010	L. ALLEN COOLEY, JR.
			$0	$81,608	6/30/2013	
41	239	CEMENT INFLUENCES ON GRAVEL AGGREGATE	$87,716	$0	10/1/2010	ROBERT VARNER
		CONCRETE STRENGTH	$0	$99,974	6/30/2013	
42	240	EVALUATION OF FERTILITY PRACTICES	$188,942	$0	10/1/2010	GREGG MUNSHAW
		DURING ROADSIDE ESTABLISHMENT IN MS TO	$0	$392,186	6/30/2013	
		MINIMIZE NONPOINT SOURCE POLLUTANTS				
43	241	SAFE ALERT SYSTEM PILOT PROJECT	$325,000	$0	10/1/2010	MARK HERAK
			$0	$750,000	12/31/2012	
44	242	COLLECTION AND EVALUATION OF CORE DATA	$99,000	$0	10/1/2010	L. ALLEN COOLEY, JR.
		FOR THE MEPDG FOR OVERLAYED AND NEW	$0	$99,000	12/31/2011	
		PAVEMENTS				

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

	FY 2010	FY 2011
FY 2010 & 2011 SPR PART II ALLOCATION (2011 Estimated)	$2,140,369	$1,502,257
less 25% NCHRP (2011 Estimated)	$123,541	$109,056
less 25% TRB Correlation Service	$27,534	$27,534
less POOLED-FUND STUDIES	$460,000	$430,000
plus FY 2009 Carryover	$2,344,687	
SPR AVAILABLE FOR FY 2010 & 2011 PART II WORK PROGRAM	3873980.57	935667
plus STATE MATCH	$968,495	$233,917
TOTAL AVAILABLE FROM SPR PART II	$4,842,476	$1,169,584
less EXPENDITURES THRU 08/04/09	$1,061,289	
less ESTIMATED EXPENDITURES 8/04/09 THRU 9/30/09	$300,000	
less PROJECTS THAT CLOSED OUT DURING FY 2010	$175,594	
ESTIMATED FY 2010 CARRYOVER	$3,305,593	$3,305,593
TOTAL FUNDS AVAILABLE		$4,475,177
LESS FY 2011 PROJECTS		$3,511,861
BALANCE		$963,316

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

NCHRP, TRB & POOLED FUND PROJECTS WITH 100% FEDERAL FUNDING FOR FY 2011 (L560)

	FY 2010	FY 2011	
MISSISSIPPI PARTICIPATION IN NCHRP	$123,541	$109,056	MDOT RESEARCH DIVISION
TRANSPORTATION RESEARCH BOARD CORRELATION SERVI	$27,534	$27,534	MDOT RESEARCH DIVISION
POOL FUND STUDIES			
AUBURN UNIVERSITY ACCELERATED PAVEMENT LOADING FACILITY	$175,000	$175,000	ALABAMA DEPARTMENT OF TRANSPORTATION
UPDATING US PRECIPITATION FREQUENCY ESTIMATES FOR THE SOUTHEASTERN REGION	$50,000	$58,000	FEDERAL HIGHWAY ADMINISTRATION
TRANSPORTATION LIBRARY CONNECTIVITY	$15,000	$15,000	WISCONSIN DEPARTMENT OF TRANSPORTATION
CONSTRUCTION OF CRACK-FREE BRIDGE DECKS (PHASE II)	$15,000	$15,000	KANSAS DEPARTMENT OF TRANSPORTATION
IMPROVING RESILIENT MODULUS TEST PROCEDURES FOR UNBOUND MATERIALS	$15,000	$15,000	FEDERAL HIGHWAY ADMINISTRATION
SOUTHEAST TRANSPORTATION RESEARCH CONSORTIUM	$10,000	$5,000	LOUISIANA DEPARTMENT OF TRANSPORTATION
ACCOMMODATING OVERSIZE/OVERWEIGHT VEHICLES AT ROUNDABOUTS	$15,000	$15,000	AASHTO
FY 2011 NEW POOLED FUND			
TECHNOLOGY TRANSFER INTELLIGENT COMPACTION CONSORTIUM	$0	$7,000	IOWA DEPARTMENT OF TRANSPORTATION
ITS POOLED FUND PROGRAM (ENTERPRISE)	$0	$30,000	MICHIGAN DEPARTMENT OF TRANSPORTATION
BRIDGE PIER SCOUR RESEARCH	$0	$20,000	FEDERAL HIGHWAY ADMINISTRATION
ACCELERATING INNOVATION IMPLEMENTATION ACROSS STATE BOUNDARIES	$0	$10,000	CALIFORNIA DEPARTMENT OF TRANSPORTATION
IMPROVING THE QUALITY OF PAVEMENT PROFILERS	$0	$15,000	FEDERAL HIGHWAY ADMINISTRATION
AASHTO POOLED FUND CONTRIBUTION			
DARWIN-ME COOPERATIVE SOFTWARE DEVELOPMENT	$50,000		
TOTALS	$496,075	$566,590	

MISSISSIPPI PROJECT 2011
WORK PROGRAM - PART II (80%/20%)
FY 2011 (L560)

MISSISSIPPI PARTICIPATION IN OTHER RESEARCH PROJECTS
100% STATE FUNDED FY 2011 (NON-SPR)

STUDY TITLE	BUDGET PROGRAM / EXPENDITURES LAST YR	TOTAL EXPENDITURES TO DATE / TOTAL STUDY BUDGET	STARTED / COMPLETION DATE	PRINCIPAL INVESTIGATOR FTC
Implement the 2002 Design Guide for MDOT (Non-SP&R Port	$0.00	$502,297.00	10/1/1999	Chetana Rao
	$0.00	$500,000.00	6/30/2012	Applied Research Assoc.

MISSISSIPPI SPR-1(59)

GENERAL COMMENTS ON RESEARCH WORK PROGRAM FOR FISCAL YEAR 2011

The SPR Part II research work program allocation for FY 2011 totals $1,502,257 (estimated) and includes a National Cooperative Highway Research Program (NCHRP) contribution of $109,056 (estimated) for FY 2011, a TRB Correlation Service contribution of $27,534 and pooled-fund studies totaling $590,000 as detailed in the program tabulation and narrative included in this document. The NCHRP funding is 5.5% of the SPR Part II allocation. 25% of MDOT's TRB Correlation Service contribution is funded using SPR Part II funds. The remaining agency required funding for both NCHRP and TRB are funding through MDOT's Planning Division (SPR-1(57)) using SPR Part I funds. This work program tabulation also includes renewal statements for all on-going line items. The renewal statements for state studies contain financial information including total study budget, total expenditures to date, and cost estimates for fiscal year 2011. Also included in the renewal statements for state studies are narrative descriptions of study objectives, accomplishments of the past year, and work planned for fiscal year 2011. Beginning and completion dates are shown for each state study. Line items other than state studies have narrative descriptions of scope, objectives and anticipated activities along with a cost estimate. These tabulations and renewal statements constitute the FY 2011 research work program.

The pooled fund studies, the TRB Correlation Service and NCHRP as described herein are funded with 100% SPR Part II funds (no state match). The forty-nine (49) line items in the tabulation mentioned above includes only those items for which there is a state match (80/20) in the funding.

Additional projects utilizing either 100% Federal non-SPR funds or 100% State funds that are administered by the Research Division are also described within this document.

State study numbers in this work program are the same as those currently being used, and they will remain the same in all correspondence. Study proposals for future submissions will be numbered sequentially.

LINE ITEM 1

Long-Term Pavement Performance (LTPP)

This line item is for support of the Long-Term Pavement Performance (LTPP) program begun under the Strategic Highway Research Program (SHRP) and now a part of the Federal Highway Administration (FHWA). Activities covered include site nomination, site verification, historic data searches, support for material sampling and field-testing, construction supervision, and technology transfer activities associated with LTPP and SHRP product implementation. Activities associated with the new SHRP II program as outlined in the current authorization will also be supported by this line item.

Cost Estimate for FY 2011

Salaries (Regular Employees)	$1,250
Employee Benefits	$ 250
Materials, Supplies, and Services	$ 20
Travel and Sustenance	$ 480
Total	$2,000

LINE ITEM 2

Implementation of Research Projects

This line item funds Research Division activities relating to implementation of research studies. Implementation Activities consist of field and office activities that apply research results to the solution of operational problems in the transportation area. Examples of these activities are:

1. Applying new products and/or procedures in the field to specific field problems.
2. Short-term field and/or office technical support in trouble-shooting and design.
3. Assistance in development of specifications and tests to implement new products or procedures.
4. Identifying areas in which research is required.
5. Initial preparation costs associated with proposed research.

Research information for implementation may originate from MDOT's Research Program (in-house and Contract), including both completed and ongoing studies; from other state transportation agencies' experiences and research; from national and international sources, from the FHWA; and from major research sources such as NCHRP, Corps of Engineers, etc.

Cost Estimate for FY 2011

Salaries (Regular Employees)	$140,040
Employee Benefits	$32,011
Materials, Supplies, and Services	$7,772
Travel and Sustenance	$10,177
Total	$190,000

LINE ITEM 3

Technology Transfer

This activity funds Research Division activities relating to the distribution of information about transportation technologies to any of MDOT Research Division's transportation customers.

Examples of technology transfer activities include:

- making presentations of research results to various groups such as universities and technical societies
- participation in user group meetings, conferences, seminars and training courses
- distribution of research results
- inputting research and research-in-progress (RIP) results into the Transportation Research Information Service (TRIS)
- producing and distributing a MDOT Research Newsletter

NOTE: The SPR WORK PROGRAM-PART I (SPR-1(52)), provides direct support to the Center for Technology Transfer (T2) at Jackson State University, and those activities and funds are not included in the above line item, Technology Transfer.

Cost Estimate for FY 2011

Salaries (Regular Employees)	$60,250
Employee Benefits	$17,750
Materials, Supplies, and Services	$5,400
Travel and Sustenance	$12,800
Conference Registrations	$3,800
Total	$100,000

LINE ITEM 4

Pavement Management

This item covers the activities of the Research Division relating to the development, implementation, maintenance and operation of the Department's Pavement Management System. The Pavement Management System database serves as an important resource for Departmental sponsored pavement related research.

Activities include awareness of national pavement management state-of-the-art and practice, administration of field data collection and statewide database development, administration of pavement condition survey contracts, quality assurance for condition surveys, in-house software development, administration of contract software development, planning and conducting in-house training, administration of contract pavement management research, implementation of pavement management research and annual distress surveys associated with MDOT's maintained pavement projects.

Cost Estimate for FY 2011

Salaries (Regular Employees)	$290,000
Employee Benefits	$15,000
Materials, Supplies, and Services	$5,000
Travel and Sustenance	$8,000
Conference Registrations	$2,000
Total	$320,000

LINE ITEM 5

Network Level Pavement Friction Testing

This item covers the friction data collection activities of the Research Division to ensure that MDOT provides acceptable surface skid resistance for the traveling public.

MDOT currently tests the surface friction of the entire highway network on a 3-year cycle. Areas of low surface friction are identified and submitted for immediate surface treatment to improve surface friction. This line item funds the surface friction data collection on 1/3rd of the network annually and includes periodic calibration of equipment.

Cost Estimate for FY 2011

Salaries (Regular Employees)	$52,000
Employee Benefits	$14,560
Materials, Supplies, and Services	$12,000
Travel and Sustenance	$21,440
Total	$100,000

LINE ITEM 6

Information and Data Collection Technology

This activity funds Research Division activities relating to the budgeting, purchasing, managing, updating, programming and servicing of all of the equipment and software.

Examples of Information and Data Collection Technology activities include:

- Budgeting for and purchasing upgrades to existing equipment and software
- Keeping up with new technology to allow the division to stay current with industry developments
- Working with staff to resolve hardware and software issues in a timely manner
- Managing the network for the division which includes backing up servers and day-to-day, week-to-week, and month-to month maintenance
- Programming in-house applications for use in the division
- Loading pavement management condition data every two years
- Helping to diagnose and repair division nondestructive testing equipment and computers
- Maintaining Research Division intranet website and support for research related postings on MDOT's "GoMDOT" webpage

Cost Estimate for FY 2011

Salaries (Regular Employees)	$73,912
Employee Benefits	$27,895
Materials, Supplies, and Services	$3,193
Travel and Sustenance	$3,000
Conference Registrations	$2,000
Total	$110,000

MISSISSIPPI SPR-1(59)

LINE ITEM 7 STATE STUDY NUMBER: N/A

TOTAL STUDY BUDGET: $25,000 TOTAL STUDY COST TO DATE: $0

DATE STARTED: 10/01/09 COMPLETION DATE: 09/30/10

STUDY TITLE: **Minor Research Studies**

RESEARCH AGENCY: MDOT Research Division

PRINCIPAL INVESTIGATOR: James C. Watkins

Objective:

Low cost/short duration projects may be done without being put into a process of clearances and competing with other programs. An example of such a project is an experimental feature evaluation.

The Research Advisory Committee will establish a resource threshold to be met before requiring any project be put into a centralized clearinghouse/priority setting process. Current operating procedures are to conduct research projects where the expenditure ceiling is expected to be under $10,000 and the project duration is expected to be one year or less.

These are based on selection and approval by the Research Engineer, following an appropriate review of District needs and literature review.

Additionally, support for national efforts coordinated by organizations such as AASHTO, will be funded by this line item.

Cost Estimate for FY 2011 $25,000

MISSISSIPPI SPR-1(59)

LINE ITEM 8	STATE STUDY NUMBER: 170
TOTAL STUDY BUDGET: $907,663	TOTAL STUDY COST TO DATE: $604,419
DATE STARTED: 03/01/04	COMPLETION DATE: 06/30/12
STUDY TITLE:	**Implement the 2002 Design Guide for MDOT (Phase II)**
RESEARCH AGENCY:	Applied Research Associates, Inc.
PRINCIPAL INVESTIGATOR:	Chetana Rao

Objective:

Applied Research Associates, Inc. is finalizing the development of the Mechanistic-Empirical Pavement Design Guide (MEPDG) for Design of New and Rehabilitated Structures through NCHRP Project 1-37A. The MEPDG incorporates mechanistic-empirical 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 Design Guide 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 current procedure
- Develop and execute a plan for calibration of Guide performance and distress models

Progress:

FY 2005:

Work on project tasks was slowed at MDOT's request in anticipation of recommendations from NCHRP Project 1-40 which is reviewing NCHRP 1-37A deliverables. However, work continued, especially on those tasks not affected by NCHRP 1-40. The following tasks have either been completed or progress made during this FY:

- Preliminary sensitivity analysis is completed
- Completed establishment of materials and traffic estimation procedures and default values
- Progress made on performing detailed sensitivity analysis of Design Guide software
- Progress made on setting up a laboratory and field testing program
- Progress made on finalizing the selection of pavement sections for use in calibrating/validating the design guide performance models
- Progress made on preparing a Phase II Interim report that documents the research results for FYs 04 and 05 and will provide a detailed research plan for the next 24 months.

FY 2006:

Either the following tasks have been completed or progress made during FY 06:

- Project staff attended the December 2005 NCHRP 1-40 meeting in Washington, D.C.
- Subgrade material tests were completed including tests on materials sampled for MDOT SS 179 and ARA reviewed the resulting test results.
- Continued to coordinate and acquire pavement inventory and performance data for subsequent calibration/validation of the MEPDG performance models. Work directly related to actual calibration/validation of these models has been suspended or slowed at the request of MDOT to ensure incorporation of the latest NCHRP 1-40 results.

FY 2007:

Work continued on project tasks that were not directly impacted by the delay in NCHRP 1-40. These included developing a procedure to determine the suitability of pavement performance data for local validation and calibration of MEDPG distress models. The procedure was used to determine the suitability of new pavement sections for local calibration and validation of distress models. The procedure and analysis results were documented in the form of a technical

memorandum and submitted to MDOT. The project team also reviewed NCHRP 1-37A and 1-40 recommendation and current research to determine state-of-the-art in testing stabilized base/subbase materials. The review results were used to finalize the test procedure to use for testing of stabilized materials. We also continued coordinating, acquiring and reviewing pavement inventory and performance data on selected pavement sections.

Laboratory testing of candidate materials to develop material libraries continued with the assistance of Burns Cooley Dennis (BCD), Inc. During FY07, BCD completed resilient modulus testing for all subgrade samples. Tests on granular (base/subbase) materials were also initiated. Work on granular materials included coordinating with districts to select representative materials, acquiring representative materials and initiating testing.

Fifteen material types were selected based upon comments from MDOT district materials engineers. During FY07, six of the materials were obtained and tested.

FY 2008:

A majority of the project activities was related to task 7 and task 9, which have been defined as:

- Task 7: Select pavement sections to be used in the validation and local calibration process,
- Task 9: Assemble data for validation and calibration of MEPDG performance prediction models

These tasks are being conducted simultaneously for efficiency and have involved a great deal of coordination and communication with MDOT staff. ARA reviewed the distress data elements in the MDOT pavement condition databases and provided a format for MDOT to provide pavement performance, layer design, and construction activity schedules. ARA received and organized MDOT data for new flexible pavements; new rigid pavements, composite overlay flexible pavements, and overlay rigid pavements. By the end of FY 2008, ARA will complete the following:

1. Review the data for completeness and quality.
2. Prepare list of sections that show reliable, consistent, and predictable performance data trends over time (i.e., distress does not decrease with time or waver over time) so that MDOT can retrieve materials and construction data for sections in the list.
3. Evaluate materials and construction data received and exclude sections without vital materials data will be excluded for further data collection.

In addition other administrative issues were addressed including the transition to the new key project staff from ARA.

FY 2009:

A majority of the project activity was related to the following tasks of the project:

- Task 7: Select pavement sections to be used in the validation and local calibration process,
- Task 9: Assemble data for validation and calibration of MEPDG performance prediction models
- Task 12: Recommend input levels needed for design inputs
- Task 15: Prepare final project report and design manual

These tasks are being conducted simultaneously for efficiency and have involved a great deal of coordination and communication with MDOT staff. ARA reviewed the distress data elements in the MDOT pavement condition databases and selected candidate sections that cover all the pavement types identified for use in the calibration of the distress models.

1. Review the data for completeness and quality.
2. Prepare list of sections that show reliable, consistent, and predictable performance data trends over time (i.e., distress does not decrease with time or waver over time) so that MDOT can retrieve materials and construction data for sections in the list.

MDOT is currently assisting ARA with the collection of materials and construction data so that only those sections with all necessary information can be included in the calibration database. MDOT is collecting data in a format provided by ARA. During the collection of data by MDOT, ARA has assisted MDOT staff by responding to several questions regarding data necessary for the MEPDG and significance in the overall performance models, traffic inputs, etc. In addition, ARA has also extracted data from LTPP database to collect information on Mississippi sections and those in the neighboring states.

ARA has prepared preliminary drafts of the Design Manual and Software Implementation Guide that has been reviewed by MDOT.
ARA has fully executed the subcontract with BCD, Inc. for the testing of granular subbase, chemically stabilized base, and subgrade materials. A final report has been received by ARA along with the test data. Likewise, ARA has fully reviewed the material test data and reports prepared by Mississippi State University and The University of Mississippi for testing HMA and PCC materials.
In addition other administrative issues were addressed. The PI has met with MDOT during FY 2009 to discuss technical issues on this project including those aspects relevant to modifications that can be made to the software. ARA has also prepared and responded to MDOT as needed towards a contract modification to extend the time and budget for this study.

FY 2010:

A majority of the project activities in FY 10 is for the following tasks

- Task 7: Select pavement sections to be used in the validation and local calibration process (after review of construction, materials, and traffic data)
- Task 9: Assemble data for validation and calibration of MEPDG performance prediction models
- Task 10: Back-Calculation of elastic layer moduli from FWD deflection basins
- Task 11: Validation and calibration of the MEPDG performance prediction models.
- Task 12: Recommend input levels needed for design inputs
- Task 13: Evaluate design results using Mississippi calibrated models
- Task 14: Develop training materials and train DOT personnel
- Task 15: Prepare final project report and design manual

ARA expects that tasks majority of these tasks will be initiated in FY 09 and completed in FY 10 pending the availability of construction, materials, and traffic data from MDOT in a timely manner.

Cost Estimate for FY 2011 $190,767

MISSISSIPPI SPR-1(59)

LINE ITEM 9 STATE STUDY NUMBER: 171

TOTAL STUDY BUDGET: $350,000 TOTAL STUDY COST TO DATE: $226,898

DATE STARTED: 03/01/04 COMPLETION DATE: 06/30/12

STUDY TITLE: **In-House Support to State Study 170**

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: William F. Barstis

Objective:

This study will be conducted to support the proposed study "Implement the 2002 Design Guide for Mississippi DOT." The construction, traffic and materials data will be obtained for approximately 132 existing pavement sections. In addition to this data, pavement coring and FWD testing will be required for 24 of these pavement sections. Coordination between the six District Materials Engineers, the MDOT Central Laboratory and the private testing firm will be required to ensure that the requisite materials testing is conducted on representative samples of subgrade soils, crushed rock base course materials and chemically stabilized soil materials. Review the input/output data related to the customized Mechanistic-Empirical Design Guide software as well as the developed training materials including courses, seminars and manuals that will be delivered to MDOT as a result of the referenced study.

Progress:

FY 2005:

Pavement performance data was provided to the principal investigator of SS No. 170 for numerous pavement sections located throughout the state. Collection of requisite MDOT construction and materials data for several of these pavement sections was performed and the data submitted to the principal investigator. Several coordination meetings were held to support this data retrieval and submission process.

FY 2006:

We continued to collect requisite data for calibration/validation of performance models.

FY 2007:

The work performed included the development of distress data in an Excel spreadsheet acceptable by ARA. The construction, traffic and materials data for many of these sections were also obtained and delivered to ARA. In addition to data collection some of the work included review of multiple reports and following recent developments in the M-E PDG software.

FY 2008:

MDOT completed submission of current and historical data from relevant pavement condition surveys to ARA. Construction records were sent for many original asphalt pavement structures for review by ARA. Work also included the review of multiple reports and studies pertaining to the development, calibration and implementation of the ME-PDG.

FY 2009:

The work completed by MDOT included the submission of data from relevant pavement condition surveys to ARA. Much of this year's efforts revolved around extracting relevant data from microfilm records. All currently available microfilm has been scanned. In addition to these roadway sections, multiple PCC sections located outside the state of Mississippi were reviewed for use in the calibration effort. MDOT also began efforts in obtaining traffic data for the relevant sections located throughout the State.

FY 2010:

Work for the next FY shall include the continuation of submitting construction and traffic records for all pavement structures. In addition, MDOT will begin to conduct field testing of rehabilitated pavement structures throughout the state. Work may also include the submission of more data from condition surveys as more become available.

Plans for FY 2011:

Work for the next FY shall include the continuation of submitting construction and traffic records for all pavement structures. In addition, MDOT will begin to conduct field testing of rehabilitated pavement structures throughout the state. Work may also include the submission of more data from condition surveys as more become available.

Cost Estimate for FY 2011 $123,101

MISSISSIPPI SPR-1(59)

LINE ITEM 10 STATE STUDY NUMBER: 180

TOTAL STUDY BUDGET: $90,000 TOTAL STUDY COST TO DATE: $70,836

DATE STARTED: 10/01/05 COMPLETION DATE: 12/31/10

STUDY TITLE: **Evaluation of Pavement Marking Materials**

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: Cindy Smith

Objective:

Current MDOT policy requires that products to be used on construction and maintenance projects come from the Departmental "Approved Products List". Additionally in order for the Department to obtain Federal participation on projects, all products must have an approved equal (i.e., no sole source products).

Safety has long been a priority for MDOT and with that in mind the Department is constantly exploring methods and products that will improve visibility for motorists both at night and during wet conditions. In order to evaluate new striping materials, MDOT has received formal experimental feature approval (in accordance with 23 CFR 635.411(a)(3)) from the Mississippi Division Office of FHWA on the following four projects to date:

1. MS 304 from US 61 to I-55 and Spur (MS 713), Desoto & Tunica Counties
2. US 49 from US 98 South to Black Creek, Forrest County
3. Interchange at US 61 and Liberty Road, Adams County
4. I-55 from Pearl Street to I-220, Hinds & Madison Counties

The performance of each of the experimental features incorporated in these projects (and any future approved pavement marking evaluations) will be separately documented and reported to interested agencies as well as the AASHTO Product Evaluation Listing (APEL) through technology transfer procedures already in place within MDOT's Research Division. This study will fund the collection and dissemination of data resulting from these evaluations. Additionally should these evaluations prove to be successful it will enable the approval of more products for the Departmental "Approved Product List" and enable Federal participation on more projects utilizing these products.

Progress:

FY 2006:

The Adams County (Liberty Road Interchange) project had the 3M temporary tape applied and MDOT Research Division documented the application of this tape and began monitoring the retroreflectivity and durability of this tape.
The division measured the retroreflectivity and durability of previously placed inverted profile stripe (Gulfline) on concrete pavements throughout the state.

FY 2007:

Construction was completed for three projects during this fiscal year, (I-55, SR 304, 713 Spur). The striping was tested for all of these projects along with US 61 and US 49. The final test was completed for US 61.

FY 2008:

MDOT continued to monitor the reflectivity and durability of the pavement marking material on the following projects:

- MS 304 from US 61 to I-55 and Spur (MS 713), Desoto & Tunica Counties
- US 49 from US 98 South to Black Creek, Forrest County
- I-55 from Pearl Street to I-220, Hinds & Madison Counties

All projects were tested twice during the past year. It addition to these projects, the striping material on US 82 on Oktibbeha County was tested at the request of Melinda McGrath.

FY 2009:

MDOT continued to monitor the reflectivity and durability of the pavement marking material on the following projects:

- MS 304 from US 61 to I-55 and Spur (MS 713), Desoto & Tunica Counties
- US 49 from US 98 South to Black Creek, Forrest County
- I-55 from Pearl Street to I-220, Hinds & Madison Counties

All projects were tested during the past year. It addition to these projects, the striping material on US 82 on Oktibbeha County was tested at the request of Melinda McGrath. Testing was completed for the US 49 test section.

FY 2010:

The proposed work for FY 2010 is the continued testing of the following projects:

- MS 304 from US 61 to I-55 and Spur (MS 713), Desoto & Tunica Counties
- I-55 from Pearl Street to I-220, Hinds & Madison Counties

This study should be completed within this fiscal year.

Plans for FY 2011:

We will finish collecting data on I55, and we will notify FHWA of the final results.

Cost Estimate for FY 2011 $4,000

MISSISSIPPI SPR-1(59)

LINE ITEM 11	STATE STUDY NUMBER: 181
TOTAL STUDY BUDGET: $100,000	TOTAL STUDY COST TO DATE: $73,573
DATE STARTED: 10/01/05	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Structural Characterization of Asphalt Drainage Course Layers**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	L. Allen Cooley, Jr.

Objective:

Asphalt Drainage Courses (ADCs) are generally required under all 4-lane facility flexible pavements in Mississippi. Within typical pavement sections, ADCs are placed over a stabilized granular soil base layer. MDOT is currently funding studies to implement the new Mechanistic-Empirical Pavement Design Guide (MEPDG). Within this new design guide all layers of the pavement structure are evaluated for fundamental engineering properties such as modulus and Poisson's Ratio. The proposed study includes three objectives:

1. Properly characterize the stiffness (modulus) of ADC materials.

2. Develop appropriate transfer functions for ADC materials. MDOT uses the Falling Weight Deflectometer (FWD) to characterize the structural capacity of in-place pavements that are scheduled for overlay. Data developed from FWD testing is input into ELMOD 5 for evaluating determining required thickness of overlay. To facilitate analysis using ELMOD 5 typical moduli values of ADC materials (objective 1) are required along with appropriate transfer functions.

3. The current MDOT flexible pavement design procedure does not assign a structural value (layer coefficient) to ADCs. The new MEPDG allows the contribution of the 4 inches of asphalt binder stabilized aggregates to the overall structural integrity of the pavement. Possible elimination of the underlying chemically stabilized soil base course could be realized if the drainage layer is shown to be structurally equivalent to the stabilized base layer, leading to a savings in pavement construction. The results from the first two objectives will be used in the MEPDG to perform this evaluation.

Progress:

FY 2007:

Six aggregates were identified and sampled. These aggregates included three limestone sources, a granite source, a sandstone source and a gravel source. The limestone aggregates were from Calera, AL; Reed, KY; and Vicksburg, MS. The granite is from Columbus, GA; the sandstone is from Delaware, AR; and the gravel is from Picayune, MS. A sample from the No. 57 stockpile was collected from each source, except for the gravel. For the gravel source, the oversize material and a ¾-screen material were blended to create a gradation that meets the No. 57 stockpile gradation. Aggregate property testing was performed on each source. After aggregate testing was completed, each source was combined with one percent lime and either 2.1 or 2.5 percent asphalt binder per the Asphalt Drainage Coarse specification found in the Mississippi Standard Specifications for Road and Bridge Construction, Section 306. Three ADC samples per aggregate were compacted using a static load to simulate the field "seating" of the ADC mixture. Each of the samples was tested for modulus at 40, 60 and 80 degrees F at a deviator stress of 2, 5, 10 and 15 psi. These stresses were chosen after analyses to determine stresses at depth on a typical MDOT pavement structures using ADC. Besides the laboratory testing, a literature review has been performed on the current state of the practice of using ADC as structural layers. The data presented from the laboratory has been organized and reduced and some analysis has been conducted.

FY 2008:

Modulus testing of all asphalt drainage course materials was completed. Also during the last year, the scope of the project was modified slightly. Instead of targeting a transfer function to be used with ELMOD5, analyses will be conducted in order to develop remaining service lives for asphalt drainage course materials based upon results of falling weight deflectometer testing.

The initial contract expired for the project on December 31, 2007 due to an oversight by the consultant; therefore, the project deliverables were not completed by this date. No additional work was completed during the last three quarters of FY 08.

FY 2009:

No work was performed during the first three quarters of FY 09 because no contract was in place. A new contract was developed to complete this study with a Notice to Proceed (NTP) issued during the fourth quarter of FY 09.

From the NTP date to the end of the fourth quarter computer based mechanistic analyses were performed to determine the range of vertical stresses expected at the top of the asphalt

drainage course under normal traffic loadings. Researchers worked with MDOT to locate pavement sections for coring to obtain samples of in-place asphalt drainage courses.

FY 2010:

The researchers will core the selected pavements to obtain samples of asphalt drainage courses. Repeated load triaxial tests will be conducted on selected field and laboratory samples to compare results between the field and laboratory test values. The researchers will analyze the data to determine whether a relationship exists between applied vertical stresses and the onset of permanent deformation. This relationship will then be utilized in an effort to develop remaining service life estimates for use with FWD results. The laboratory modulus values will also be utilized for use with FWD results within the Mississippi ELMOD 5 program for backcalculating in-place modulus values. A final report will be compiled following MDOT guidelines that document the findings, conclusions and recommendations generated from this study.

Plans for FY 2011:

The project will be finished and the final report provided to MDOT.

Cost Estimate for FY 2011 $26,424

MISSISSIPPI SPR-1(59)

LINE ITEM 12	STATE STUDY NUMBER: 184
TOTAL STUDY BUDGET: $218,224	TOTAL STUDY COST TO DATE: $67,421
DATE STARTED: 10/01/05	COMPLETION DATE: 09/30/14
STUDY TITLE:	**Long-Term Field Monitoring and Performance of Paving Fabric Interlayer to Reduce Reflective Cracking**
RESEARCH AGENCY:	Jackson State University
PRINCIPAL INVESTIGATOR:	Farshad Amini

Objective:

The conclusions and recommendations from Phase I State Study No. 174, Potential Applications of Paving Fabrics to Reduce Reflective Cracking, substantiated the development of this project. The primary objective is to conduct long-term monitoring of the performance of a flexible pavement which includes a paving fabric between the in-situ pavement and an HMA overlay. A comprehensive testing, monitoring, and analysis program is proposed, where twelve 500-ft pavement test sections are constructed on an existing two-lane highway, 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 will be reported. In addition, a cost-benefit analysis will be performed to develop total life cycle costs for each section. This project, by accomplishing the above objectives, will provide a fundamental understanding of the behavior of paving fabric systems to reduce reflective cracking, and will offer practicing engineers a valuable alternative for more effective schemes during pavement rehabilitation strategies.

Progress:

FY 2007:

The test site was selected. A site visit was conducted to examine the initial conditions. FWD testing was performed on the road for the test sections. A crack survey was done on the existing pavement of all test sections before milling, sealing, or overlay placement. The distress data

collection is generally in accordance with the "Distress Identification Manual for the Long-Term Pavement Performance Project, SHRP-P-338". Full depth coring was done on the existing pavement of all test sections before milling, sealing, or overlay placement. The specifications for the installation of the paving fabric sections were modified and finalized. The construction of the paving fabric sections included a test section, and the 12 research sections. The construction process was closely monitored. The monitoring including quality control during construction to ensure that the paving fabric systems have been installed in accordance with the specifications.

FY 2008:

A comprehensive construction report indicating the results of the test section, the 12 research sections, process during quality control, the equipment, testing, and the lessons learned and recommendations was prepared. The initial crack survey analysis was also completed during this year.

FY 2009:

The first annual survey was completed. One paper titled "Lessons Learned from Construction of Paving Fabric Systems to Reduce Reflective Cracking in Pavements" was presented at the Mississippi Transportation Institute (MTI) Conference held in Choctaw, MS in October 2008.

FY 2010:

The second annual survey was completed and analyzed during this year. The distress data collection was in accordance with the “Distress Identification Manual for the Long-Term Pavement Performance Project, SHRP-P-338” (SHRP, 1993). The data is used to determine the effectiveness of the paving fabric systems. Quarterly progress reports were submitted.

Plans for FY 2011:

The third annual crack survey will be completed and analyzed during this year. The distress data collection will generally be in accordance with the “Distress Identification Manual for the Long-Term Pavement Performance Project, SHRP-P-338” (SHRP, 1993). The crack data from the prior preconstruction crack survey will be compared to the subsequent annual crack data. This will be done to evaluate the effectiveness of the paving fabric systems to reduce reflective cracking. Quarterly progress reports will be prepared.

Cost Estimate for FY 2011 $2,400

MISSISSIPPI SPR-1(59)

LINE ITEM 13	STATE STUDY NUMBER: 185
TOTAL STUDY BUDGET: $30,000	TOTAL STUDY COST TO DATE: $14,752
DATE STARTED: 10/01/05	COMPLETION DATE: 09/30/14
STUDY TITLE:	**In-House Support to State Study No. 184 - Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking**
RESEARCH AGENCY:	MDOT Research Division
PRINCIPAL INVESTIGATOR:	Cindy Smith

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:

1. FWD field testing and evaluation of requisite overlay of proposed pavement for inclusion in Phase II study.
2. 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.
3. Mapping of cracks on the video logs for submission to Jackson State University.
4. Traffic control will be required to facilitate FWD testing by MDOT and pavement coring operations by Burns, Cooley, & Dennis, Inc.
5. Review of one construction report, three progress reports, and one final report.

Progress:

FY 2007:

A crack survey was done on the existing pavement of all test sections before milling, sealing, or overlay placement. MDOT used the profiler to collect crack data and review the data. The

distress data collected was in accordance with the "Distress Identification Manual for the Long-Term Pavement Performance Project, SHRP-P-338" (SHRP, 1993).

The construction process was monitored for the research sections. An initial crack survey was performed of the test sections using the MDOT profiler immediately following completion of construction.

FY 2008:

MDOT collected data for the third survey of the research sections. In addition to collecting the third set of data, MDOT continued to map all distresses from the first, second and third surveys and submitted the results to JSU. The first draft of the construction report was completed by JSU and reviewed by MDOT during the past fiscal year.

FY 2009:

MDOT collected data for the third survey of the research sections. In addition to collecting the third set of data, MDOT continued to map all distresses from the surveys and submitted the results to JSU.

FY 2010:

Collect the data for the annual survey and submit same to JSU.

Plans for FY 2011:

We will continue to monitor the site and collect data and submit the data to JSU.

Cost Estimate for FY 2011 $3,811

MISSISSIPPI SPR-1(59)

LINE ITEM 14	STATE STUDY NUMBER: 186
TOTAL STUDY BUDGET: $20,400	TOTAL STUDY COST TO DATE: $19,251
DATE STARTED: 10/01/05	COMPLETION DATE: 12/31/14
STUDY TITLE:	**Consultant Support to State Study No. 184 - Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	Randy Ahlrich

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:

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

Progress:

FY 2007:

Full depth coring was done on the existing pavement of all test sections before milling, sealing, or overlay placement. One full-depth core was extracted from all test sections except for the 2 control sections. 3 full depth cores were extracted from each of the 2 control sections. BCD also monitored the construction process for the research sections.

FY 2008:

BCD reviewed draft of construction report prepared by JSU. No other work was performed this year.

FY 2009:

No work performed during FY 09.

FY 2010:

No work is scheduled for this upcoming year.

Plans for FY 2011:

No work is planned for FY2011.

Cost Estimate for FY 2011 $0

MISSISSIPPI SPR-1(59)

LINE ITEM 15	STATE STUDY NUMBER: 206
TOTAL STUDY BUDGET: $239,703	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/07	COMPLETION DATE: 12/31/13
STUDY TITLE:	**Performance Specification for Chemically Stabilized Layers**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Isaac Howard

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:

FY 2008:

During FY 2008 no meaningful activities were performed on this project. Recent events have caused significant priority shifts within MDOT related to new construction, primarily material costs. This project requires a full scale test section, and therefore has been temporarily tabled at the consent of the MDOT Research Division.

FY 2009:

Work accomplished during FY 09 dealt with planning of test data to be collected in companion studies. This project is intended to use data collected by other entities and use the data toward the goal of development of a draft performance specification. Other efforts focused on literature review and preliminary investigation.

FY 2010:

Progress was minimal during this period. The project was intended to begin with test data obtained from other sources, which did not end up being available. As a result, the majority of the intended project time allotment was used waiting for test data. In the spring of 2010, discussion began related to re-working the project scope to obtain test data. Progress in this regard progressed through the summer of 2010 by sending project members to the MDOT Materials Laboratory to learn the methods used by MDOT to collect existing data. The existing database of soil cement mix designs was obtained for investigation to allow selection of representative materials for use in laboratory testing of soil cement. Initial calorimetry work was performed to begin the process of selecting equipment and methods to attempt to measure maturity in soil cement for use in specifications. Suitable material samples were identified.

Plans for FY 2011:

Efforts planned will focus primarily on material processing, calorimetry, and unconfined compressive strength testing. The ability to measure maturity properties of soil cement mixtures and subsequently correlate them to strength gain will dictate the direction of the work thereafter. Various equipment packages, specimen sizes, data collection resolutions, and similar are envisioned to be performed during the period in conjunction with calorimetry. Prior to significant laboratory efforts, the PI plans to meet with MDOT Research Engineers and discuss the modified scope of work and determine the amount and type of initial laboratory testing to perform. During the early portion of this time period the PI would like to request a no-cost time extension to September 30, 2013. This amount of time will provide on the order of 36 months to work on the project as originally proposed.

Cost Estimate for FY 2011 $60,000

MISSISSIPPI SPR-1(59)

LINE ITEM 16	STATE STUDY NUMBER: 207
TOTAL STUDY BUDGET: $135,000	TOTAL STUDY COST TO DATE: $53,240
DATE STARTED: 10/01/07	COMPLETION DATE: 09/30/11
STUDY TITLE:	**Open Graded Friction Course for HMA Pavements**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Tom White

Objective:

Open Graded Friction Courses (OGFCs) decrease hydroplaning potential, spray, noise and underlying pavement temperature. Because of relatively high annual rainfall in the state, use of OGFC would significantly reduce hydroplaning potential, which is a major safety issue in Mississippi. Additional beneficial functions are reduction in spray, noise and underlying pavement temperature.

Research is proposed that will provide comprehensive tests, data, material evaluation, and performance results for OGFC. As a result, MDOT will be in a position to make decisions on broad application of OGFC through out the state with respect to allowing materials, verification of mix design criteria, safety (hydroplaning and spray), noise and contribution to pavement structural capacity. Testing will be conducted in both the laboratory and the field. Field testing is proposed for test sections strategically located as to site and materials representative throughout Mississippi.

Progress:

FY 2008:

There was finalization of the technical advisory committee and coordination with the committee on scope of work. A preliminary review of literature was accomplished to identify material types, specifications and mix design methods for open-graded friction courses (OGFC) coarser than used by the Mississippi Department of Transportation (MDOT) and for OGFC with rubber added

to the mixture. The Florida Department of Transportation (FLDOT) was identified as having significant experience with a coarser OGFC and OGFC with rubber added.

Contact has been made with the FLDOT State Materials Engineer to clarify several points relative to their use of OGFC. These discussions are continuing. Aggregates and gradations have been identified for laboratory testing and mix designs. Sources of asphalt and rubber have also been identified. Bulk samples of all materials have been requested. Mix designs were initiated.

FY 2009:

A literature review was initiated and contacts made with other state DOTs and industry representatives to gather information on OGFC aggregate gradations, binder specifications and construction standard practice.

Current literature has been reviewed relative to scales of noise and equipment for noise measurement. This review indicated there has been significant advancement in equipment for measuring and recording noise and software for noise analysis. As a result, a number of vendors have been contacted to obtain information and specifications on appropriate equipment and software. Prices for equipment purchase or rental have been requested. A request is being prepared to modify the project budget to rent or purchase the equipment.

Target OGFC gradations have been met with stockpile aggregates obtained for the study. Binder samples have also been obtained. Inquiry was made with MDOT as to possible test sections for this calendar year.

FY 2010:

The literature review chapter has been completed. Work was initiated on material and test plan chapters. Draft recommendations have been prepared for modifications to include rubber modified asphalt binder and MDOT 12.5 mm OGFC gradation and a 12.5 mm-Coarse OGFC gradation. Requirements for the rubber modified binder and 12.5 mm-Coarse OGFC gradation were modeled after FLDOT specifications. Binders included in the study are a PG 67-22 that is blended with rubber and a polymer modified PG 76-22 obtained from the same supplier. In the initial material test matrix, tests were proposed with a PG 76-22 blended with rubber. This was found not to be feasible because the resulting binder would not be workable. The PB 76-22 blended with rubber option will not be considered further.

Arrangements have not been made for field noise measurement equipment. The planned test section was not constructed. Options to access the equipment include renting, purchase new, and purchase demonstration units. Which option would be available would depend on when the test section is built. Short term rental could be most viable option.

As part of OGFC laboratory evaluation, laboratory equipment and protocol are being developed to use the field falling head permeability device applied in SS 201. The apparatus has been completed and preliminary tests conducted. Specimen geometry for the tests consists of a 19 to 25 mm OGFC cap compacted on a previously compacted dense core. A preliminary number of gyrations in the Superpave gyratory compactor have been identified. Sensitivity studies of the results to the test are continuing.

Plans for FY 2011:

Specimens will be prepared to conduct laboratory tests for permeability, texture, stripping, noise, dynamic modulus, shear strength, and interface bond strength. Depending on a decision to construct a test section field noise measuring equipment will be obtained and used to evaluate their noise characteristics relative to dense graded HMA surfaces.

Cost Estimate for FY 2011 $100,515

MISSISSIPPI SPR-1(59)

LINE ITEM 17	STATE STUDY NUMBER: 208
TOTAL STUDY BUDGET: $275,000	TOTAL STUDY COST TO DATE: $101,068
DATE STARTED: 10/01/07	COMPLETION DATE: 12/31/11
STUDY TITLE:	**Effect of Coarse Aggregate Cleanliness & Moisture Content on HMA Performance**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Isaac Howard L. Allen Cooley, Jr.

Objective:

There are two issues that are related to the use of absorptive, dirty aggregates. The first issue is the potential for moisture damage. Dirty coatings left on aggregate surfaces can prevent the asphalt binder from properly adhering to the aggregates, leading to an increased potential for moisture damage. This is especially true when clayey fines coat the aggregates. Additionally, all of the moisture from highly absorptive aggregates may not be removed during the production process. Moisture remaining within the aggregates will increase the potential for moisture damage. The second issue is that of compactibility of the HMA in the field. Moisture remaining within the aggregates will try to escape the asphalt binder coated aggregates in the form of water vapor. The water vapor acts to extend the asphalt binder making the HMA act like it is over asphalted. When this occurs, the mixture can act very tender under the roller and be difficult to compact.

In order to evaluate the effect of absorptive, dirty aggregates, field projects will be visited. Aggregates from project will be sampled and evaluated for cleanliness using a number of tests to determine the number of adhered fines as well as the activity of those fines. Mixture will be sampled and tested for moisture content and susceptibility to moisture damage. Additionally, the mixtures will be evaluated during compaction to determine the influence of aggregate moisture content on compactability.

Progress:

FY 2008:

The researchers initiated the research project. An e-mail survey of District Materials Engineers was conducted to identify aggregate sources that could potentially be included within the research. Aggregate properties that were important in selecting appropriate materials included cleanliness and absorption. Samples of various aggregates were obtained and tested. Based upon the recommendations of the District Materials Engineers and the test results, four aggregate sources were selected. The PURWheel was re-furbished into nearly operational condition.

FY 2009:

Work accomplished was in a variety of areas including working on development and calibration of laboratory equipment, literature review, identifying suitable aggregate quarries, and sampling materials from one paving project.

Arrangements commenced for testing of adhered fines and scanning electron microscope testing. Preliminary laboratory work was also performed with respect to laboratory measured properties.

FY 2010:

Progress consisted of visiting multiple field sites and collecting a variety of samples from the field sites. Samples included compacted cores, aggregate samples, and similar. Laboratory testing included adhered fines, scanning electron microscope, and wheel tracking. At the end of the period, the majority of the field site visits are complete and some of the laboratory testing and analysis is complete. A small effort has been put forth related to literature review and writing.

Plans for FY 2011:

All field site visits, sample acquisition, testing, analysis, and writing is planned to be complete by September 30, 2011. Originally the project was scheduled to be complete December 31, 2010 but acquisition of samples from suitable field sites has made completion of the work by that data prohibitive. It is envisioned that all field samples will be acquired in 2010, but that the remaining laboratory testing, analysis, and report writing will be performed in 2011. The PI would like to request a no-cost time extension for the project to September 30, 2011 in the early stages of this time period.

Cost Estimate for FY 2011 $100,000

MISSISSIPPI SPR-1(59)

LINE ITEM 18 STATE STUDY NUMBER: 210

TOTAL STUDY BUDGET: $59,544 TOTAL STUDY COST TO DATE: $18,779

DATE STARTED: 10/01/08 COMPLETION DATE: 06/30/11

RESEARCH AGENCY: Jackson State University

PRINCIPAL INVESTIGATOR: Feng Wang

Objective:

The proposed research will address the possible emergency evacuation needs for the greater Jackson area of Mississippi. This research will study the feasibility of applying the new generation dynamic traffic assignment (DTA) based traffic-network planning and simulation model, DYNASMART-P, in developing and evaluating emergency evacuation strategies to assist implementation of intelligent transportation system (ITS) functionalities. These functionalities will improve emergency preparedness, mitigation, response and recovery capabilities for this area of Mississippi. This study will also enable MDOT to verify viable emergency traffic control strategies and facilitate the implementation of ITS technologies in major highway corridors in the state.

Progress:

FY 2009:

A project kick-off meeting was held for the researchers to talk with MDOT engineers who are familiar with emergency evacuation management, highway construction project, and intelligent transportation system. We inquired for the freeway network and traffic demand data from the Central Mississippi Planning & Development District (CMPDD). Using the transportation software TransCAD, the GIS dataset for three counties of Rankin, Hinds, and Madison obtained from MDOT Transportation Planning Division was converted from its original format to the format that can be used in the DynaSmart program. The highway network models for the above three counties then were established in the DynaSmart program. 24-hour traffic volume data on different highways were provided by MDOT and some other important traffic volumes were manually counted using MDOT camera video information on web. Using the "Jackson 2010 Phase Final Origin-Destination Matrix" data provided by MDOT, simulation runs on normal

condition were conducted and the simulation results were compared with observed traffic flow data in order to calibrate the network model and traffic demand. Manual examinations were made according to MDOT published highway maps, information from Google Earth/Maps, and data collected in field trips in order to ensure the accuracy and validity of road networks built in the DynaSmart program. Based on assumed evacuation scenario, the classic gravity model was chosen and applied to distribute evacuation production/attraction trips on the network model by the program TransCAD in order to calculate evacuation OD demand matrix. Initial simulation results were shown to MDOT traffic engineers and emergency evacuation experts in project meetings, and feedbacks obtained accordingly.

FY 2010:

In the 4th quarter of 2009, (1) Worked with Mr. Acey Roberts, Project Monitor, Mr. Larry Fisher, Hinds County Director of Homeland Security Emergency Management, and Mr. Robert Chapman, State Transportation Emergency Coordinator to develop a new evacuation scenario in which a spill of hazardous material (e.g. chlorine) in Jackson downtown as a freight train derailed at the railroad yard near 2567 N. Mill Street, Jackson, MS 39215 was assumed in order to identify bottlenecks in the surrounding roadway network during the evacuation process, and evaluate and optimize the traffic management strategies. (2) Finalized scenario with Mr. Acey Roberts, Project Monitor, and Mr. Wes Dean, State Traffic Engineer, and the Research Advisory Committee (RAC). In the 1st quarter of 2010, (1) Developed simulation experiment plans to test baseline and optimized traffic management strategies under various conditions. (2) Developed initial simulation results and identified congested locations in the highway network during the evacuation process in simulations. In the 2nd quarter of 2010,(1) Identified simulation difficulty in computation capacity and computation time. (2) Tried different approaches including computer memory (RAM) upgrade and new algorithms to deal with the computation difficulty. (3) Added new staff and student to replace the visiting scholar in the research team. (4) Obtained MDOT's approval for a 12 month extension to the project. In the 3rd quarter,(1) Worked with Dr. Xuesong Zhou at the University of Utah, for simulation computing capacity and simulation algorithm issues and possible solution strategies.

Plans for FY 2011:

In the next year,(1) Continue simulation experiments for the evacuation scenario with different computing environments of computer memory sizes and simulation algorithms including DTALite, a computing-efficient program derived from DynaSmart and developed by Dr. Xuesong Zhou. (2) Evaluate different traffic management and traffic control strategies for the evacuation scenario and transportation network. (3) Develop research results and research report.

Cost Estimate for FY 2011 $37,977

MISSISSIPPI SPR-1(59)

LINE ITEM 19	STATE STUDY NUMBER: 211
TOTAL STUDY BUDGET: $330,000	TOTAL STUDY COST TO DATE: $54,427
DATE STARTED: 10/01/08	COMPLETION DATE: 12/31/11
STUDY TITLE:	**Laboratory Testing and Evaluation of Near Surface Properties of Flexible Pavements Due to Bituminous Surface Treatments**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Isaac Howard

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:

FY 2009:

Work accomplished was primarily related to obtain slabs from pavements and subsequently to saw them into cores and other appropriate samples for testing. Vialit testing, viscosity testing, and frosted marble testing made up the majority of the testing performed. The Vialit testing made significant progress and should be completed in the relatively near future. Likewise, the majority of the viscosity testing should be complete in the relatively near future. Preliminary work related to sawing specimens for bending beam rheometer and dynamic shear rheometer testing also occurred alongside preliminary efforts to develop a long term performance test for seal treatments.

FY 2010:

One area of progress consisted of performing significant amounts of viscosity, frosted marble, bending beam rheometer, and sweep testing. Another area of progress was preliminary concept work related to a long term performance test of chip seals using a modified sweeping procedure. A preliminary concept has been developed. Plans have been initiated to obtain cores from field projects within Mississippi for use in development and calibration of the test procedure. Analysis has focused more on viscosity and frosted marble data as this testing has progressed ahead of other testing. Analysis of frosted marble data has indicated a potentially viable approach for evaluating traffic opening using data from frosted marble and sweep testing. Both the frosted marble and sweep tests were performed in the standard manner as well in a modified format.

Plans for FY 2011:

Visiting seal treatment projects and obtained field constructed cores for use in calibrating a long term performance test for seal treatments is an area where significant effort is envisioned. A significant amount of bending beam Rheometer and sweep testing is envisioned during this period. Testing should also occur with the long term performance test including preliminary testing to establish ranges of key parameters and perhaps initial data collection with a preliminary set of equipment and test protocol. A key to the progress will be acquisition of suitable field samples from ongoing seal treatment projects.

Cost Estimate for FY 2011 $100,000

MISSISSIPPI SPR-1(59)

LINE ITEM 20	STATE STUDY NUMBER: 212
TOTAL STUDY BUDGET: $115,000	TOTAL STUDY COST TO DATE: $94,413
DATE STARTED: 10/01/08	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Utilization of RAP in Construction-Phase II:High Rap Surface Course**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Isaac Howard

Objective:

The project will focus on laboratory investigation of high RAP content warm mixed asphalt for use as an overlay material. Material characterization will be the focus of the research, and will include determination of a variety of properties needed for mix design (e.g. stiffness), as well as attempt to modify properties expected to be problematic (e.g. durability and cracking). The project will also attempt to leverage the information obtained from MDOT SS 200.

Progress:

FY 2009:

Work accomplished was primarily related to compaction and testing of 100% RAP specimens incorporating warm mixed additives. Significant amounts of bending beam rheometer specimens were also sawn from compacted gyratory samples. Slabs were produced for friction measurements and were subsequently tested with a dynamic friction tester and a circular texture meter. Data analysis related to evaluation of properties of varying RAP bituminous materials was also performed.

FY 2010:

The majority of the needed laboratory testing occurred during this period. All friction testing has been completed, alongside essentially all testing of 100% RAP to establish the properties of the material in this condition for the purpose of characterization. With exception of minor amounts

of additional testing warranted by analysis, all PURWheel, APA, moisture damage, dynamic modulus, durability, and cracking test data has been collected. The data collected has been analyzed to a moderate extent, though the focus to date has been largely on collecting the large amount of test data required for this project. The data provided by MDOT related to existing mix designs and practices has been partially analyzed. The final report has been started.

Plans for FY 2011:

The majority of the analysis should be performed in October and November alongside the majority of the writing of the technical report. The remaining work on the technical report will be completed in December.

Cost Estimate for FY 2011 $56,200

MISSISSIPPI SPR-1(59)

LINE ITEM 21	STATE STUDY NUMBER: 213
TOTAL STUDY BUDGET: $70,920	TOTAL STUDY COST TO DATE: $40,767
DATE STARTED: 10/01/08	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Performance Evaluation of Roundabouts for Traffic Delay and Crash Reduction Oxford, MS**
RESEARCH AGENCY:	University of Mississippi
PRINCIPAL INVESTIGATOR:	Waheed Uddin

Objective:

This study will evaluate the effectiveness of the roundabout traffic control method for improved traffic flow, reductions of traffic delays and crashes, and enhanced air quality. The project research team will collect post- roundabout traffic volume, delay, and crash data for comparison with the pre- roundabout data. Volume data will be collected during peak flow events such as home football games in the fall of 2009. The pre- and post-construction data will be analyzed using plots, trends, and statistical tests of significance. A public opinion survey on roundabouts will also be performed and included in the project. Benefit and cost analysis will be conducted and results will be presented in GIS visualization and thematic maps.

Progress:

FY 2009:

The study oversight committee members agreed to revise and expand the scope of the work after the first kick-off meeting. The revised work plan includes an opinion survey of the road users and additional traffic data collection. Review of Lamar Blvd project consultant report was initiated. A few meetings were held in the office of the City of Oxford Assistant City Engineer who provided a GIS road map file and crash data from their database files. The data is being processed by the student staff. The graduate student is implementing the newly acquired S-Paramics traffic microsimulation software that will be used in this study.

FY 2010:

Two roundabouts constructed on South Lamar Blvd and Highway 6 Interchange in Oxford replaced a traffic signal at North end and a STOP controlled intersection at South end of the overpass. The overall goal of this study is to assess S Lamar roundabouts' performance with respect to traffic flow, capacity, safety improvements, and public opinion survey. The study involved: collection of on-site traffic data at the study site for all movements and peak hour volume, synthesis and statistical analysis of pre- and post-roundabout crash data, traffic microsimulation to assess the traffic flow attributes, idling and delay time, and vehicle emissions. Tasks 1, 2, and 4, are 100% complete, Task 3 (opinion survey) is 50%, Task 5 is 80%, and Task 6 (final report) is 40% complete. The following specific accomplishments have been achieved: 1) The GIS vector map of Oxford road network with daily traffic volume data was implemented on the GeoMedia Pro GIS including S Lamar and MS Highway 6. The layout plans of both roundabouts (north and south on S. Lamar/MS Hwy 6 interchange) were registered and planimetrics were produced in GeoMedia Pro and exported to the S-Paramics microsimulation software. 2) Traffic flow simulations of the S. Lamar overpass including both junctions were run for pre- and post- construction of roundabouts. Both the highest peak hour volume of manually collected data during the week of October 12, 2009, and the volume predicted for 2016 were simulated. 3) The S-Paramics simulation results show evidence of improved performance after roundabout construction with respect to 18% reduction in average delay per vehicle, 77% reduction in average idling time per vehicle during queues, 46% increase in mean speed, and 77% reduced emissions. 4) Crash data for Oxford were acquired from the Department of Public Safety for 2005-2009, which show statistically significant reduction in post-roundabout period compared to the stop-controlled. Number of crashes reduced 32% and 58% reduction was noted in injury crashes for the study site. 5) Public opinion survey form was revised after the MDOT feedback. 6) The interim report was orally presented and submitted to the MDOT oversight committee.

Plans for FY 2011:

"The following activities are planned until the study period ends on December 31, 2010:1) Public opinion survey form implementation, data collection, and synthesis of responses considering respondent age, familiarity, and favorability. 2) Final results of performance evaluation of the roundabouts.3) Submission of draft final project, review and comments by the oversight committee, and final report to the study sponsor. "

Cost Estimate for FY 2011 $37,616

MISSISSIPPI SPR-1(59)

LINE ITEM 22	STATE STUDY NUMBER: 215
TOTAL STUDY BUDGET: $50,215	TOTAL STUDY COST TO DATE: $12,566
DATE STARTED: 10/01/08	COMPLETION DATE: 09/30/11
STUDY TITLE:	**Integrated Kudzu Control on Mississippi Roadsides**
RESEARCH AGENCY:	United States Department of Agriculture
PRINCIPAL INVESTIGATOR:	Mark Weaver

Objective:

Management of invasive weed species is an ongoing challenge for land managers. Kudzu is among the 10 most common, aggressive and poorly controlled weeds in Mississippi and presently infests over 500,000 acres of private forestland within the state, resulting in annual loss of $54 million dollars in timber sales. While various control options have been documented over the years, there are new, effective, affordable approaches that need to be integrated into a rapid and efficient land management strategy. This study will evaluate an intense, rapid, integrated kudzu eradication program at four locations in Mississippi. Use of herbicides with high selectivity and a biological control agent will allow for simultaneous re-establishment of desirable vegetation, thus providing more long-lasting kudzu exclusion.

Progress:

FY 2009:

The replicated field trials have been established near Coffeeville, MS, in the Holly Springs National Forest to control experimental evaluation of kudzu management tactics. Under evaluation at this test site are two selective, non-restricted-used herbicides; an experimental herbicide; mechanical control (mowing); biological control; and three different integrated control regimens.

Additionally, three other field locations around Mississippi are under ongoing evaluation, which include chemical, biological, mechanical and integrated control techniques. Work towards more efficient production of the biological control agent is underway, and results on improved safety of the bioherbicide were published.

FY 2010:

Excellent control of kudzu was obtained with integrated eradication programs in experimental plots. Additionally, it was demonstrated that desirable, native vegetation can be established concurrent to the kudzu eradication program. These experiments were conducted in triplicate and replicated at three sites in Mississippi in existing kudzu-infested areas including Eden, Mound Bayou and Byhalia. Side-by-side treatments of traditional herbicides, new herbicides and an integrated cultural / mechanical / biological / chemical program enabled assessment of the practicality and efficacy of these eradication strategies.

Plans for FY 2011:

Kudzu control efforts during 2009 and 2010 will be monitored during 2011. The test of kudzu control is the amount of kudzu coming back in the year after treatment, so biomass will be measured from all plots at all locations during 2011. Visual assessments will also be recorded.

Cost Estimate for FY 2011 $16,500

MISSISSIPPI SPR-1(59)

LINE ITEM 23	STATE STUDY NUMBER: 216
TOTAL STUDY BUDGET: $78,300	TOTAL STUDY COST TO DATE: $75,114
DATE STARTED: 10/01/08	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Shrinkage and Durability Study of Bridge Deck Concrete**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	Robert Varner

Objective:

MDOT's water to cement ratio requirement for concrete bridge decks is contributing to excessive shrinkage and cracking. Burns Cooley & Dennis, Inc. (BCD) will work with the MDOT District Materials Engineer in each district to identify the most common sources of aggregates and cementitious materials used in bridge deck concrete in their respective district. BCD will conduct testing on five laboratory mixtures for each district using local materials, including a typical MDOT Class AA mixture and a mixture based on the University of Kansas study. (Note that The University of Kansas study is a pooled fund study of which MDOT is a participant, but does not consider the influence of local Mississippi materials.) BCD will use the other three mixtures to evaluate a 0.50 water to cement ratio with supplemental cementitious material. This study will provide MDOT engineers with data to write specifications that will reduce shrinkage cracking while maintaining durability for concrete in bridge decks.

Progress:

FY 2009:

All materials were sampled and laboratory mixing was completed. Fresh properties and strength data was collected for all mixtures. Shrinkage and permeability data was also periodically collected.

FY 2010:

Work accomplished during this period includes shrinkage measurements and permeability testing. BCD provided MDOT with data updates. BCD also provided a presentation summarizing preliminary results from this study at the ACI Mid-South Chapter Symposium on April 29.

Plans for FY 2011:

Shrinkage and permeability measurements will be completed and a final report will be provided to MDOT.

Cost Estimate for FY 2011 $3,186

MISSISSIPPI SPR-1(59)

LINE ITEM 24	STATE STUDY NUMBER: 217
TOTAL STUDY BUDGET: $225,000	TOTAL STUDY COST TO DATE: $11,177
DATE STARTED: 10/01/08	COMPLETION DATE: 12/31/12
STUDY TITLE:	**Strain Resistant, Extended Performance Pavements, an Alternate to Subdrainag**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Tom White

Objective:

Deterioration or failure of pavement layers below the surface means pavement maintenance or rehabilitation costs will increase significantly. Moisture is one medium contributing to pavement deterioration. The effect can be countered by use of subdrainage systems. However, they increase pavement costs and are exhibiting their own maintenance needs. An alternate pavement type is the perpetual or strain resistant, extended performance pavement. This type of pavement uses a high binder, moisture and strain resistant HMA at the bottom of the pavement structure. Overlying layers are rut and fatigue resistant HMA mixtures.

This study proposes construction of a strain resistant, extended performance pavement test section. Tests, including distress, FWD, smoothness and skid resistance, will be conducted on this test section on a periodic basis. Groups of in service pavements, both with and without subdrainage layers, will also be identified and evaluated for condition, structural capacity, smoothness and skid resistance. Performance of the strain resistant, extended performance pavement will be arrayed against that of the conventional pavements with and without subdrainage systems.

Progress:

FY 2009:

A Technical Advisory Committee (TAC) meeting was held and the scope of work agreed to. The proposal for scope of work and budget was submitted for review and approval. Software to be utilized in the project was obtained and installed.

FY 2010:

There was a delay in starting the project until a graduate student could be associated with the project. With a student identified, the study literature review was initiated. Focus of the literature review was to catalog existing fatigue criteria for conventional flexible and perpetual pavement concepts. The student has also been training on the software to be used in part of the analysis.

As part of the study, a group of pavements in the MDOT inventory will be studied. The benefit is that materials, their combinations and thicknesses will be identified. Their performance based on cataloged fatigue criteria will be evaluated. In addition, an attempt will be made to extract a set of similar test sections for analysis from the Strategic Highway Research Program Long Term Pavement Performance (LTPP) data base.

A list of factors expected to be related to pavement performance was developed. That list consists of drainage, pavement thickness, and traffic. Associated performance indicators are fatigue cracking, rutting, roughness, and pavement stiffness (deflection).

A structure of the potential levels of the factors and performance indicators was proposed in generic terms, i.e. L, M, and H (low, medium, and high) and submitted to the MDOT Research Division. The goal was to begin to define the generic terms based on MDOT's pavement management data base. Subsequently, a meeting was held with both Research and Planning Divisions. As a result of the meeting Research is developing sets of candidate pavement sections.

Plans for FY 2011:

The literature review will continue. An analysis of pavement sets from both MDOT's data base and the LTPP data base w ill be analyses and evaluated on the basis of possible fatigue criteria. Material samples of pavement layers will be obtained and tests conducted.

Cost Estimate for FY 2011 $73,000

MISSISSIPPI SPR-1(59)

LINE ITEM 25 STATE STUDY NUMBER: 218

TOTAL STUDY BUDGET: $40,000 TOTAL STUDY COST TO DATE: $457

DATE STARTED: 10/01/08 COMPLETION DATE: 12/31/12

STUDY TITLE: **In-House Support to State Study No. 217**

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: Matt Strickland

Objective:

This study will provide requisite distress, FWD, smoothness and skid resistance data of the strain resistant, extended performance pavement test section constructed for evaluation in SS No. 217. Collection of similar data will be conducted on in service pavements identified in the referenced study. This support study will also provide assistance for any forensic studies conducted on the test section.

Progress:

FY 2009:

Advisory meetings were conducted for State Study 217.

FY 2010:

MSU met with MDOT's Research and Planning Divisions to discuss identification of candidate sections for this study. Some initial pavement management system data queries were run, and MSU will let us know the pavement sections on which they want traffic count data.

Plans for FY 2011:

Once candidate sections are identified, FWD, smoothness, and pavement condition evaluation will be performed on these sections.

Cost Estimate for FY 2011 $31,634

MISSISSIPPI SPR-1(59)

LINE ITEM 26	STATE STUDY NUMBER: 221
TOTAL STUDY BUDGET: $120,421	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/09	COMPLETION DATE: 12/31/11
STUDY TITLE:	**Evaluation of MDOT's Distress Thresholds for Maintained Pavement Projects**
RESEARCH AGENCY:	Jackson State University
PRINCIPAL INVESTIGATOR:	Feng Wang

Objective:

Establishing warranty criteria and associated distress thresholds to monitor the performance of warranted pavements (maintained projects) is a very important issue that must be resolved. Currently MDOT uses converted deduct points for pavement distresses and the distress thresholds are accumulated deduct points, while many other states use distress indicators and thresholds directly from measurements of pavement distresses or density of distresses. This research will evaluate the effectiveness of using the current MDOT's distress thresholds and investigate new ways of quantifying distress thresholds to monitor the performance of the maintained projects in Mississippi. Through a literature search and a survey study of other states, specifications on performance indicators and associated thresholds used in other states or recommended by expert opinions are reviewed and compared with the practice in MDOT. The validity of using the current MDOT's distress thresholds and any possible adjustment or replacement option will be checked with the performance data saved in MDOT's pavement management system (PMS). Analytical capabilities based on statistical analysis and regression modeling over the PMS performance data will be developed to establish warranty specifications on distress thresholds. Based on the investigation, the research will make suggestions for MDOT to adopt possible new features of the warranty specifications on distress thresholds and how the MDOT PMS database can be used to monitor the performance of maintained projects in the state of Mississippi.

Progress:

FY 2010:

During the last Federal Fiscal (FY) year, the research team has achieved the following major progresses: (1) Collaborated with Dr. Jorge Prozzi at the University of Texas at Austin. Hired Dr. Yan Qi, PE, from Louisiana State University as a research associate and Dr. Amin El Gendy from the University of Manitoba, Canada as a post-doc researcher; (2) Collaborated with MDOT engineers to check the availability and adequacy of PMS data of both warranty and non-warranty projects; (3) Conducted literature review on pavement warranty specifications, distress indicators and thresholds, PMS data and data collection technologies, pavement condition evaluation methods, and pavement warranty practice in Mississippi; (4) Initiated the survey study of the pavement warranty practice of other states. (5) Visited Fugro-Roadware in Austin, TX and communicated with Mr. Doug Chalman to be familiar with automated pavement data collection technology; and (6) Ordered computers and statistics and mathematics programs for the project.

Plans for FY 2011:

The research team will finish the following tasks in the next Federal Fiscal year: (1) conduct the warranty practice survey questionnaire using a web-based approach to distribute the questionnaire to each state and other related agencies, and analyze the survey results to determine the commonly collected distresses types, corresponding thresholds, and pavement condition rating methods; (2) in case of inadequacy of pavement distress data in MDOT's PMS database, work with MDOT engineers for a plan of new data collection, including sample size, equipment, pavement section selection, and distress data types, etc; (3) analyze available pavement distress and performance data of both warranty and non-warranty projects in Mississippi, and develop histograms over time and percentile ranges for distress thresholds for warranty projects; (4) examine the currently used deduct point curve method for pavement condition rating of the warranty projects in Mississippi and make modifications of the deduct point curves if necessary; (5) perform a comprehensive statistical comparison analysis of the manual and automated pavement survey methods, in term of variation, reliability, precision, efficiency, and cost-effectiveness.

Cost Estimate for FY 2011 $60,211

MISSISSIPPI SPR-1(59)

LINE ITEM 27	STATE STUDY NUMBER: 222
TOTAL STUDY BUDGET: $131,217	TOTAL STUDY COST TO DATE: $384
DATE STARTED: 10/01/09	COMPLETION DATE: 12/31/11
STUDY TITLE:	**Best Practices of MDOT's Survey Operation, Organization & Technology Implementation**
RESEARCH AGENCY:	University of Southern Mississippi
PRINCIPAL INVESTIGATOR:	Tulio Sulbaran Andrew Strelzoff

Objective:

The objective of this project is to increase the cost efficiency, timeliness and safety of MDOT surveying activities through the identification of MDOT best practices grounded on: (1) Best operational approach to use a range of surveying technologies, (2) Most effective organizational model/process to best utilize the newest surveying technologies; and (3) Best roll-out strategy which will help MDOT districts move to the most efficient surveying technology.

The result of this project will form a body of knowledge which will be used by policy makers to increase the use of cost and time effective technologies for surveying throughout MDOT.

Progress:

FY 2010:

May 28th 2010: Notice to Proceed
May 29th 2010: Received suggested questions for research survey from TAC
June 1st 2010: Published online Ranking Questionnaire for TAC memebers to begin selecting important questions for the Final Research Instrument
June 23rd: TAC meeting to begin selecting final questions for research instrument questionnaire
July 6th and 7th 2010: 2 Day TAC meeting to finalize questionnaire research instrument

July 2010: TAC Meeting to finalize research instrument
August 2010: Research questionnaires published online and responses gathered from contact list provided by TAC
September 2010: Meeting with TAC to present initial results and analysis and to prepare followup questions for on-site interviews
October 2010: March 2011 on-site interviews at each of the six MDOT district offices

Plans for FY 2011:

March 2011: Meeting with TAC to prepare second follow-up general questionnaire for all MDOT Survey
April 2011: Publication of final online questionnaire for all MDOT staff
May 2011: Final Report preparation and submission

Cost Estimate for FY 2011 $28,610

MISSISSIPPI SPR-1(59)

LINE ITEM 28	STATE STUDY NUMBER: 223
TOTAL STUDY BUDGET: $152,810	TOTAL STUDY COST TO DATE: $2,470
DATE STARTED: 10/01/09	COMPLETION DATE: 12/31/12
STUDY TITLE:	**I55 Integrated Diversion Traffic Management Benefit Study**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Li Zhang

Objective:

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

Progress:

FY 2010:

The research team started the project after Jun. 1. Will finish literature review and system archtecture tasks. Will work with Traffic Eengineering Division to perform system archtecture task.

Plans for FY 2011:

Will collect data for base simulation moded and estabish base model. Will formulate mathematical integrated corridor delay model, finds solutions to the model and implement the model

Cost Estimate for FY 2011 $100,000

MISSISSIPPI SPR-1(59)

LINE ITEM 29 STATE STUDY NUMBER: 225

TOTAL STUDY BUDGET: $94,000 TOTAL STUDY COST TO DATE: $0

DATE STARTED: 10/01/09 COMPLETION DATE: 12/31/10

STUDY TITLE: **Turbidity Monitoring at Select Construction Sites**

RESEARCH AGENCY: Thompson Engineering

PRINCIPAL INVESTIGATOR: Thad Hopper

Objective:

MDOT has no real-world data on effects of construction on turbidity levels in run-off from construction projects, and the EPA may soon be promulgating a Final Rule establishing numeric turbidity limitations. The goal of this research project is to establish baseline turbidity conditions at select construction sites by establishing a water quality monitoring program and documenting existing and MDOT approved BMPs. The water quality monitoring program will be primarily focused on gathering turbidity data, but because turbidity is related to other factors, may include parameters such as total suspended solids, pH, and temperature. Data, following initial site selection and site visits with MDOT, will be collected using MDEQ and EPA protocols as guidance. Because of the complex factors which affect turbidity, this may be the first phase of a multiphase project.

Progress:

FY 2010:

This project was awarded in March 2010. Work performed from award of the project includes review of sampling equipment and instrumentation (including meetings with vendors and discussions with MDEQ); and progress on site selection, including review of ECPs and BMPs at potential sampling locations. We anticipate that selection of sampling methodology, sampling and analysis plan preparattion, and site selction will be complete by September 30, 2010.

Plans for FY 2011:

The majority of the project will be performed from October 2010 throuch August 2010. Tasks will include instrumentation installation, data collection, and report preparation.

Cost Estimate for FY 2011 $80,000

MISSISSIPPI SPR-1(59)

LINE ITEM 30	STATE STUDY NUMBER: 226
TOTAL STUDY BUDGET: $93,000	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/09	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Environmental Management Plan Development for MDOT Laboratori**
RESEARCH AGENCY:	Thompson Engineering
PRINCIPAL INVESTIGATOR:	Thad Hopper

Objective:

Maintaining compliance with environmental regulations, environmental permits and handling and disposal of waste materials is growing increasingly complicated. The establishment of a fully functioning Environmental Management Plan will serve as the framework for setting, reviewing and maintaining environmental objectives and targets throughout MDOT Laboratories. An Environmental Management Plan will ultimately maintain environmental policy and develop the procedures to achieve the goals and targets of various Plans within MDOT Laboratories.

The development of the Environmental Management Plan will be achieved through audits, inspections, and document development. The Environmental Management Plan will be maintained by routine inspections, review of procedures and documents, and implementation of corrective or preventative actions.

Progress:

FY 2010:

This project was awarded in March 2010. Work performed from the award date has included project planning and discussions with the State Materials Engineer. Additional meetings are planned with the District Materials Engineers in August. During the month,of September we antiicpate performing the preliminary audit of the Central Laboratory and developing audit procedures to be used for the audits of the District Laboratories.

Plans for FY 2011:

The majority of the project will be performed from October 2010 through July 2011. Tasks which will be performed include performance of the statewide audits, and development of the draft EMP and compliance tracking system.

Cost Estimate for FY 2011 $84,000

MISSISSIPPI SPR-1(59)

LINE ITEM 31	STATE STUDY NUMBER: 227
TOTAL STUDY BUDGET: $79,978	TOTAL STUDY COST TO DATE: $309
DATE STARTED: 10/01/09	COMPLETION DATE: 06/30/11
STUDY TITLE:	**Variability of Cement Treated Layers in MDOT Road Projects**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	Robert Varner

Objective:

MDOT does not currently require QC/QA testing for subgrade and subbase stabilization. MDOT specifications have recently been revised to reduce the cement content in cement treated layers. However, little or no field investigations have been performed to determine the impact of this change on the in-place layer. Burns Cooley Dennis, Inc. will work with MDOT to identify two projects that have utilized cement treated subbase layers and will perform tests to determine variability. Cores of cement treated subbase will be extracted and evaluated for cement content (ASTM D 806), thickness, and compressive strength (ASTM D1633).

Progress:

FY 2010:

Work accomplished during this period includes identifying two MDOT projects for soil cement research, obtaining samples of virgin soil and cutting cores from project No. 1 (Hwy 84 Jefferson Davis County). BCD conducted the following test on these cores; thickness, unit weight, compressive strength, moisture content, and cement content. BCD developed spreadsheets to manage data. BCD met with the MDOT TAC Committee to discuss test results from the first 4 cores.

Plans for FY 2011:

BCD will cut remaining 20 cores from project No. 2 BCD will conduct the following test on these cores; thickness, unit weight, compressive strength, moisture content, and cement content on remaining cores. BCD will develop a final report and submit to MDOT.

Cost Estimate for FY 2011 $41,000

MISSISSIPPI SPR-1(59)

LINE ITEM 32	STATE STUDY NUMBER: 228
TOTAL STUDY BUDGET: $135,044	TOTAL STUDY COST TO DATE: $7,220
DATE STARTED: 10/01/09	COMPLETION DATE: 12/31/13
STUDY TITLE:	**Evaluating Alternative Mowing Regimen and the use of Native Grasses and Wildflowers on Roadside Right of Ways**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	John Guyton Jeanne Jones

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:

FY 2010:

Excellent progress has been made during the first phase of this study. Even with a slightly late start we are on schedule for most items. A graduate student with a native plant background has

been hired and he has made remarkable progress familiarizing himself with Mississippi's native plants and meeting colleagues who can assist with difficult plant identification. The research plots have been identified, marked and surveyed. Spring and summer surveys of the propagules in a transect of each plot has been completed. The profile of the soil pH from the roadway through the research plots has revealed minimal variation. The plots have been mowed and woody vegetation has been removed. Signs are being installed.

Plans for FY 2011:

The survey of plants in the research plots will continue and several plots will be planted with native wildflowers. Woody vegetation will be removed as necessary. The web site and survey will go active and an update on the project will be made at the Mississippi Native Plant Society fall conference. The wildflower section of the MDOT website will be popularized through a variety of means. Spotlight counts will be made of nocturnal deer activity in the research area and these will be followed by an assessment of the sites in an attempt to determine why deer are in that particular locale. The spotlight surveys will include the research plots for comparison and other locations along the corridor where the research is being conducted.

Cost Estimate for FY 2011 $44,489

MISSISSIPPI SPR-1(59)

LINE ITEM 33	STATE STUDY NUMBER: 229
TOTAL STUDY BUDGET: $150,000	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/09	COMPLETION DATE: 09/30/12
STUDY TITLE:	**Instrumentation & Computational Modeling for Evaluation of Bridge Across Waterways**
RESEARCH AGENCY:	Jackson State University
PRINCIPAL INVESTIGATOR:	Wei Zheng

Objective:

The bridge substructures across waterway in Mississippi are frequently subject to scour due to flood currency and collision from barge or ship. Scour is major cause of bridge failure from floods in Mississippi. This research project seeks to investigate the instrumentation and computational modeling that can monitor scour and pier damage and correlate substructure deteriorations with the remainder of bridge's capacity. It will supplement current underwater inspection of bridge substructures with more reliable measurement-and-analysis-based approaches. It also provides wireless instrumentation platform for future MDOT research to monitor other critical components of transportation systems. It will lay down foundation for professional preparation and multidisciplinary collaboration to implement field instrumentation for bridge substructure system.

Progress:

FY 2010:

The research was promptly started when the project was granted. In 10/2009, an official meeting was hold by the PI and Technical Advisory Committee (TAC) of the Mississippi Department of Transportation (MDOT). Implementation plan was discussed in detail on the meeting. The paperwork for the project funding was issued to Jackson State University (JSU) in 3/2010 by MSU, and the funding account was set up in 5/2010 by JSU. The PI had an undergraduate conduct a comprehensively literature review immediately after that. They found

some advanced sensors which can be adopted in this project, including the load-cell scour sensor, the optical fiber brag grating (FBG), the float-out transmitter sliding magnetic collar, the active sonar, and so on. They then intensively studied the sensor-based scour assessment technologies to choose an apparatus which would be used in the following field tests. In May, the Bridge Division of MDOT has provided the PI with the files of the bridge No. 127.9 on U. S. Highway 61. Meanwhile, the PI had recruited a research associate, who will join the research team in 9/2010.

Plans for FY 2011:

New literature on scour monitoring is recently isssued from the project supported by FHWA. PI and team will further will condct new review that focuses on the up-to-date field scour monitoring technologies. The PI plans to make a recommendation on the test systems to the TAC of MDOT, and will schedule a meeting for intensively discussing the selection details. To successfully install the field test apparatus, more information of the bridge No. 127.9 on U. S. Highway 61 in Warren County, the field implmentation target, will be collected through files review or on-site investigation. Meanwhile, a lab test will be conduct in this year.The instrumentation will be condcuted at JSU lab. It will calibrate and test the selected sensors and data acquisition system. Desgn of filed implementation will be started and further meeting with MDOT TAC will be planned.

Cost Estimate for FY 2011 $100,000

MISSISSIPPI SPR-1(59)

LINE ITEM 34	STATE STUDY NUMBER: 231
TOTAL STUDY BUDGET: $97,478	TOTAL STUDY COST TO DATE: $22,632
DATE STARTED: 10/01/09	COMPLETION DATE: 06/30/12
STUDY TITLE:	**Optimizing Mississippi Aggregates for Concrete Bridge Decks**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	Robert Varner

Objective:

A class BD concrete has been recently added to MDOT's classes of concrete in an effort to reduce the amount of shrinkage cracks in bridge decks. A primary focus of the BD class concrete is to optimize aggregate gradations to reduce voids in the concrete mixture matrix and reduce cement paste that is required to fill the voids. Limits have been included in the BD class concrete based on combined gradations. These limits will require possible blending of aggregates, crushing, and modifications to ready mix concrete plants. Little or no data has been generated using Mississippi aggregates that confirm that gradation limits included in the BD class concrete specifications provide concrete mixtures that exhibit less shrinkage and cracking.

Burns Cooley Dennis, Inc., will work with the department to identify one sand and gravel source of local aggregates for this research project. The aggregates will be processed and stockpiles will be create for the 1", ¾", 1/2", 3/8", No. 4, No. 8, No. 16, No. 30, No. 50, and No. 100 sizes. These stockpiles will then be used to meet combined gradation requirements listed in the BD class concrete specification. Concrete mixtures will be developed to follow the contour of the middle and upper and lower limits of the combined aggregate gradation. An additional forty-two concrete mixtures will be developed to evaluate extending the limits of the BD gradation and to determine the impact on shrinkage and strength. Unit weight and voids will also be determined for each combination of aggregates used in the mixtures. Data collected from these forty-five mixtures will be used to develop combined gradation limits for Mississippi aggregates. Each mixture will be tested for slump, temperature, air, unit weight, strength, and shrinkage (ASTM C 157).

Progress:

FY 2010:

Work accomplished during this period includes obtaining materials to be used in this research, performing laboratory testing on aggregates, processing aggregates into individual size fractions, and conducting 30 concrete laboratory mixes. BCD developed spreadsheets to manage and share data.

Plans for FY 2011:

BCD will measure shrinkage on prisms made on the 30 concrete mixtures. BCD will summarize data and provide MDOT with data updates.

Cost Estimate for FY 2011 $16,000

MISSISSIPPI SPR-1(59)

LINE ITEM 35	STATE STUDY NUMBER: 232
TOTAL STUDY BUDGET: $65,180	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 01/29/10	COMPLETION DATE: 12/31/10
STUDY TITLE:	**Development of Climate Data Input Files for the Mechanistic-Empirical Pavement Design Guide (MEPDG)**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Dennis Truax

Objective:

The Mississippi Department of Transportation (MDOT) is implementing the new Mechanistic-Empirical Pavement Design Guide (MEPDG) for the design of new flexible and rigid pavements and over lay design of existing pavements. The MEPDG recognizes that pavement material properties change with changes in temperature and moisture conditions. These changing material properties impact the ability of paving materials to support dynamic vehicle loadings which are reflected in MEPDG output as predicted pavement performance.

The MEPDG software includes 5 to 10 year historic climate records on a relatively small number of sites in Mississippi which are used to extract the requisite temperature and moisture data. Therefore minimal data is currently available to predict environmental conditions for 20 or 40 year pavement design periods. The current MEPDG repeats the 10 year data for multiple decade pavement design periods. The limited data does not adequately address future potential climate diversity for the State over multiple decades included in a typical pavement design.

In this study professional climate researchers will access additional historic climate data that will provide significantly more knowledge of weather patterns to build climate files for pavement design periods up to forty years. In addition global climate models will be used to evaluate potential temperature change over pavement design life. The files developed by the climate researchers will be checked by pavement design researchers to ensure compatibility with the MEPDG software.

Progress:

FY 2010:

This project was implemented to develop a sufficient and appropriate climate database for use by the Mississippi Department of Transportation during the calibration and application of the MEPDG. The project was awarded at the end of January, 2010. Since that time, representative data has been collected on strategic counties in the state and historic climate data files have been compiled for each of Mississippi's 82 counties. The information was reviewed for accuracy and compiled in a format suitable for application to the MEPDG (version 1.0) software. Based on this information, a virtual climate data file was also generated for each county. These data files span forty years and are a representative of what a nominal sequence of climate conditions might be expected over this time frame. While they are obviously not forecasts, they are statistically representative of what should be expected. The time scale mirrors that of the historic data and can be readily used with MEPDG to study system designs. A draft of the summary document reviewing existing and virtual databases is under construction and will be completed, reviewed and finalized in the next fiscal year.

Plans for FY 2011:

By the end of the calendar year, the team expects to complete the three tasks in this project. These are: 1) Develop historic climate data files as for each county in Mississippi with a record duration sufficient for the agency's needs; 2) Develop future scenario virtual climate data sets for the periods twenty (20) and forty (40) years in the future; and 3) Prepare a summary report. This task involves reporting on the data sources used to develop the historic files and the prediction processes used to build the virtual files. However, recent discussions regarding the nature of the virtual climate data, and the assumptions needed to project what is to be characterized as a nominal climate day over a forty-year period, has led the research team to raise the question of possibly needing different virtual data projections. There are climatic factors in play that may or may not be constant over this period of projection (e.g., global warming, changing weather patterns, and volcanic eruptions). The modeling approach used to develop the virtual data can be employed to generate "worse-case" scenarios that might be of value. Also, data ordering might have value (e.g., consolidating warm years to the early year or the latter years in the data set) in performing sensitivity studies of system designs. Therefore, it is conceivable that an extension in time and budget may be requested to support such an investigation. This will be examined and resolved during the beginning of the next fiscal year.

Cost Estimate for FY 2011 $22,000

MISSISSIPPI SPR-1(59)

LINE ITEM 36	STATE STUDY NUMBER: 234
TOTAL STUDY BUDGET: $213,482	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/10	COMPLETION DATE: 06/30/13
STUDY TITLE:	**Evaluation of Short Statured Species for Rapid Establishment on Mississippi Roadsides**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Gregg Munshaw

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.

Cost Estimate for FY 2011 $128,736

MISSISSIPPI SPR-1(59)

LINE ITEM 37	STATE STUDY NUMBER: 235
TOTAL STUDY BUDGET: $140,875	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/2010	COMPLETION DATE: 06/30/2013
STUDY TITLE:	**Triple-Bottom Line Assessment of Future Mississippi Intermodal Facility**
RESEARCH AGENCY:	University of Southern Mississippi
PRINCIPAL INVESTIGATOR:	Tulio Sulbaran

Objective:

A proposed intermodal facility in south Mississippi is still in the concept stage. It is the perfect time for the stakeholders to have a thorough study of these kinds of facilities. This triple-bottom line assessment of comparable facilities will provide the base information needed by the citizens, governments, and businesses involved with the realization of the south Mississippi intermodal complex to make better informed decisions. The stakeholders can learn from the mistakes and successes of other intermodal transportation endeavors. Processes and organizations can be established that will allow the region to develop a world-class inland port intermodal facility that improves the competitiveness of the businesses involved, protects the environment and quality-of-life of south Mississippi, and creates equitable and sustainable economic development.

Too often regions that have or attempted to establish intermodal facilities have made the same mistakes and the results are often citizen outrage and failure to achieve all three triple-bottom line outcomes. The Port of the Future in Gulfport is an exciting opportunity for the Gulf Coast. The Mississippi State Port Authority (MSPA) and stakeholders on the coast have come together to start making this vision come true. This study will help give the inland regions in proximity to Gulfport the knowledge to leverage the opportunity created by the Port of the Future to benefit the profits, planet, and people that is south Mississippi.

Cost Estimate for FY 2011 $44,867

MISSISSIPPI SPR-1(59)

LINE ITEM 38 STATE STUDY NUMBER: 235

TOTAL STUDY BUDGET: $180,000 TOTAL STUDY COST TO DATE: $0

DATE STARTED: 10/01/2010 COMPLETION DATE: 06/13/2013

STUDY TITLE: **Expansive Soil (Yazoo Clay) Characterization**

RESEARCH AGENCY: U.S. Army Engineer Research and Development

PRINCIPAL INVESTIGATOR: Landris T. Lee

Objective:

MDOT's geotechnical design and construction solutions for dealing with Yazoo clay in central Mississippi have generally relied on standard operating procedures for excavation and slope angles. The standard procedures are triggered by one or two soil behavior indicator values determined by laboratory testing. Applying a standard solution that depends primarily on these indicators increases the likelihood of being either overly conservative (incurring higher construction cost) or under-conservative (incurring repair due to poor performance). Evaluating additional indicators (approximately two dozen others) for correlation to soil shrink/swell behavior will increase MDOT's capability for more accurate characterization of problematic soils, and ultimately will allow more flexibility for choosing optimal design/construction solutions.

Cost Estimate for FY 2011 $135,000

MISSISSIPPI SPR-1(59)

LINE ITEM 39	STATE STUDY NUMBER: 237
TOTAL STUDY BUDGET: $95,000	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/10	COMPLETION DATE: 06/30/13
STUDY TITLE:	**Development of Sustainable Highway Construction Rating System**
RESEARCH AGENCY:	Jackson State University
PRINCIPAL INVESTIGATOR:	Lin Li

Objective:

The need for promoting sustainability and green highway construction requires a sustainable highway rating system. To address this need, and building upon its experience and expertise in the area of sustainable highway construction, a research effort is proposed to develop a rating system for green highway construction. The primary objective of the proposed research project is to develop a green highway rating system for The State of Mississippi. A systemic approach, including decision criteria, weighing each criterion, and evaluation of trade-offs, will be used to develop a sustainability rating system for highway construction.

Cost Estimate for FY 2011 $45,000

MISSISSIPPI SPR-1(59)

LINE ITEM 40	STATE STUDY NUMBER: 238
TOTAL STUDY BUDGET: $81,607	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/2010	COMPLETION DATE: 06/30/2013
STUDY TITLE:	**Evaluation of Crushed Concrete Base Strength**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	L. Allen Cooley, Jr.

Objective:

BCD will work with MDOT to identify four sources, with the three base grading (¾ down, No. 610, and 825B) for laboratory testing. Gradations and Atterberg limits of the base samples will be performed in accordance to MT-22 and AASHTO T89/90. The moisture-density relationship of the base materials will then be performed in accordance with MT-8 and AASHTO T180. Following the determination of the moisture-density relationship of the base materials, three-point CBR (AASHTO T193) tests at varying efforts covering the range of MDOT's field density requirements (standard effort) for base materials and ranging from about 90 to 100 percent modified compaction effort. Additionally, resilient modulus (NCHRP1-28) tests will be conducted at target densities meeting the MDOT minimum field density (standard effort) requirements and at 100 percent of modified effort compaction. Additionally, LA abrasion (AASHTO T96), Micro Deval (AASHTO T327), and fine aggregate angularity (AASHTO T304) tests will be performed to investigate possible indicators of high and/or low strength base materials. Upon completion of these laboratory tests, 2 additional resilient modulus tests will be performed on the 610 crushed limestone base at two additional compactive efforts to obtain resilent modulus versus compaction for densities ranging from 95 to 100 percent of MDOT standard effort. Also, one crushed concrete base material will also be selected for testing at two additional compactive efforts to obtain resilient modulus versus compaction for densities ranging from 95 to 100 percent of MDOT standard effort. The crushed concrete sample selected will be the sample that is found to meet current MDOT criteria, and be nearest to the lower quality limits that are currently required by MDOT and/or the quality indicator(s) that are found in this study. Following these strength tests and aggregate properties tests, the data will be compared and summarized into a final report for MDOT.

Cost Estimate for FY 2011 $67,153

MISSISSIPPI SPR-1(59)

LINE ITEM 41	STATE STUDY NUMBER: 239
TOTAL STUDY BUDGET: $99,973	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/2010	COMPLETION DATE: 06/30/2013
STUDY TITLE:	**Cement Influences on Gravel Aggregate Concrete Strength**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	Robert Varner

Objective:

BCD will work with MDOT to identify gravel, limestone and cementitious material sources for use in this study. BCD will secure samples of cementitious materials and aggregates and perform specific gravity test and sieve analyses on the aggregate samples. BCD will develop 84 MDOT Class AA concrete mixes and develop spreadsheets for data processing and calculations. BCD will conduct laboratory mixing and testing of concrete which will include slump, unit weight, temperature, and compressive strength. BCD will also conduct compressive strength test on mortar cubes for each cement sample. BCD will provide a final report detailing the concrete mixtures, materials and the test results. Low strength mixes will be documented along with associated cementitious material characteristics.

Cost Estimate for FY 2011 $87,715

MISSISSIPPI SPR-1(59)

LINE ITEM 42	STATE STUDY NUMBER: 240
TOTAL STUDY BUDGET: $392,186	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/10	COMPLETION DATE: 06/30/13
STUDY TITLE:	**Evaluation of Fertility Practices During Roadside Establishment in MS to Minimize Nonpoint Source Pollutants**
RESEARCH AGENCY:	Mississippi State University
PRINCIPAL INVESTIGATOR:	Gregg Munshaw

Objective:

Turf on Mississippi roadsides is typically established with one large fertilizer application at the time of planting without soil test recommendations. There is great concern for runoff of sediment and nutrients from roadside turf sites. Nutrient and sediment losses from highway construction sites are inevitable due to the lack of vegetation and sloped land. Our objective is to provide guidelines for maximizing the efficiency of fertilizer use with rapid plant establishment and minimal runoff. Experiments will be conducted to compare the current single application rate with other methods that are based on soil test recommendations. Rain simulations will provide a consistent and precise data flow that will result in fertilization best management practices for road construction in Mississippi.

Cost Estimate for FY 2011 $188,941

MISSISSIPPI SPR-1(59)

LINE ITEM 43 STATE STUDY NUMBER: 241

TOTAL STUDY BUDGET: $750,000 TOTAL STUDY COST TO DATE: $0

DATE STARTED: 10/01/10 COMPLETION DATE: 12/31/12

STUDY TITLE: **SAFE Alert System Pilot Project**

RESEARCH AGENCY: Safe Communications, LLC

PRINCIPAL INVESTIGATOR: Mark Herak

Objective:

The work covered in this scope provides for the implementation of a pilot project to deploy an S.A.F.E. Alert System that shall be capable of intercepting anonymized subscriber data signals from cell devices over multiple carriers. The system shall be capable of identifying cell devices uniquely and determining their location. The S.A.F.E system implemented shall be capable of sending messages to a single individual or groups of individuals based on their unique ID, location, or geographical region. The pilot project shall also implement and deploy a Traffic Data System (TDS) to analysis the anonymized subscriber data of the S.A.F.E. Alert System to monitor and display movement of devices for information and traffic management purposes.

The pilot project shall implement the system over a small test region in the Jackson Metro area. The test region shall be inclusive of all areas within a 20 mile radius from the MDOT Shop complex located at 2567 N West St, Jackson, MS 39216. The pilot project shall include the installation of all necessary equipment, systems, computers, software, as well as all incidentals required to provide a fully functioning system in the test region. Upon completion, the operation and performance of the Safe Alert System shall be evaluated to determine if it should be implemented on a larger scale or statewide.

Systems and clients of the S.A.F.E system will be installed, and integrated at the MDOT Office of Enforcement and the MDOT Statewide Traffic Management Center by the contractor as part of the project.

The goal of the pilot will be a proof of concept for a system that can be used by the appropriate State agencies and first responders to alert the population at large during imminent and immediate national or statewide emergencies and catastrophic events. The System will also

provide MDOT Traffic Management Centers real-time Traffic Data and monitoring capabilities as outlined in this document.

Cost Estimate for FY 2011 $325,000

MISSISSIPPI SPR-1(59)

LINE ITEM 44	STATE STUDY NUMBER: 242
TOTAL STUDY BUDGET: $99,000	TOTAL STUDY COST TO DATE: $0
DATE STARTED: 10/01/10	COMPLETION DATE: 12/31/11
STUDY TITLE:	**Collection and Evaluation of Core Data for the MEPDG for Overlayed and New Pavements**
RESEARCH AGENCY:	Burns, Cooley & Dennis, Inc.
PRINCIPAL INVESTIGATOR:	L. Allen Cooley, Jr.

Objective:

This study will collect and analyze data for new and rehabilitated pavements to continue to calibrate the Mechanistic-Empirical Design Guide for Mississippi.

Cost Estimate for FY 2011 $99,000

MISSISSIPPI SPR-1(59)

Mississippi Participation in NCHRP

The Mississippi Department of Transportation contributes to the National Cooperative Highway Research Program (NCHRP). NCHRP is a special-purpose program administered by the Transportation Research Board (TRB) under a three-way agreement among the National Academy of Sciences, AASHTO, and the FHWA. Funding is provided by state highway and transportation agencies at a rate of 5.5% of the agencies' SPR (both Part I & II) funds. Funds for this participation are 100% Federal and thus contain no state match. These pooled funds are used to fund research aimed at solving national or regional problems and can only be spent on problems approved by at least two-thirds of the states. Formal solicitations are made from the states, AASHTO committees, TRB committees and FHWA to develop problem statements. MDOT's annual contribution is paid utilizing both SPR Part I & Part II funds. The amount of funding from each part is based on the 75/25 split (i.e. 75% of the annual NCHRP contribution is funded from Part I funds and 25% of the contribution is funded from Part II funds).

Cost Estimate for FY 2011 SPR Part II Funds: $109,056

Transportation Research Board Correlation Service

This service provides for subscription to a "Research Correlation Service" from the Transportation Research Board, a service established and operated in accordance with the recommendation of the Executive Committee of AASHTO. The activities supported by this subscription include the collection of available information concerning past, current and proposed research related to transportation from all sources including federal, state and other government agencies, colleges and universities, research and planning organizations, transport operators and industry, as well as the TRB Annual Meeting and conference programs; the study and correlation of this information through the work of the committees of the Board and dissemination of the useful findings of research and other information by all feasible means including the several TRB publication series, the output of the Transportation Information Services, and through personal contacts during scheduled field visits by the TRB professional staff. The FY 2010 TRB Correlation Service is funded for $110,136, which corresponds to the current annual subscription cost for Mississippi. Funding for the TRB Correlation Service is also shared by both Part I & Part II SPR funds and is based on the 75/25 split (i.e. 75% of the annual TRB Correlation Service is funded from Part I funds and 25% of the Service is funded from Part II funds).

Cost Estimate for FY 2011 SPR Part II Funds: $27,534

POOLED FUND STUDIES

Pooled Fund Study: ***Auburn University Accelerated Pavement Loading Facility***

Host Agency-Alabama Department of Transportation

The objective of this pooled-fund study is to construct, operate, and analyze the data from Mississippi's sections on the NCAT test track. One of MDOT's existing sections from previous rounds at the track will continue to be trafficked, and a new section will be constructed to replace MDOT's other previous section. The mix design for the new section will explore the possibility of incorporating the maximum amount of recycled asphalt pavement (RAP). Round 4 at the test track will evaluate hot mix asphalt pavement under a traffic loading of 10 million equivalent single axle load (ESALs) over a three year period. Each participating state is responsible for the pavement design for any new test sections. The National Center for Asphalt Technology (NCAT) will be responsible for monitoring the experiment to include periodic data collection and data analysis. The MDOT has committed to the fourth round of test section construction, trafficking and analysis. This commitment will be for fiscal years 2009 through 2011 in the following amounts:

FY 2010 - $175,000 FY 2011 - $175,000 FY 2012 - $175,000

Pooled Fund Study: ***Updating US Precipitation Frequency Estimates for the Southeastern Region***

Host Agency-Federal Highway Administration

In some parts of the country, rainfall maps have not been updated for approximately 50 years. This particular project is for the Southeastern Region and is of interest to the following States: Alabama, Florida, Georgia and Mississippi. This study will determine the annual exceedance probabilities (AEP) and average recurrence intervals (ARI) for durations ranging from 5 minutes to 60 days and for ARIs from 1 to 1,000 years. The point estimates will be spatially interpolated to a resolution of 4km x 4km. The study results will be published as volumes of NOAA Atlas 14, a wholly web based publication available at www.nws.noaa.gov/ohd/hdsc. The total project budget is $670,000, with Mississippi's portion costing $158,000 over 3 years.

FY 2009 - $50,000 FY 2010 - $50,000 FY 2011 - $58,000

Pooled Fund Study: ***Transportation Library Connectivity***

Host Agency-Wisconsin Department of Transportation

Accessible, reliable, and timely information is central to quality performance for all transportation agencies and stakeholders. Yet, a vast amount of transportation-related information is neither collected nor made available for use by others. This project will focus on making the transfer of information an integral part of transportation library and information services. Under the guidance of a full-time staff person contracted for the project, and with the support of a comprehensive marketing plan and materials, pooled fund participants will work to implement a national transportation technology transfer program for information and knowledge management. Guidance will be provided for cataloguing documents into the Online Computer Library Center and converting them to online format and network development. The total project budget is approximately $1,000,000.

MDOT originally funded participation in this project in the FY 2008 Research Work Program with a onetime payment of $15,000. Subsequent to this initial payment, the project study performed some additional work directly for MDOT in its efforts to improve and enhance library services; therefore, MDOT provided an additional $15,000 during FY 2009. This additional work continued into FY 2010.

The pooled fund is being assumed by Missouri DOT for FY11 and beyond.

FY2008 - $15,000 FY2009 - $15,000 FY2010 - $15,000

FY2011 - $15,000 FY 2012 - $15,000 FY 2013 - $15,000 FY 2014 - $15,000

Pooled Fund Study: ***Construction of Crack-Free Bridge Decks (Phase II)***

Host Agency-Kansas Department of Transportation

Cracks in concrete bridge decks provide easy access for water and deicing chemicals that shorten the life of the deck. Concrete bridge deck cracking research over the past 40 years has resulted in an accumulation of knowledge regarding the causes of this cracking. However, only a small number of findings from this research have been used to implement changes in bridge deck design and construction procedures. Phase I work, being accomplished under TPF-5(051), is utilizing this accumulated knowledge in the design and construction of 20 low-cracking, high-performance bridge decks for comparison with an equal number of control decks. The purpose of this Phase II study is to apply the knowledge gained in Phase I to the construction of 20 additional bridges and evaluate their performance. The original total project budget was $980,000; however, the KU Transportation Research Institute has committed an additional $500,000 so the total project budget will be $1,480,000.

FY 2008 - $15,000 FY 2009 - $15,000 FY 2010 - $15,000

FY 2011 - $15,000 FY 2012 - $15,000

Pooled Fund Study: ***Improving Resilient Modulus Test Procedures for Unbound Materials***

Host Agency-Federal Highway Administration

The Mechanistic-Empirical Pavement Design Guide requires that the resilient modulus of the subgrade be used to design the pavement thickness for both asphalt and Portland cement concrete pavements. Due to the complexity of the test, test results have been inconsistent. This study includes three primary goals:

1. To reduce the variability currently associated with resilient modulus testing of unbound materials
2. To conduct a precision and bias study of the test procedure
3. Provide assistance to states to properly equip and setup a laboratory for successful MR testing

The total project budget is $400,000. Not enough partner states have been obtained to date; therefore, MDOT has been unable to commit funding to this project. Previously approved funds will be shifted from FY08-10 to FY09-11 in the event requisite partners are obtained.

FY 2009 - $15,000 FY 2010 - $15,000 FY 2011 - $15,000

Pooled Fund Study: ***Southeast Transportation Research Consortium***

Host Agency-Louisiana Department of Transportation

The RAC Region II is developing a collaborative research program through the Transportation Pooled Fund (TPF) Program. The research program is called the Southeast Transportation Consortium and is intended to encourage coordination among member states and provide resources and management of collaborative studies. The consortium intends to address high priority transportation research topics of common interest to the RAC II Region states and for which expertise exists within the region.

FY 2010 - $10,000 FY 2011 - $5,000

Pooled Fund Study: ***Accommodating Oversize/Overweight Vehicles at Roundabouts***

Host Agency-AASHTO

The objectives of this study are to: 1. Compile current practice and research by various states and countries related to the effects that oversize/overweight vehicles (also called super loads) have on roundabout location, design and accommodation, and 2. Fill in information gaps with respect to roundabout design and operations for these classes of vehicles. Total funding required is $200,000. MDOT will contribute a total of $30,000.

FY 2010 - $15,000 FY 2011 - $15,000

Pooled Fund Study: ***Technology Transfer Intelligent Compaction Consortium***

Host Agency-Iowa Department of Transportation

Hosted by the Iowa Department of Transportation in both 2008 and 2009, an annual workshop was held to promote the advancement of intelligent compaction practices where they addressed the needs and subsequently the challenges which state agencies would face with the adoption of such innovative technologies. In order to further understand the potential challenges which state agencies could encounter when adopting Intelligent Compaction (IC), another meeting is vital. The meeting, which will consist of two workshops, will give agencies the opportunity to investigate IC technology and its advantages/disadvantages as it pertains to earthwork and HMA construction.

The program will be open to any state agency which finds IC technology interesting and important to their respectful agency. This research will ultimately lead to the implementation of new technologies in intelligent compaction and furthermore increase the life of pavements, therefore heightened state agencies' interest and possible involvement in such innovative technologies. Each state agency will be represented by one representative in both workshops. The workshops, as mentioned earlier, will consist of two meetings. One of them will be in person occurring during the fall months, with the location being determined by an Executive Committee and being moved regionally each year to accommodate the participating states. The other will be a webinar hosted by the EERC in the spring to review a layout of the upcoming year's activities as it refers to IC research as well as to provide feedback to the multiple participating sponsors.

FY 2006 - $25,000 FY 2007 - $25,000 FY 2009 - $25,000 FY 2011 - $7,000

Pooled Fund Study: ***ITS Pooled Fund Program (ENTERPRISE)***

Host Agency-Michigan Department of Transportation

Created in 1991, Enterprise was an agreement which funded allocation of research done in the field of Intelligent Transportation Systems. Through the collaboration of four U.S. states, funding was provided each year to constitute the testing of multiple projects. Nonetheless, since its inception, Enterprise has grown to be extremely popular not only within U.S. state agencies, but foreign agencies as well, being represented throughout Europe and Canada. Consequently, focuses have been further geared toward the advancement of joint research for the development and deployment of ITS technologies.

Enterprise has multiple responsibilities as a global entity. They must promote ITS technologies which are compatible to national and international initiatives, support member state projects, and pursue ITS research projects which are member-state approved and suggested. Furthermore, goals which are chosen by member agencies vary yearly. Consequently, work plans, or schedules are designated annually to specify what and how future projects will be pursued within the Enterprise program.

FY 2011 – $30,000 FY 2012 - $30,000 FY 2014 - $30,000

Pooled Fund Study: ***Continued Advancements in Load and Resistance Factor Design (LRFD) for Foundations, Substructures and Other Geotechnical Features***

Host Agency-Federal Highway Administration

Considering the changes which have been made to the AASHTO load and resistance factor design (LRFD) specifications over the past few years, state DOT's must continue to stay current with the newly developed practices and guidelines. LRFD specifications are used predominantly throughout DOT's when considering bridge and foundation design, furthermore introducing the need for state agencies to stay abreast any revisions in design specifications. Consequently, due to such changes, gaps of information have been created in the geotechnical guidance. In order to stay relevant to state DOT's and promote better usability amongst such state agencies, revisions to the reference materials and training/technology transfer is imperative. For instance, as it refers to technical guidance, the calibration of design methods for deep and shallow foundations and earth retaining structures are only a few of many areas which the Federal Highway Administration (FHWA) must address.

There are multiple aims of this pooled fund, which will be completed in two phases. Phase I will consist of redeveloping instructor web-based training for substructure or foundation design of bridges and identifying research topics. Phase II will consist of the updating and maintenance process associated with the materials.

FY 2011 - $50,000 FY 2012 - $50,000 FY 2013 - $50,000 FY 2014 - $50,000

Pooled Fund Study: ***Bridge Pier Scour Research***

Host Agency-Federal Highway Administration

This research study focuses on advancing the knowledge of current practices for determining design scour depth of bridges. Using a combination of data obtained from historical scour research literature, laboratory experiments, field-testing, data collection and data evaluation, research will be completed and the issues associated with bridge scour practices and the lack of knowledge about such will be consequently addressed.

FY 2011 - $20,000 FY 2012 - $20,000 FY 2013 - $20,000 FY 2014 - $20,000

Pooled Fund Study: ***Accelerating Innovation Implementation Across State Boundaries***

Host Agency-California Department of Transportation

With the advancement of technology and research throughout U.S. DOTs, it has become pressingly important to ensure the efficiency of projects, while maintaining cost-effective timelines and budgets. Considering such pivotal factors, the AASHTO Research Advisory Committee has chosen multiple research projects which have been deemed successful according to such factors. Nonetheless, in order to achieve such a compromise, the implementation of ready-to-use innovations has been introduced which will be shared throughout the pooled DOTs. Lead by the California Department of Transportation, this pooled fund project will effectively decrease time and money spent by DOTs on similar research or studies which have been previously done by other participating state agencies, and will encourage technology transfer amongst them as well.

Along with implementing this program, marketing strategies will also be developed as a joint effort of all participating DOTs to establish dissemination methods for the sharing of research and these ready-to-use innovations. Training will also be available for the pooled state agencies for implementation purposes as well as specific research. Along with the many advantages such a project offers, this sharing of research will further promote a more rapid growth of innovations throughout U.S. DOTs. It will give each member state the opportunity to showcase their innovations as well as introduce them to other participating agencies. The rewards of such a pooled funded program are important for the advancement of DOTs nationwide and will be a huge impact on future developments, budgets, and effectiveness of the implemented innovations.

FY 2011 - $10,000 FY 2012 - $10,000 FY 2013 - $10,000

Pooled Fund Study: ***Improving the Quality of Pavement Profiler Measurement***

Host Agency-Federal Highway Administration

This research study focuses on providing agencies with information and firsthand experience to address issues and concerns related to profiler operation, equipment, and procedures. There is an increasing need for Department of Transportation to purchase and upgrade profiling equipment to provide network-level and project specific smoothness information. This includes profilers operated at close to posted speed limits that are most often used to determine ride quality on a network-level. The project objectives include:

- Deliver sample procurement specifications, maintenance guidelines, and profile analysis software.
- Establish criteria for verification centers and assist with the development of these locations.
- Develop and deploy a traceable verification center.
- Provide technical review of software that locates surface imperfections that require corrective repair during construction can relate the bumps to the highway users and procure for general distribution. MDOT contributed to this pooled fund from 2003-2006.

FY2003 - $30,000 FY2004 - $30,000 FY2005 - $30,000 FY2006 - $30,000

FY2011 - $15,000 FY2012 - $15,000 FY2013 - $15,000 FY2014 - $15,000