Mississippi

Department of Transportation

RESEARCH WORK PROGRAM

SPR-1(60), Part II

For the Fiscal Period

October 1, 2011 to September 30, 2012

Prepared by the
Mississippi Department of Transportation
RESEARCH DIVISION

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State Research Engineer

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

GENERAL COMMENTS ON RESEARCH WORK PROGRAM FOR FISCAL YEAR 2012

The State Planning & Research (SPR) Part II research work program allocation for FY 2012 totals $1,590,024 (estimated) and includes the following 100% federally funded items:

- National Cooperative Highway Research Program (NCHRP) contribution of $523,590 (estimated) for FY 2012. The NCHRP funding is 5.5% of the SPR Part II allocation.
- TRB Correlation Service contribution of $110,135
- AASHTO Technical Services Program contributions totaling $52,700
- Pooled-fund studies totaling $581,900 as detailed in this document

This work program document also includes descriptions of all ongoing internal research line items and state studies, both new and continuing, as well as a summary of expenditures for the upcoming and previous fiscal years. The state study descriptions contain the following information:

- Study objective
- Total study budget
- Total expenditures to date
- Cost estimates for FY 2012
- Previous FY expenditures
- Past years' progress
- Planned work for FY2012

State study numbers in this work program are the same as previous years for continuing studies, and each new state study will be assigned the next available number.
Line items other than state studies have narrative descriptions of scope, objectives and anticipated activities along with a cost estimate. The 51 line items in the tabulation mentioned above include only those items for which there is a state match (80/20) in the funding. The pooled fund studies, the TRB Correlation Service, AASHTO TSP, and NCHRP are funded with 100% SPR Part II funds (no state match). Additional projects using either 100% federal non-SPR funds or 100% state funds that are administered by Research Division are described after the 51 line items. This document will be submitted to MDOT's Research Advisory Committee (RAC) and approved and/or amended by Federal Highway Administration (FHWA).

Table of Contents

Line Items Spreadsheets

Mississippi FY2012 Work Program (100% Federal and 80%/20% State Funded Studies)										
Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
Existing State Studies & Internal Line Items										
1	Long-Term Pavement Performance (LTPP)	N/A	10/1/2011	9/30/2012	$0.00	$8,798.54	$3,000.00	$8,798.54	James C. Watkins	MDOT
2	Implementation of Research Projects	N/A	10/1/2011	9/30/2012	$0.00	$237,196.13	$216,880.00	$237,196.13	James C. Watkins	MDOT
3	Technology Transfer	N/A	10/1/2011	9/30/2012	$0.00	$83,718.23	$80,000.00	$83,718.23	James C. Watkins	MDOT
4	Pavement Management	N/A	10/1/2011	9/30/2012	$0.00	$214,581.13	$300,000.00	$214,581.13	Cindy Smith	MDOT
5	Skid Collection	N/A	10/1/2011	9/30/2012	$0.00	$75,996.58	$52,736.00	$75,996.58	Gary Browning	MDOT
6	Information and Data Collection Technology	N/A	10/1/2011	9/30/2012	$0.00	$79,169.12	$115,000.00	$79,169.12	Reginald Jenkins	MDOT
7	Performance Measures	N/A	10/1/2011	9/30/2012	$95,600.00	$0.00	$95,600.00	$0.00	Adam Aleithawe	MDOT
8	Research Contract Liaison	N/A	10/1/2011	9/30/2012	$51,200.00	$0.00	$51,200.00	$0.00	Robbie Vance	MDOT
9	Minor Research Studies	N/A	10/1/2011	9/30/2012	$25,000.00	$25,000.00	$25,000.00	$1,889.31	James C. Watkins	MDOT
10	Implement the 2002 Design Guide for MDOT (Phase II)	170	11/3/2003	12/31/2012	$907,663.00	$665,948.68	$300,000.00	$61,529.68	Chetana Rao	ARA
11	In-House Support to State Study 170	171	11/3/2003	6/30/2012	$350,000.00	$229,404.94	$80,000.00	$2,505.94	William F. Barstis	MDOT
12	Structural Characterization of Asphalt Drainage Course Layers	181	8/25/2009	12/31/2011	$100,000.00	$0.00	$20,400.00	$0.00	Allen Cooley	BCD

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
13	Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking	184	11/10/2005	9/30/2014	$218,224.00	$67,421.00	$23,000.00	$0.00	Farshad Amini	JSU
14	In-House Support to State Study No. 184 - Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking	185	11/10/2005	9/30/2014	$30,000.00	$14,752.00	$3,000.00	$0.00	Cindy Smith	MDOT
15	Consultant Support to State Study No. 184 - Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems to Reduce Reflective Cracking	186	1/30/2006	12/31/2014	$20,400.00	$14,900.00	$0.00	$0.00	Randy Ahlrich	BCD
16	Performance Specification for Chemically Stabilized Layers	206	1/11/2008	12/31/2013	$239,703.00	$51,245.00	$85,000.00	$30,577.24	Isaac Howard	MSU
17	Open Graded Friction Course for HMA Pavements	207	9/30/2008	6/30/2012	$135,000.00	$115,907.92	$19,092.08	$13,294.54	Tom White	MSU

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
18	Effect of Coarse Aggregate Cleanliness & Moisture Content on HMA Performance	208	1/11/2008	12/31/2011	$275,000.00	$235,840.87	$39,159.13	$93,237.47	Isaac Howard	MSU
19	Laboratory Testing and Evaluation of Near Surface Properties of Flexible Pavements Due to Bituminous Surface Treatments	211	1/5/2009	12/31/2011	$330,000.00	$181,205.94	$75,000.00	$67,381.83	Isaac Howard	MSU
20	Integrated Kudzu Control on Mississippi Roadsides	215	12/1/2008	12/31/2011	$50,215.00	$25,825.13	$24,389.87	$8,302.77	Mark Weaver	USDA
21	Strain Resistant, Extended Performance Pavements, an Alternate to Subdrainage	217	8/26/2009	12/31/2012	$225,000.00	$25,086.78	$74,000.00	$25,086.78	Tom White	MSU
22	In-House Support to State Study No. 217	218	8/26/2009	12/31/2012	$40,000.00	$549.00	$6,000.00	$0.00	William F. Barstis	MDOT
23	Evaluation of MDOT's Distress Thresholds for Maintained Pavement Projects	221	3/29/2010	12/31/2011	$120,421.00	$25,623.35	$94,797.66	$25,623.35	Feng Wang	JSU

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
24	Best Practices of MDOT's Survey Operation, Organization & Technology Implementation	222	4/30/2010	12/31/2011	$131,217.00	$13,811.72	$117,405.28	$11,048.69	Tulio Sulbaran	USM
25	I55 Integrated Diversion Traffic Management Benefit Study	223	3/29/2010	12/31/2012	$152,810.00	$56,697.82	$90,000.00	$41,597.19	Li Zhang	MSU
26	Turbidity Monitoring at Select Construction Sites	225	3/10/2010	6/30/2012	$94,000.00	$30,781.04	$40,000.00	$30,781.04	Thad Hopper	Thompson
27	Environmental Management Plan Development for MDOT Laboratories	226	3/10/2010	12/31/2011	$93,000.00	$44,680.70	$35,000.00	$44,680.70	Thad Hopper	Thompson
28	Variability of Cement Treated Layers in MDOT Road Projects	227	5/30/2010	12/31/2011	$79,979.00	$77,385.95	$2,593.05	$49,120.02	Robert Varner	BCD
29	Evaluating Alternative Mowing Regimen and the Use of Native Grasses and Wildflowers on Roadside Right of Ways	228	1/29/2010	12/31/2013	$135,044.00	$48,517.91	$32,587.00	$28,266.66	John Guyton	MSU

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
30	Instrumentation & Computational Modeling for Evaluation of Bridge Substructures Across Waterways	229	1/29/2010	9/30/2012	$150,000.00	$5,467.22	$100,000.00	$5,467.22	Wei Zheng	JSU
31	Optimizing Mississippi Aggregates for Concrete Bridge Decks	231	5/7/2010	6/30/2012	$97,478.52	$22,633.00	$26,584.00	$22,633.00	Robert Varner	BCD
32	Evaluation of Short Statured Species for Rapid Establishment on Mississippi Roadsides	234	2/2/2011	6/30/2013	$213,482.41	$52,214.32	$69,057.00	$52,214.32	Gregg Munshaw	MSU
33	Triple-Bottom Line Assessment of Future Mississippi Intermodal Facility	235	2/22/2011	12/31/2012	$140,875.00	$0.00	$122,175.70	$0.00	Tulio Sulbaran	USM
34	Expansive Soil (Yazoo Clay) Characterization	236	8/3/2011	12/31/2012	$180,000.00	$0.00	$90,000.00	$0.00	Landris T. Lee	ERDC
35	Evaluation of Crushed Concrete Base Strength	238	2/25/2011	12/31/2012	$81,607.61	$0.00	$60,000.00	$0.00	L. Allen Cooley, Jr.	BCD
36	Cement Influences on Gravel Aggregate Concrete Strength	239	3/2/2011	12/31/2012	$99,973.99	$69,289.94	$13,000.00	$69,289.94	Robert Varner	BCD

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
37	Evaluation of Fertility Practices During Roadside Establishment in MS to Minimize Nonpoint Source Pollutants	240	2/2/2011	6/30/2013	$392,186.29	$29,369.53	$187,555.00	$29,369.53	Gregg Munshaw	MSU
38	SAFE Alert System Pilot Project	241	No NTP Yet	No NTP Yet	$750,000.00	$0.00	$325,000.00	$0.00	Mark Herak	
39	Collection and Evaluation of Core Data for the MEPDG for Overlayed and New Pavements	242	No NTP Yet	No NTP Yet	$200,000.00	$0.00	$99,000.00	$0.00	L. Allen Cooley, Jr.	BCD
					Total Technical Assistance		$939,416.00	$701,349.04		
					Total State Studies Excluding Tech Assistance		$2,253,795.77	$712,007.91		
					Total All Continuing 80/20		$3,193,211.77	$1,413,356.95		

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
New State Studies for FY12										
40	Aggregate Absorption in HMA Mixtures	245	3/1/2012	12/31/2013	$90,503.46	$0.00	$18,100.69	$0.00	Allen Cooley	BCD
41	Development of Laboratory Mix Design Procedures for RAP Mixes	246	3/1/2012	12/31/2013	$98,493.21	$0.00	$19,698.64	$0.00	Allen Cooley	BCD
42	Influence of Cementitious Materials on Shrinkage of Bridge Deck Concrete	247	3/1/2012	12/31/2014	$99,843.50	$0.00	$11,093.72	$0.00	Robert Varner	BCD
43	Cost-Effectiveness Study of the Pavement Warranty Program in Mississippi	248	2/1/2012	6/30/2014	$149,948.00	$0.00	$18,743.50	$0.00	Yan Qi	JSU
44	Full Depth Reclamation for High Traffic Applications	250	2/1/2012	6/30/2015	$291,975.80	$0.00	$24,331.32	$0.00	Isaac Howard	MSU
45	In-House Support to Full-Depth Reclamation for High-Traffic Applications	257	2/1/2012	6/30/2015	$6,000.00	$0.00	$2,000.00	$0.00	William Barstis	MDOT
46	Acceptable Vibrations on Green Concrete	251	2/1/2012	6/30/2013	$79,907.78	$0.00	$19,976.95	$0.00	Seamus Freyne	MSU
47	Driver Speed Limit Compliance in School Zones: Assessing the Impact of Sign Saturation	252	2/1/2012	6/30/2013	$78,177.60	$0.00	$19,544.40	$0.00	Li Zhang	MSU

Line Item	Project/Study Name	Study #	Proposed/ Actual Start Date	Proposed/Actual End Date	Total Study Budget	Total Expenditures to Date	FY12 Budget	FY11 Expenditures	PI	Agency/Co
48	Optimizing Roadway Vertical Alignment Design with Microstation and Geopak	253	2/1/2012	6/30/2014	$177,707.00	$0.00	$22,213.38	$0.00	Li Zhang	MSU
49	A Synthesis Study of Noncontact Nondestructive Evaluation of Top-down Cracking in Asphalt Pavements	254	2/1/2012	6/30/2013	$71,500.00	$0.00	$11,916.67	$0.00	Waheed Uddin	UM
50	Simulation of Emergency Evacuation for Grand Gulf Nuclear Power Plant at Port Gibson, Mississippi	255	2/1/2012	6/30/2014	$160,000.00	$0.00	$20,000.00	$0.00	Feng Wang	JSU
51	Improved Characterization of Truck Traffic Loading for MDOT Pavement Design	256	2/1/2012	6/30/2014	$311,881.63	$0.00	$145,335.78	$0.00	Chetana Rao	ARA
						Total New Studies	$332,955.05			
					State Study Totals		$3,526,166.82	$1,413,356.95		

100% Federally Funded FY2012 Studies			
Continuing Pooled Funds			
		FY2011	**FY2012**
Accelerating Innovation Implementation and Technology TransferAcross State Boundaries (now IMISS)	Title changed to Implementation of Maintenance Innovations from State to State (IMISS).	$10,000.00	$10,000.00
Transportation Library Connectivity and Development		$15,000.00	$15,000.00
Bridge Pier Scour Research		$20,000.00	$20,000.00
Continued Advancements in Load and Resistance Factor Design (LRFD) for Foundations, Substructures and Other Geotechnical Features		$50,000.00	$50,000.00
ITS Pooled Fund Program (ENTERPRISE)		$30,000.00	$30,000.00
Improving the Quality of Pavement Profilers		$15,000.00	$15,000.00
Construction of Crack-Free Bridge Decks (Phase II)		$15,000.00	$15,000.00
Auburn University Accelerated Pavement Loading Facility		$175,000.00	$175,000.00
	Total Continuing Pooled Funds	$330,000.00	$330,000.00
Transportation Research Board (TRB) Correlation Service		$27,534.00	$110,135.00
Mississippi Participation in NCHRP		$123,541.00	$523,590.00
	Total Continuing Pooled Funds + NCHRP and TRB		$963,725.00

Rejoined Pooled Funds			
Pavement Surface Properties: A Consortium		$0.00	$20,000.00
Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements	Formerly Analysis of MNRoadWhitetopping Performance Data for a Module in the ME Design Guide	$0.00	$9,200.00
Southeast Transportation Research Consortium		$5,000.00	$5,000.00
	Total Rejoined Pooled Funds		$34,200.00
	Total Continuing and Rejoined Pooled Funds		$364,200.00
	Total Continuing and Rejoined Pooled Funds + NCHRP and TRB		$997,925.00

New Pooled Funds for FY12

		FY2011	FY2012
Highway Safety Manual Implementation		$0.00	$20,000.00
Shaking Table Testing to Evaluate Effectiveness of Vertical Drains for Liquefaction Mitigation	*Title changed to Full Scale Shake Table Testing to Evaluate Seismic Performance of Soil Walls*	$0.00	$10,000.00
2012 Multi-State Asset Management Implementation Workshop		$0.00	$10,000.00
Traffic Signal Systems Operation and Management		$0.00	$25,000.00
Regional Sustainable Pavement Consortium		$0.00	$25,000.00
Real Time Current Velocity (RTCV) Pilot Project for Mississippi River Bridges		$0.00	$50,000.00
Next-Generation Transportation Construction Management		$0.00	$25,000.00
	Total New Pooled Funds		$165,000.00
$430,000 for FY11 includes expenditures on some pooled funds which ended last year and are therefore not included in this report.	**Total All Pooled Funds**	$430,000.00	$529,200.00
	Total All Pooled Funds + NCHRP/TRB		$1,162,925.00

AASHTO Technical Services Program (TSP)

	FY2011	FY2012
AASHTO Equipment Management Technical Services Program (EMTSP)	$0.00	$3,000.00
AASHTO Load and Resistance Factor Design (LRFD)	$0.00	$10,000.00
AASHTO Technical Service Program to Develop AASHTO Materials Standards (DAMS)	$0.00	$5,000.00
AASHTO National Transportation Product Evaluation Program (NTPEP)	$0.00	$7,500.00
AASHTO Product Evaluation Listing (APEL)	$0.00	$1,200.00
AASHTO Transportation System Preservation Technical Service Program (TSP^2)	$0.00	$20,000.00
AASHTO Technical Implementation Group (TIG)	$0.00	$6,000.00
TOTAL AASHTO TSP		$52,700.00
TOTAL 100% Federal Including Pooled Funds, AASHTO, NCHRP & TRB		**$1,215,625.00**

Summary of Work Program Expenditures and Budget for Current and Previous FYs		
	FY 2011	FY 2012
FY 2011 & 2012 SPR PART II ALLOCATION (2012 Estimated)	$1,590,024.48	$1,590,024.48
Less 100% NCHRP (Estimated for FY12--FY11 was 25%, FY12 is 100%)	$123,541.00	$523,590.00
Less 100% TRB (Estimated for FY12--FY11 was 25%, FY12 is 100%)	$27,534.00	$110,135.00
Less Continuing Pooled Fund Studies		$330,000.00
Less Rejoined Pooled-Fund Studies		$34,200.00
Less New Pooled-Fund Studies		$165,000.00
Less AASHTO TSP		$52,700.00
Less All Pooled Funds(for Previous FY)	$430,000.00	
Plus FY 2010 Carryover	$3,453,275.18	
SPR Available for 2011 & 2012 Part II Work Progam	$4,462,224.66	$374,399.48
plus STATE MATCH	$1,115,556.17	$93,599.87
TOTAL AVAILABLE FROM SPR PART II	$5,577,780.83	$467,999.35
Less State Study Expenditures Through 6/30/2011	$1,413,356.95	
Less Estimated State Study Expenditures 7/1/11 - 9/30/11	$446,058.27	
Less Projects Closing Out in FY2011	$175,594.03	
Estimated FY2011 Carryover	$3,542,771.58	$3,542,771.58
TOTAL FUNDS AVAILABLE		$4,010,770.93
Less FY2012 State Studies		$3,526,166.82
Balance		$ 484,604.11

Mississippi Participation in Other Reseach Projects
100% State Funded (Non-SPR)

	Budget Program FY12	Previous FY Expenditures	Total Expended to Date	Total Study Budget
Implement the 2002 Design Guide for MDOT (Non-SP&R Portion)	$0.00	$0.00	$502,297.00	$500,000.00

PI: Chetana Rao
Applied Research Associates

Continuing State Studies and Technical Assistance Line Items

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 2012

Salaries (Regular Employees)	$1,500.00
Employee Benefit	$420.00
Materials, Supplies, and Services	$600.00
Travel and Sustenance	$480.00
Conference Registrations	$0.00
Total	$3,000.00

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 2012

Salaries (Regular Employees)	$160,000.00
Employee Benefit	$47,544.00
Materials, Supplies, and Services	$3,336.00
Travel and Sustenance	$6,000.00
Conference Registrations	$0.00
Total	$216,880.00

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 (T^2) at Jackson State University, and those activities and funds are not included in the above line item, Technology Transfer.

Cost Estimate for FY 2012

Salaries (Regular Employees)	$ 32,000.00
Employee Benefit	$ 8,960.00
Materials, Supplies, and Services	$ 0.00
Travel and Sustenance	$ 39,040.00
Conference Registrations	$ 0.00
Total	$80,000.00

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 2012

Salaries (Regular Employees)	$233,598.00
Employee Benefit	$65,407.00
Materials, Supplies, and Services	$995.00
Travel and Sustenance	$0.00
Conference Registrations	$0.00
Total	$300,000.00

LINE ITEM 5

Skid Data Collection

This item covers the skid data collection activities of the Research Division to ensure that MDOT provides acceptable surface skid resistance for the traveling public. This line item includes skid collection for new construction acceptance, product evaluation, and quality assurance of contractor-collected skid data, and periodic maintenance and calibration of the skid collection vehicle.

Cost Estimate for FY 2012

Salaries (Regular Employees)	$ 35,000
Employee Benefit	$ 9,800
Materials, Supplies, and Services	$ 1,936
Travel and Sustenance	$ 6,000
Conference Registrations	$ 0
Total	$ 52,736

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 2012

Salaries (Regular Employees)	$88,331.00
Employee Benefit	$24,733.00
Materials, Supplies, and Services	$1,936.00
Travel and Sustenance	$0.00
Conference Registrations	$0.00
Total	$115,000.00

LINE ITEM 7

Performance Measures

This line item includes the study of performance measures for Research and other divisions. It involves in-house support to any contracted studies, as well as salaries and time for internal task force meetings, data analysis, etc.

Cost Estimate for FY 2012

Salaries (Regular Employees)	$ 70,000
Employee Benefit	$ 19,600
Materials, Supplies, and Services	$ 1,000
Travel and Sustenance	$ 5,000
Conference Registrations	$ 0
Total	$ 95 ,600

LINE ITEM 8

Research Contract Liaison

This line item covers the division's contracting, work program preparation assistance, monitoring of quarterly progress reports, and payment of pooled funds, NCHRP, TRB, and other federally funded programs. Included are such tasks as completion of ADMs, close communication with Consultant Services Unit, assistance with Commission agenda items, completion of FHWA payment forms, tracking of project status and expenditures, and review and publication of quarterly progress reports and final research reports.

Cost Estimate for FY 2012

Salaries (Regular Employees)	$ 40,000
Employee Benefit	$ 11,200
Materials, Supplies, and Services	$ 0
Travel and Sustenance	$ 0
Conference Registrations	$ 0
Total	$51,200

LINE ITEM 9

Minor Research Studies

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 2012 $ 25,000

LINE ITEM 10 **STATE STUDY NUMBER:** 170

TOTAL STUDY BUDGET: $907,663.00 **TOTAL STUDY COST TO DATE:** $665,948.68

DATE STARTED: 11/03/2003 **COMPLETION DATE:** 12/31/2012

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

Cost Estimate for FY 2012 $300,000.00

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.

FY 2011:

Assembly of calibration data, coordination with MDOT to collect information necessary for calibration.

Plans for FY 2012:

- Review input files for DARWin M-E
- Review field data of non-LTPP sections
- Review & customize NCAT's climate files for project analysis
- Creating input libraries for DARWin M-E
- CIPR & Stabilized Base Consulting
- Determine Depth to Ground Water
- Determine Effect of Truck Overloads
- MS-ATLAS File & DARWin-ME Compatibility
- Calibration and validation of performance models
- Recommend levels needed for design input
- Evaluate design results using locally calibrated models
- Develop training materials and conduct training
- Customize software
- Final report

LINE ITEM 11 **STATE STUDY NUMBER:** 171

TOTAL STUDY BUDGET: $350,000.00 **TOTAL STUDY COST TO DATE:** $229,404.94

DATE STARTED: 11/03/2003 **COMPLETION DATE:** 06/30/2012

In-House Support to State Study 170

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: William F. Barstis

Objective:

This study will be conducted to support the State Study 170, "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.

Cost Estimate for FY 2012 $80,000.00

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 FY 2010 included 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.

FY 2011:

Work for the FY 2011 included 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.

Plans for FY 2012:

MDOT will continue provision of data to ARA as needed. Coring and field work will be included.

LINE ITEM 12 **STATE STUDY NUMBER:** 181

TOTAL STUDY BUDGET: $100,000.00 **TOTAL STUDY COST TO DATE:** $0

DATE STARTED: 8/25/2009 **COMPLETION DATE:** 12/31/2011

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.

Cost Estimate for FY 2012: $20,400

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.

FY 2011:

FWD Testing was completed at the field projects and the results of the FWD testing have been forwarded to Dynatest.

Plans for FY 2012:

Laboratory testing will be initiated and completed. Following completion of the laboratory work, a final report will be provided.

LINE ITEM 13 **STATE STUDY NUMBER:** 184

TOTAL STUDY BUDGET: $218,224.00 **TOTAL STUDY COST TO DATE:** $67,421.00

DATE STARTED: 11/10/2005 **COMPLETION DATE:** 09/30/2014

Long-Term Field Monitoring and Performance of Paving Fabric Interlayer Systems 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.

Cost Estimate for FY 2012 $23,000.00

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.

FY 2011:

The third annual survey was completed during this year. The data is used to determine the effectiveness of the paving fabric systems. In addition, three core samples from each of the twelve test sections were taken to determine the thickness and conditions of each section. This data will be used during the evaluation of the crack growth.

Plans for FY2012:

The fourth 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.

LINE ITEM 14 **STATE STUDY NUMBER:** 185

TOTAL STUDY BUDGET: $30,000.00 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: 11/10/2005 **COMPLETION DATE:** 09/30/2014

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

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.

Cost Estimate for FY 2012 $3,000.00

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:

Collected the data for the annual survey and submitted same to JSU.

FY 2010:

Collected the data for the annual survey and submitted same to JSU.

Plans for FY 2012:

Data will be collected and submitted to JSU.

LINE ITEM 15 **STATE STUDY NUMBER:** 186

TOTAL STUDY BUDGET: $20,400.00 **TOTAL STUDY COST TO DATE:** $14,900.00

DATE STARTED: 01/30/2006 **COMPLETION DATE:** 12/31/2014

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.

Cost Estimate for FY 2012 $0.00

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 was done in FY10.

FY 2011:

No work was done in FY11.

Plans for FY 2012:

No work is planned for FY2012.

LINE ITEM 16 **STATE STUDY NUMBER:** 206

TOTAL STUDY BUDGET: $239,703.00 **TOTAL STUDY COST TO DATE:** $51,245.00

DATE STARTED: 01/11/2008 **COMPLETION DATE:** 12/31/2013

Performance Specification For Chemically Stabilized Pavement 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.

Cost Estimate for FY 2012 $ 85,000

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.

FY 2011:

The approach to the study was modified near the beginning of FY 11 with MDOT approval. The new approach has similar goals but does not rely as heavily on data from other sources. Three soils and three cementitious materials were selected, obtained, and fundamental properties measured. The needed calorimetry (thermal profile) equipment was fabricated alongside a suitable mold and compaction apparatus to allow compacted specimen fabrication inside a plastic mold. Calorimety testing, variability testing, and strength versus time testing were initiated and made some progress. All applicable soils from the MDOT database from the past five years were also obtaiend for use in analysis; preliminary analysis was performed.

Plans for FY 2012:

Continue calorimetry, strength versus time, and strength variability testing. Testing with multiple compaction methods and curing protocols are also envisioned. The data collected will be analyzed in the context of the existing database of MDOT soils in the next year as applicable. Additional literature review, writing, and analysis will also be performed as applicable. Depending on progress, a field test may be attempted in the later part of the federal FY.

LINE ITEM 17 **STATE STUDY NUMBER:** 207

TOTAL STUDY BUDGET: $135,000.00 **TOTAL STUDY COST TO DATE:** $115,907.92

DATE STARTED: 09/30/2008 **COMPLETION DATE:** 06/30/2012

Open Graded Friction Course for HMA

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 throughout 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.

Cost Estimate for FY 2012 $19,092.08

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.

FY 2011:

Initial evaluation of the proposed coarse 12.5 mixture (modeled after FLDOT specifications) indicaed the mixture would be unsatisfactory. As a result, the gradation was modified and the mixture with the modified gradation appeared to be satisfactory. Laboratory apparatus to test cores and slabs for falling head permeability were fabricated. The apparatus is compatible with components used for the field apparatus used to evaluate the OGFC constructed on I-55. In practice, 19 to 25 mm of OGFC is placed on a dense HMA. Tests on specimens with other than this geometry are not reasonable. Falling head permeability test results on I-55 have been used to select core and slab compactive

efforts for the thin OGFC on dense HMA. A new shear device has been fabricated for use to determine shear srength and interface shear strength. A request has been made to include a test section of OGFC mixtues in a paving project this consturction season.

Plans for FY 2012:

There have been delays on this project and a test section is very important to evaluate field performance. As a result, a no cost extension was requested until June 30, 2012. The extension will provide time for the prposed test section and completion of laboratory tests. Tests include dynamic modulus, shear strength, and interface shear srength as well as texture and friction. For the last two tests a loan of equipment from FHWA has to be scheduled.

LINE ITEM 18 **STATE STUDY NUMBER:** 208

TOTAL STUDY BUDGET: $275,000.00 **TOTAL STUDY COST TO DATE:** $235,840.87

DATE STARTED: 01/11/2008 **COMPLETION DATE:** 12/31/2011

Effect of Coarse Aggregate Cleanliness & Moisture Content on HMA Performance

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Isaac Howard

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.

Cost Estimate for FY 2012 $40,000.00

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.

FY 2011:

Twelve field projects have been visited and samples obtained to characterize effects of aggregate cleanliness and moisture content on stripping potential and long term

performance. The samples have been exposed to a variety of tests including the scanning electron microscope, aggregate characterization tests, density investigation, and wheel tracking. All testing has been completed, analysis has made considerable progress. The final report is well underway and is fairly close to completion.

Plans for FY 2012:

Complete remaining analysis and submit final report to MDOT.

LINE ITEM 19 **STATE STUDY NUMBER:** 211

TOTAL STUDY BUDGET: $330,000.00 **TOTAL STUDY COST TO DATE:** $181,205.94

DATE STARTED: 01/05/2009 **COMPLETION DATE:** 12/31/2011

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.

Cost Estimate for FY 2012 $75,000.00

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.

FY 2011:

The majority of the needed BBR testing was performed during the year. All envisioned IDT testing was performed during FY 11. Some sweep testing and some effort was devoted to the long term performance test. The majority of the data collected in the study thus far has been reduced and placed into tables and figures suitable for the final report. Over 1,000 tests were conducted during FY 11 related to this project.

Plans for FY 2012:

Continue to analyze data collected, and begin to focus on analysis between test methods and not just within test methods. A few hundred sweep tests are scheduled for FY 12, alongside additional effort on the long term performance test. Plans are to begin monitoring a second location during FY 12 in addition to the one section currently being monitored. Some effort will also be given to writing the final report for the study.

LINE ITEM 20 **STATE STUDY NUMBER: 215**

TOTAL STUDY BUDGET: $50,215 **TOTAL STUDY COST TO DATE: $25,825.13**

DATE STARTED: 10/01/08 **COMPLETION DATE:** 12/31/11

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.

FY 2011:

Finalized data analysis and worked on final report.

Plans for FY 2012:

Deliver final report.

LINE ITEM 21 **STATE STUDY NUMBER:** 217

TOTAL STUDY BUDGET: $225,000.00 **TOTAL STUDY COST TO DATE:** $25,086.78

DATE STARTED: 08/26/2009 **COMPLETION DATE:** 12/31/2012

Strain Resistant, Extended Performance Pavements, an Alternate to Subdrainage

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Tom 7White

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.

Cost Estimate for FY 2012 $74,000.00

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.

FY 2011:

Initial evaluation of the proposed coarse 12.5 mixture (modeled after FLDOT specifications) indicated the mixture would be unsatisfactory. As a result, the gradation was modified and the mixture with the modified gradation appeared to be satisfactory. Laboratory apparatus to test cores and slabs for falling head permeability were fabricated. The apparatus is compatible with components used for the field apparatus used to evaluate the OGFC constructed on I-55. In practice, 19 to 25 mm of OGFC is placed on a dense HMA. Tests on specimens with other than this geometry are not reasonable. Falling head permeability test results on I-55 have been used to select core and slab compactive efforts for the thin OGFC on dense HMA. A new shear device has been fabricated for use to determine shear strength and interface shear strength. A request has been made to include a test section of OGFC mixtures in a paving project this construction season.

Plans for FY 2012:

There have been delays on this project and a test section is very important to evaluate field performance. As a result, a no cost extension was requested until June 30, 2012. The extension will provide time for the proposed test section and completion of laboratory tests. Tests include dynamic modulus, shear strength, and interface shear strength as well as texture and friction. For the last two tests a loan of equipment from FHWA has to be scheduled.

LINE ITEM 22 **STATE STUDY NUMBER:** 218

TOTAL STUDY BUDGET: $40,000.00 **TOTAL STUDY COST TO DATE:** $549.00

DATE STARTED: 08/26/2009 **COMPLETION DATE:** 12/31/2012

In-House Support to State Study No. 217

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: William F. Barstis

Objective:

This study will provide in-house support to State Study 217, Strain Resistant, Extended Performance Pavements, an Alternate to Subdrainage.

Cost Estimate for FY 2012 $6,000.00

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.

FY 2011:

No work was done.

Plans for FY 2012:

Data and support will be provided to MSU as needed.

LINE ITEM 23 **STATE STUDY NUMBER:** 221

TOTAL STUDY BUDGET: $120,421.00 **TOTAL STUDY COST TO DATE:** $25,623.35

DATE STARTED: 03/29/2010 **COMPLETION DATE:** 12/31/2011 (ext)

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.

Cost Estimate for FY 2012 $94,797.66

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.

FY 2011:

In the past year, the research team has: Finished reviewing the pavement warranty program in Mississippi and other states, prepared a summary report on the warranty practice in Mississippi and in U.S; Developed a web-based pavement warranty survey questionnaire, circulated the survey questionnaire, followed up on the non-responders, prepared the summary report for the survey study; Acquired the PMS data of non-warranty projects and warranty projects from MDOT, filtered the PMS data for incomplete rehabilitation information, and converted the distress data of warranty projects into editable Excel data format; Conducted analysis for possible ways to classify the data into different traffic and structural condition groups, and adopted the truck volume classifications used by the Planning Division and the structural numbers before functional and structural rehabilitations as the cut off values to group the data; Calculated the structural number before the data collection date of each pavement section, combined the traffic data for each section, and classified the raw distress data into 12 groups; Calculated the deduct points of each distress type for non-warranty

pavement sections, developed and compared the histograms of the deduct points at various service times for both warranty and non-warranty pavement sections, and investigated the appropriateness of the threshold values for each distress type.

Plans for FY 2012:

The research plans to: Extend the histogram analysis to other forms of distress data, such as the raw distress data before converted to deduct points, the distress density data, or composite distress data; Explore other ways to analyze the distress data, such as develop the distress evolvement curves over time, compare the distress evolvement curves for warranty and non-warranty pavement sections, develop the pavement deterioration models based on the distress evolvement curves for warranty and non-warranty pavement sections; and Summarize the study results, and prepare the final project report.

LINE ITEM 24 **STATE STUDY NUMBER:** 222

TOTAL STUDY BUDGET: $131,217.00 **TOTAL STUDY COST TO DATE:** $13,811.72

DATE STARTED: 04/30/2010 **COMPLETION DATE:** 12/31/2011

Best Practices of MDOT's Survey Operation, Organization & Technology Implementation

RESEARCH AGENCY: University of Southern Mississippi

PRINCIPAL INVESTIGATOR: Tulio Sulbaran

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.

Cost Estimate for FY 2012 $117,405.28

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 members 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 follow-up questions for on-site interviews
October 2010: March 2011 on-site interviews at each of the six MDOT district offices

FY 2011:

Prepared, hosted and led a two day Technical Advisory Committee (TAC) meeting July 6th and 7th 2010 at USM(Hattiesburg) during which questions to be asked of various groups of MDOT personnel where finalized and organized into five questionnaires; Edited the five web-based questionnaires following the input from the TAC for final overview by the TAC; Developed a unified website hosted at USM which will be used to make the final research questionnaires easily available for MDOT personnel; Sent final questionnaires versions to the TAC to obtain final feedback; Prepared cover letter that would be sent by USM to questionnaire recipients; Held Teleconference with MDOT project leader to discuss the logistics of deploying the research instrument; Held progress meeting prior to deploying questionnaires; Fine-tuned final electronic version of the questionnaires based on feedback from TAC; Prepared the final five websites for MDOT staff to access the questionnaires; Sent e-mail to the participants of the five groups requesting them to fill out questionnaire; Held Teleconference with MDOT project leader to discuss deployment progress; Monitored server performance to insure quality experience on the part of all participants.

Plans for FY2012:

Begin Statistics Analysis; Prepare first Draft Statistical Analysis Chapter of the Report; Hold progress; meeting to discuss Statistical Analysis; Complete Statistics Analysis; Complete

Draft Report; Obtain Feedback from MDOT; Complete Report; Final Report Presentation and Q&A.

LINE ITEM 25 **STATE STUDY NUMBER:** 223

TOTAL STUDY BUDGET: $152,810.00 **TOTAL STUDY COST TO DATE:** $56,697.82

DATE STARTED: 03/29/2010 **COMPLETION DATE:** 12/31/2012

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.

Cost Estimate for FY 2012 $90,000.00

Progress:

FY 2010:

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

FY 2011:

The Literature review about integrated corridor management has been conducted and finished. Two Meetings with MDOT traffic and planning divisions were held to discuss data collection efforts. Outreaches to Central Mississippi MPO in Jackson, City of Jackson and City of Ridgeland were conduct to get some feedback. A project progress meeting with the traffic engineering division was hold in Jackson, MS in May 19. City of Jackson was contacted to get traffic control device Information on the detour route. Traffic on detour routes (State Street) was surveyed. Raw data was processed to form AM/PM flow rate for further studies. AM/PM traffic patterns were studies as well. A traffic study report was formed for internal use and will be included in final project report. Instead of direct survey of traffic by project team, traffic volumes on I-55 freeway and ramp are attempted alternatively for the cost saving. Video images from MDOT ITS traffic cameras are being recorded. Software to count traffic from video images is sought for and will continue to seek. CORSIM traffic simulation models about I55 freeway and detour routes (Surface Street) have been built separately. Worked with Siemens and Temp Inc. to install an ACTRA system and prepared the lab test and development environment. System device and system architecture have been determined by working as MDOT and equipment providers.

Plans for FY 2012:

Software to count traffic from video images will be sought and video data will be processed by the software and traffic counts on freeway and ramps will be obtained. CORSIM network on Freeway and detour route will be integrated. The combined model will be calibrated. The system model will be developed. The combined freeway and surface detour traffic delay model will be established. Optimum solutions will be sought. The model will be tested in the system architecture, which has been determined by project team, MDOT, and equipment providers. In summary, in the next fiscal year, Task 3 Base Line Traffic Simulation Model Development, Task 4 An Artificial Intelligent Approach, and Task 5 An Optimization Approach are scheduled to finish.

LINE ITEM 22 **STATE STUDY NUMBER:** 225

TOTAL STUDY BUDGET: $94,000.00 **TOTAL STUDY COST TO DATE:** $30,781.04

DATE STARTED: 03/10/2010 **COMPLETION DATE:** 06/30/2012 (ext)

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.

Cost Estimate for FY 2012 $40,000.00

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.

FY 2011:

Turbidity monitoring equipment, including continuous recording sondes as well as siphon samplers, has been deployed at three construction sites around the state. Various deployment methods have been explored to combat silting in of the probes due to receding stormwaters after large stormwater events.

Plans for FY 2012:

We will continue to deploy the turbidity monitoring equipment at streams in various types of topography around the state. Data will be collected to determine which methods work best under different conditions and to evaluate potential turbidity generated by construction practices.

LINE ITEM 27 **STATE STUDY NUMBER:** 226

TOTAL STUDY BUDGET: $93,000.00 **TOTAL STUDY COST TO DATE:** $44,680.70

DATE STARTED: 03/10/2010 **COMPLETION DATE:** 12/31/2011 (ext)

Environmental Management Plan Development for MDOT Laboratories

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.

Cost Estimate for FY 2012 $35,000.00

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 anticipate performing the preliminary audit of the Central Laboratory and developing audit procedures to be used for the audits of the District Laboratories.

FY 2011:

A contract extension has been granted until December, 2011. Work performed from October through December 2010 included project planning and discussions with the State Materials Engineer. On December 17, an initial audit of the Central Laboratory was performed. An additional site visit was required to fill-in information gaps from the initial site visit and was performed on March 4, 2011. The district laboratories were all competed with their initial audits in June 2011.

Plans for FY 2012:

Complete audits of laboratories, draft EMS and/ Report, and present findings and recommendations to MDOT.

LINE ITEM 28 **STATE STUDY NUMBER:** 227

TOTAL STUDY BUDGET: $79,979.00 **TOTAL STUDY COST TO DATE:** $77,385.95

DATE STARTED: 5/30/2010 **COMPLETION DATE:** 12/31/2011

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.

FY 2011:

Laboratory testing was completed for this study. A final report was started, but was not completed because information was needed.

Plans for FY 2012:

BCD will continue working on final report and provide MDOT with a draft final report in September.

LINE ITEM 29 **STATE STUDY NUMBER:** 228

TOTAL STUDY BUDGET: $135,044.00 **TOTAL STUDY COST TO DATE:** $48,517.91

DATE STARTED: 01/29/2010 **COMPLETION DATE:** 12/31/2013

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

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.

Cost Estimate for FY 2012 $32,587.00

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.

FY 2011:

We have completed a year of inventorying and monitoring the growth of plants in the research plots. We are using spotlight counts and trail cameras to monitor deer presence and activity in our research plots. Wildflower seeds have been planted twice in the research plots with little growth obvious. The seasonal internet wildflower guide has been finished for placing on the MDOT website.

Plans for FY 2012:

Continue monitoring and survey public for their perceptions of manicured ROW, ROW with wildflowers and ROW with supplemented wildflower plots. Deer activity will continue to be monitored. Completion of several research components.

LINE ITEM 30 **STATE STUDY NUMBER:** 229

TOTAL STUDY BUDGET: $150,000.00 **TOTAL STUDY COST TO DATE:** $5,467.22

DATE STARTED: 01/29/2010 **COMPLETION DATE:** 09/30/2012

Instrumentation & Computational Modeling for Evaluation of Bridge Substructures Across Waterways

RESEARCH AGENCY: Jackson State University

PRINCIPAL INVESTIGATOR: Wei Zheng

Objective:

A high degree of uncertainty exists for the prediction of lateral earth pressures applied to earth retention structures sited in the swelling clay deposits which exist throughout Mississippi. Current procedures for estimating these pressures are known to include some conservatism, by necessity. In consideration of the high degree of uncertainty in earth pressure estimates and the high costs of design inefficiencies, this research seeks to reduce these inefficiencies via the development of a rational procedure for evaluating stress states which may exist throughout the life of the retaining structure. This will be achieved through the introduction of soil suction measurements to conventional geotechnical analyses. The results of this research program would be subjected to prediction and validation in a field monitoring program involving a constructed retaining wall in an expansive clay deposit.

Cost Estimate for FY 2012 $100,000.00

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.

FY 2011:

The report on literature review on applicable scour sensors and recommendation of selected scour sensors has been presented to MDOT/TAC and staff in Bridge division. The vendors of anticipated sensors have been invited to present further specification and application of these sensors through web-based seminars. After careful study of various sensors in terms of their applicable conditions, installation, durability, measurement reliability, cost, and maintenance, and communicate with MDOT/ACT, the suitable TDR (Time Domain Reflectometers) sensor is selected for the field implementation for the next phase. PI and his research team also have made efforts to develop a probabilistic framework for assessing the scoured bridges. As results, two research papers deal with scour motoring, “An Alternative Approach to Detecting Scour at Bridge Foundation”, and “Assessment of Performance Reliability of Scoured Bridges Based on Probabilistic Inference with In-Suit Monitoring Data”, were presented to the TRB Annual Meeting 2011.

Plans for FY 2012:

The selected TDR sensor will be purchased and tested at the lab for pilot test and operation. The additional staff will be hired with the project budge to carry out the lab work. The TAC will be invited to examine the pilot test and make suggestions. PI and his team finally will present the implementation design of float-out device sensors at the selected bridge and propose the phase II project for the field implementation. PI and his research team also continue efforts to improve efficiency of a probabilistic computational framework for assessing the scoured bridges.

LINE ITEM 31 **STATE STUDY NUMBER:** 231

TOTAL STUDY BUDGET: $97,478.52 **TOTAL STUDY COST TO DATE:** $22,633.00

DATE STARTED: 05/07/2010 **COMPLETION DATE:** 06/30/2012

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).

Cost Estimate for FY 2012 $26,584.00

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.

FY 2011:

Shrinkage measurements were made and excel files updated. Data updates were provided to TAC members. BCD also provided an update to TAC members in a meeting held on December 2, 2010.

Plans for FY 2012:

BCD will complete shrinkage measurements in November 2011 and continue working on final report. BCD will provide MDOT with a draft final report in February 2012. MDOT will review and provide comments on draft final report. BCD will edit draft final report and provide MDOT with a final report on or before June 30, 2012.

LINE ITEM 32 **STATE STUDY NUMBER:** 234

TOTAL STUDY BUDGET: $213,482.41 **TOTAL STUDY COST TO DATE:** $52,214.32

DATE STARTED: 02/02/2011 **COMPLETION DATE:** 06/30/2013

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 2012 $69,057.00

Progress:

FY 2011:

The notice to proceed came in February 2011. Since that time, I have brought on a master of science student to conduct this research. The student conducted a thorough literature review on short statured species that showed promise for quick germination and establishment. A list of species that fit the above criteria was generated and seed located. Each species was tested in a germination chamber to determine whether they may be considered good options for this study. Once a list of species was generated we generated treatments consisting of single species or a mixture of several species. Plots along highway 25 were prepared and seed was planted in early June. Weekly measurements occurred from the time of planting until plot coverage reached 70%. Digital image analysis, volumetric water content, and visual ratings were all used to generate data on this study. A second study looking at the effect of various mulch materials on plant establishment commenced in July. The same measurements listed above were recorded weekly until 70% plot coverage occurred.

Plans for FY 2012:

The studies conducted in 2011 will be repeated to be sure that the results are repeatable.

LINE ITEM 33 **STATE STUDY NUMBER:** 235

TOTAL STUDY BUDGET: $140,875.00 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: 02/22/2011 **COMPLETION DATE:** 12/31/2012

Triple-Bottom Line Assessment of Future Mississippi Intermodal Facility

RESEARCH AGENCY: University of Southern Mississippi

PRINCIPAL INVESTIGATOR: Chad Miller

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 who 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 2012 $122,175.70

Progress:

FY 2011:

Secure executed contract; Began Literature Review; Began to Identify Benchmark facilities; Substantially completed literature review; Substantially completed list of benchmark facility; Initiated data Collection Instrument; Continued the collection of information regarding the benchmark facilities information; Held progress meeting.

Plans for FY 2012:

Prepare List of Stakeholders that will answer questionnaire; Complete data collection instrument; Develop first draft of best practices concept for leadership, strategy, and organizational design; Begin establish potential site requirements based on comparable facility design; Hold progress meetings

LINE ITEM 34 **STATE STUDY NUMBER:** 236

TOTAL STUDY BUDGET: $180,000.00 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: 8/3/2011 **COMPLETION DATE:** 12/31/2012

Expansive Soil (Yazoo Clay) Characterization

RESEARCH AGENCY: U.S. Army Engineer Research and Development Center (ERDC)

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 2012 $45,000.00

Progress:

FY 2011:

This study was chosen for FY11's work program, but a Memorandum of Understanding between ERDC and MDOT had to be developed and approved.

Plans for FY 2012:

We just received the Notice to Proceed and will begin work on this study.

LINE ITEM 35 **STATE STUDY NUMBER:** 238

TOTAL STUDY BUDGET: $81,607.61 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: 02/25/2011 **COMPLETION DATE:** 12/31/2012

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 test 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 2012 $60,000.00

Progress:

FY 2011:

All ten base materials were obtained. These materials included seven crushed concrete base materials and three limestone base materials. Testing was initiated on all ten materials.

Plans for FY 2012:

Laboratory testing will be initiated and completed. Following completion of the laboratory work, a final report will be provided.

LINE ITEM 36 **STATE STUDY NUMBER:** 239

TOTAL STUDY BUDGET: $99,973.99 **TOTAL STUDY COST TO DATE:** $69,289.94

DATE STARTED: 03/02/2011 **COMPLETION DATE:** 12/31/2012

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 2012 $13,000.00

Progress:

FY 2011:

BCD completed all laboratory testing of 84 concrete mixtures and 21 mortar cubes mixtures needed for this study.

Plans for FY 2012:

BCD will complete the draft final report in September 2012.

LINE ITEM 37 **STATE STUDY NUMBER:** 240

TOTAL STUDY BUDGET: $392,186.29 **TOTAL STUDY COST TO DATE:** $29,369.53

DATE STARTED: 02/02/2011 **COMPLETION DATE:** 06/30/2013

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 2012 $187,555.00

Progress:

FY 2011:

The notice to proceed came in February 2011. Since that time, I have brought on a PhD student to conduct this research. The student conducted a thorough literature review on runoff, fertilizer sources, mulches, and species.The summer rainfall simulations began in July 2011 to examine fertilizer sources on time to establishment and fertilizer and

sediment losses during rain events. The seond study of this experiment began in September and examined the various mulch sources on fertilizer and sediment losses during roadside establishment.

Plans for FY 2012:

The studies conducted in 2011 will be repeated to be sure that the results are repeatable.

LINE ITEM 38 **STATE STUDY NUMBER:** 241

TOTAL STUDY BUDGET: $750,000.00 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: No NTP Yet **COMPLETION DATE:** Unknown

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 2012 $325,000.00

Progress:

FY 2011:

This project was chosen for funding for FY11, but contract issues prevented a Notice to Proceed from being issued.

Plans for FY 2012:

We hope to resolve the contract issues and get a Notice to Proceed.

LINE ITEM 39 **STATE STUDY NUMBER:** 242

TOTAL STUDY BUDGET: $200,000 **TOTAL STUDY COST TO DATE:** $0.00

DATE STARTED: No NTP Yet **COMPLETION DATE:** Unknown

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 for FY2012 is $99,000.

New State Studies for FY2012

LINE ITEM 40 **STATE STUDY NUMBER:** 245

TOTAL STUDY BUDGET: $90,503.46 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 3/1/2012 **PROPOSED COMPLETION DATE:** 12/31/2013

Aggregate Absorption in HMA Mixtures

RESEARCH AGENCY: Burns Cooley Dennis, Inc.

PRINCIPAL INVESTIGATOR: L. Allen Cooley, Jr.

Objective:

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

Estimated Cost for FY12: $18,100.69

LINE ITEM 41 **STATE STUDY NUMBER:** 246

TOTAL STUDY BUDGET: $98,493.21 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 3/1/2012 **PROPOSED COMPLETION DATE:** 12/31/2013

Development of Laboratory Mix Design Procedures for RAP Mixes

RESEARCH AGENCY: Burns Cooley Dennis, Inc.

PRINCIPAL INVESTIGATOR: L. Allen Cooley, Jr.

Objective:

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

Estimated Cost for FY12: $19,698.64

LINE ITEM 42 **STATE STUDY NUMBER:** 247

TOTAL STUDY BUDGET: $99,843.50 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 3/1/2012 **PROPOSED COMPLETION DATE:** 12/31/2014

Influence of Cementitious Materials on Shrinkage of Bridge Deck Concrete

RESEARCH AGENCY: Burns Cooley Dennis, Inc.

PRINCIPAL INVESTIGATOR: Robert Varner

Objective:

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

Estimated Cost for FY12: $11,093.72

LINE ITEM 43 **STATE STUDY NUMBER:** 248

TOTAL STUDY BUDGET: $149,948.00 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2014

Cost-Effectiveness Study of the Pavement Warranty Program in Mississippi

RESEARCH AGENCY: Jackson State University

PRINCIPAL INVESTIGATOR: Yan Qi

Objective:

This research will evaluate the cost-effectiveness of MDOT's warranty projects. Through a thorough review of the known experiences in other states, the research team will contemplate on the best practices in pavement warranty contracting. Using the available pavement management system (PMS) and cost data for warranty and non-warranty projects, statistical and economic analyses will be performed to compare the performance and costs of the two contracting procedures and assess the cost-effectiveness of warranty contracts against non-warranty projects. Based on the study, the research will provide suggestions for MDOT to adopt more cost-effective procedures in future warranty practices, yield recommendations to the modification of current warranty provisions and the performance assessment of warranted pavements, and lay a basis upon which criteria of selecting warranty projects could be developed.

Estimated Cost for FY12: $18,743.50

LINE ITEM 44 **STATE STUDY NUMBER:** 250

TOTAL STUDY BUDGET: $291,975.80 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2015

Full Depth Reclamation for High Traffic Applications

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Isaac Howard

Objective:

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

Estimated Cost for FY12: $24,331.32

LINE ITEM 45 **STATE STUDY NUMBER:** 251

TOTAL STUDY BUDGET: $6,000.00 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2015

In-House Support to Full-Depth Reclamation for High-Traffic Applications

RESEARCH AGENCY: MDOT

PRINCIPAL INVESTIGATOR: William Barstis

Objective:

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

Estimated Cost for FY12: $2,000

LINE ITEM 46 **STATE STUDY NUMBER:** 252

TOTAL STUDY BUDGET: $79,907.78 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2013

Acceptable Vibrations on Green Concrete

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Seamus Freyne

Objective:

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

Estimated Cost for FY12: $19,976.95

LINE ITEM 47 **STATE STUDY NUMBER:** 253

TOTAL STUDY BUDGET: $78,177.60 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2013

Driver Speed Limit Compliance in School Zones: Assessing the Impact of Sign Saturation

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Li Zhang

Objective:

School zones and their corresponding speed reduction signs are placed on roadways with an admirable intention: to slow driver speeds thereby improving safety in the area. However, the presence of too many signs may cause oversaturation amongst drivers, leading many of them to ignore the school zones while driving. The objective of this project is to evaluate the impact of sign saturation on driver behavior. This will be accomplished by studying driver behavior in school zones with varying sign placement and density. Changes in driver's speed will be the main focus of data collection. The results would provide MDOT with empirically based guidelines on the effectiveness of introducing new school zones in Mississippi. MDOT decision makers would be able to improve the effectiveness of existing school zones by avoiding oversaturation of similar signs on the roadway.

Estimated Cost for FY12: $19,544.40

LINE ITEM 48 **STATE STUDY NUMBER:** 254

TOTAL STUDY BUDGET: $177,707.00 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2014

Optimizing Roadway Vertical Alignment Design with Microstation and Geopak

RESEARCH AGENCY: Mississippi State University

PRINCIPAL INVESTIGATOR: Li Zhang

Objective:

The objective of this research is to provide roadway design engineer with a tool to be integrated with existing MDOT roadway design process. The tool will provide an optimized vertical alignment of roadway to satisfy the Geometric Design of Highways and Streets requirement by AASHTO and engineer's specification of elevations. This will be accomplished by using an optimization algorithm to find the VPI stations and elevations along designed section of roadway. The optimization is defined by engineers, could be balancing the cut and fill volumes, minimizing earthwork or minimizing construction cost. The program will provide the engineers with a simple alternative to manually designing the vertical alignment. The software will be designed to be user friendly.

Estimated Cost for FY12: $22,213.38

LINE ITEM 49 **STATE STUDY NUMBER:** 255

TOTAL STUDY BUDGET: $ 71,500.00 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2013

A Synthesis Study of Noncontact Nondestructive Evaluation of Top-down Cracking in Asphalt Pavements

RESEARCH AGENCY: University of Mississippi

PRINCIPAL INVESTIGATOR: Waheed Uddin

Objective:

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

Estimated Cost for FY12: $11,916.67

LINE ITEM 50 **STATE STUDY NUMBER:** 256

TOTAL STUDY BUDGET: $160,000.00 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2014

Simulation of Emergency Evacuation for Grand Gulf Nuclear Power Plant at Port Gibson, Mississippi

RESEARCH AGENCY: Jackson State University

PRINCIPAL INVESTIGATOR: Feng Wang

Objective:

The specific objectives of this study include:

1. Understand the radiological nature of a nuclear power plant emergency and disseminating the dynamic evacuation information for the residents living in the 50-mile radius and beyond to ensure an efficient and effective response to possible accidents in Grand Gulf nuclear power plant in Port Gibson, Mississippi;
2. Verify the feasibility of applying dynamic modeling methodology using a selected commercial simulation model to understand the evacuation traffic characteristics in normal, congested and disrupted road conditions for the defined emergency planning zones according to different levels power plant emergency classifications;
3. Identify the potential congested points or vulnerable segments in the evacuation network and implement traffic congestion mitigation strategies to enable a large-scale evacuation under nuclear power plant emergency conditions;
4. Analyze the effectiveness of different emergency response strategies for the transportation evacuation network under the radiological emergency conditions in the Grand Gulf Nuclear Power Plant emergency in Mississippi.

Estimated Cost for FY12: $20,000.00

LINE ITEM 51 **STATE STUDY NUMBER:** 257

TOTAL STUDY BUDGET: $311,881.63 **TOTAL STUDY COST TO DATE:** $0.00

PROPOSED START DATE: 2/1/2012 **PROPOSED COMPLETION DATE:** 6/30/2014

Improved Characterization of Truck Traffic Loading for MDOT Pavement Design

RESEARCH AGENCY: Applied Research Associates

PRINCIPAL INVESTIGATOR: Chetana Rao

Objective:

The Mississippi Department of Transportation (MDOT) is committed to improving its pavement design tools and integration of design with construction specifications and planning needs to develop and quantify cost-effective designs. MDOT has designed pavements in accordance with the 1972 American Association of State Highway and Transportation Officials (AASHTO) procedure but now is implementing the Mechanistic-Empirical Pavement Design Guide (MEPDG). The MEPDG is a new pavement design procedure that uses pavement responses and other site features for increasing the accuracy of predicting pavement distresses over time. Notable among MDOT's research efforts for adoption of this new procedure are State Study 163, which involved the development of a detailed implementation plan, and the ongoing State Study 170, which involves the calibration and validation of the MEPDG distress transfer functions to Mississippi's conditions and construction specifications. In addition, Mississippi has been a member of the AASHTO task force overseeing the development of the AASHTOWare pavement design software, DARWin-ME.

MDOT recognizes the enhanced capabilities and complexity of the MEPDG procedure and acknowledges the need for improved characterization of the various design inputs that affect the accuracy of pavement performance predictions. Several MDOT research studies are underway, or have been completed, to support the implementation process either directly or indirectly. These studies, largely complementary to the two primary research

studies cited above, were designed to provide the tools necessary to improve the accuracy and consistency in the MEPDG performance predictions. They have covered various aspects of the MEPDG design procedure and implementation, including laboratory tests for material characterization, field tests to characterize in-situ materials using conventional and innovative technologies that can be used in rehabilitation designs, development of a materials library, development of virtual climate files, and advanced characterization of traffic to account for traffic impacts in mechanistic pavement design.

The MDOT Research Division has been following the national efforts in the development of the MEPDG closely and has stayed current with the development of the DARWin-ME software. MDOT management personnel decided to implement DARWin-ME to stay at the cutting edge and have, in fact, approved revisions to the scope and schedule of State Study 170 to perform MDOT calibration using DARWin-ME (instead of with the MEPDG version 1.0).

Estimated Cost for FY12: $145,355.78

100% Federally Funded Studies (NCHRP, TRB, AASHTO, and Pooled Funds)

NCHRP/TRB

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 from SPR Part II funds.

Cost Estimate for 2012 SPR Part II Funds: $523,590.00

Transportation Research Board

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 paid using SP&R Part II funds.

Cost Estimate for 2012 SPR Part II Funds: $110,135.00

Continuing Pooled Fund Studies

Auburn University Accelerated Pavement Loading Facility -TPF-5(208)

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.

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

Transportation Library Connectivity and Development -TPF-5(237)

Host Agency: Missouri 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 was assumed by Missouri DOT in FY11.

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

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

Construction of Crack-Free Bridge Decks (Phase II) -TPF-5(174)

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

ITS Pooled Fund Program (ENTERPRISE) -TPF-5(231)

Host Agency: Michigan Department of Transportation

Created in 1991, Enterprise was an agreement which funded allocation of research done in the field of Intelligent Transformation 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 2011 – $30,000 FY 2012 - $30,000 FY 2014 - $30,000

Continued Advancements in Load and Resistance Factor Design (LRFD) for -TPF-5(227)

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

Bridge Pier Scour Research -TPF-5(211)

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

Implementing Maintenance Innovations from State to State (IMISS--formerly called Accelerating Innovation Implementation and Technology Transfer Across State Lines) -TPF-5(239)

Host Agency: California Department of Transportation

This pooled fund was approved in last year's work program as Accelerating Innovation Implementation and Technology Transfer Across State Lines. However, the name has changed to Implementing Maintenance Innovations from State to State (IMISS).

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

Improving the Quality of Pavement Profilers -TPF-5(063)

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

Rejoined Pooled Fund Studies for FY2012

These are pooled funds that fall into two categories:

1. The pooled fund ended in the previous FY, but the host agency is resoliciting, and MDOT is contributing for the new time period.
2. The pooled fund continued, but MDOT initially contributed, stopped for a time, and now wishes to contribute again.

In rejoined pooled funds new funding will need approval.

Southeast Transportation Research Consortium -TPF-5(212)

Host Agency: Louisiana Department of Transportation and Development

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.

FY2009-$5,000	FY2010 - $5,000	FY2011 - $5,000
FY2012- $5,000	FY2013 - $5,000	FY 2014 - $5,000

Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements (formerly Analysis of MnRoad Whitetopping Performance Data for a Module in the ME Design Guide)

Host Agency: Minnesota Department of Transportation

The primary purpose of this project is to create a unified national design guide for thin and ultrathin concrete overlays of existing asphalt pavements. This consists of the following distinct objectives:

1. Study and understand the field performance history of TCOAP and UTCOAP as demonstrated by various research test sections. These include current (and future) test sections at the MnROAD facility, accelerated loading facility test sections (FHWA), and other test sections installed and monitored by various local, national and international agencies.
2. Develop a design guide for concrete overlays of existing asphalt pavements utilizing existing validated performance models, as well as new analytical models derived to address design aspects not currently considered in existing methods. The design guide will be based on mechanistic-empirical principles, including the effects of various concrete overlay and existing asphalt materials, panel thickness and geometry, joint opening and stiffness, traffic loads, and climates under which they must perform.

3. Create a user-friendly design guide software program and user¿s manual. The program format should be such that it could become a module in the future national Mechanistic-Empirical Pavement Design Guide (MEPDG) for highway pavements.

This pooled fund is now titled Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements but is a continuation of Analysis of MnRoad Whitetopping Performance Data for a Module in the ME Design Guide. We are paying a one-time fee of $9,200 to wrap this study up.

FY 2012 - $9,200

Pavement Surface Properties Consortium: A Research Program

Host Agency: Virginia Department of Transportation

The objective of this pooled fund is to establish a research program focused on enhancing the level of service provided by the roadway transportation system through optimized pavement surface texture characteristics. The initial focus of the program will be the application of inertial and laser-based equipment for measuring these properties. Other questions and issues will be identified in cooperation with the pool fund participants. An interactive project solicitation process will be used to request feedback from all participants. **Note: We previously participated in this pooled fund from 2007 to 2010 and paid $20,000 each of those four years and now are rejoining it for four more years at $20,000 each.**

FY2007-$20,000	FY2008-$20,000	FY2009-$20,000	FY2010-$20,000
FY2012-$20,000	FY2013-$20,000	FY2014-$20,000	FY2015-$20,000

New Pooled Fund Studies for FY2012

2012 Multi-State Asset Management Implementation Workshop

Host Agency: California Department of Transportation

There is a significant interest among State and local transportation organizations in implementing Asset Management. To date, more than 25 States have already undertaken several forms of the initiative. The National Conference on Transportation Asset Management, co-sponsored by TRB and AASHTO and others, will help FHWA ensure that transportation agencies have the opportunity to make asset management principles work in their organization. The conference is designed to be a forum for practitioners, researchers, and others to share information on a variety of transportation asset management topics. The conference will cover surface transportation modes only. Sessions will cover a broad range of topics that will be of interest to agencies that are in the early stages of implementation of asset management as well as agencies that are in later stages of the implementation process. The objectives of the study are to

1. provide a conduit for enhancing the practical knowledge of member states concerning asset management implementation
2. enhance the working knowledge of the asset management community, and
3. provide for continued information sharing among member states beyond the 2012 conference.

FY 2012 – $10,000 FY 2013 – $10,000

Highway Safety Manual Implementation

Host Agency: Federal Highway Administration

The Highway Safety Manual (2010), 1st Edition, was published by AASHTO in 2010. The HSM provides the best factual information and tools in a useful form to facilitate roadway planning, design, operations, and maintenance decisions based on precise consideration of their safety consequences. The primary focus of the HSM is the introduction and development of analytical tools for predicting the impact of transportation project and program decisions on road safety.

The AASHTO Standing Committee on Highway Traffic Safety has established a goal to institutionalize the AASHTO Highway Safety Manual (HSM) and its associated analytical tools to make data-driven decisions, advance the science of safety, and to ultimately reduce fatalities and serious injuries. One proposed action in support of that goal is to establish and maintain an HSM Implementation Transportation Pooled-Fund Study.

The objectives of the study are (1) to advance ongoing efforts by lead states to implement the HSM, and (2) to expand implementation to all states. This study would be coordinated with other ongoing and planned implementation activities sponsored by AASHTO, FHWA, and TRB, including NCHRP Project 17-50 "Lead States Initiative for Implementing the Highway Safety Manual." It will also be coordinated with projects that develop content for future editions of the HSM including NCHRP Project 17-45 "Enhanced Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges," NCHRP Project 17-54 "Consideration of Roadside Features in the Highway Safety Manual," and Transportation Pooled-Fund Study TPF-5(099) "Evaluation of Low Cost Safety Improvements."

FY 2012 - $20,000 FY 2013 - $20,000 FY 2014 - $20,000 FY 2015 - $20,000

Next-Generation Transportation Construction Management

Host Agency: Colorado Department of Transportation

The Transportation Construction Management Group (TCM) is a coordinated effort between AASHTO, FHWA, ARTBA, AGC, and academia with representatives whose shared goal is the improvement of transportation construction management practices. This group was initiated to facilitate the sharing of best practices and to expedite the dissemination of information regarding new technology, procedures and programs. The objectives of this study are to

1. Improve the efficiency of the delivery of transportation projects through the use of appropriate project delivery methods, contracting methods and contract management provisions, new technology, new communication and documentation practices
2. Improve the quality of construction through the use of advanced construction management tools, practices, and performance measures and
3. Improve Risk Management Procedures.

FY 2012 – $25,000 FY 2013 – $25,000 FY 2014 – $25,000

Real Time Current Velocity (RTCV) Pilot Project for Mississippi River Bridges

Host Agency: Mississippi Department of Transportation

One of the most critical parameters for safe navigation on the Mississippi River is knowledge of the river currents. Experienced captains know the expected river conditions in key locations and how to read the surface of the river to make critical decisions on how to proceed. The currents in the approaches (mainly up-river) to the Mississippi River bridges (MRBs) are of special interest to tow captains. The MRBs @ Natchez, Vicksburg and Greenville have all been struck by barges. Some of these incidents have the potential to be catastrophic and highlight the need to undertake measures to improve navigation around critical structures.

High river stages on the Mississippi River result in high, turbulent flows that significantly impact a vessel's ability to safely navigate on the river. Consequently, collisions of vessels with bridges, other structures and other vessels tend to increase during high river stages. Presently, very limited real-time river current data are being measured and, therefore, river pilots are forced to rely on visual observations and experience to assess river currents. Not even the US Coast Guard has access to real-time current measurements and must rely on observations of how well river traffic is proceeding to provide guidance on river operations.

Objectives:

Demonstrate the capability of a real-time current velocity (RTCV) monitoring system in assisting in river traffic safety. Acoustic Doppler Current Profiler (ADCP) (ADCP is a sonar that attempts to produce a record of water current velocities for a range of depths. ADCPs can be configured in many ways: side-listening, into rivers and canals for long term continuous current velocity measurements, downward-listening and mounted on boats for instantaneous surveys in the ocean or rivers, and mounted on moorings, or the seabed for long term current & wave studies) will be used to acquire real-time, three dimensional, river current velocities and data which will be transmitted via an existing Automatic Identification System (AIS) to surrounding vessels.

FY2012 - $50,000 (18 months)

Regional Sustainable Pavement Consortium

Host Agency: Virginia Department of Transportation

The provision and maintenance of a reliable and sustainable transportation infrastructure is a priority for all transportation agencies. Because of its importance, its ubiquity and past and ongoing investment, highway construction is one of the most important areas of infrastructure where sustainability must be achieved. Therefore, a broadly stated sustainability framework for research, which includes a full understanding of sustainable pavement assets, has the possibility of delivering real benefits. A concerted and collaborative effort between state Departments of Transportation (DOTs) can maximize those benefits. For this reason, this proposed consortium is intended to bring DOTs together to share ideas, experiences, and to set up a common agenda to encourage the use and development of a sustainability framework for pavements. In addition, the proposed consortium will complement and support the implementation by the consortium members of the activities being pursued by the FHWA Sustainable Pavements Program. This program will establish and coordinate a Sustainable Pavements technical Working Group, develop guidelines, evaluate and assess existing tools, and assist technology transfer and deployment activities pertaining to sustainable pavements. The objective of the proposed pooled-fund project is to establish a research consortium focused on enhancing pavement sustainability.

FY 2012 – $25,000 FY 2013 – $25,000 FY 2014 – $25,000 FY 2015 - $25,000

Shaking Table Testing to Evaluate Effectiveness of Vertical Drains for Liquefaction Mitigation (now titled Full Scale Shake Testing to Evaluate Seismic Performance of Reinforced Soil Walls)

Host Agency: Utah Department of Transportation

Although blast liquefaction studies have shown that vertical drains greatly increase the rate of drainage under field conditions, they have not prevented liquefaction. In addition, it is difficult to compare pore pressure development during blasting and an earthquake. At present, no direct field or laboratory data is available to confirm whether or not the drains have the ability to limit pore pressures and resulting settlement to acceptable levels. However, shaking table tests can be conducted with a large shear box (20 ft high, 9 ft wide, 16 ft long) containing drains at SUNY-Buffalo and compared with identical testing currently underway for another funded study. Tests will be performed at progressively higher acceleration levels and durations to allow comparison of performance (pore pressure & settlement) for earthquake conditions.

FY2012 - $10,000 FY2013 - $10,000

Traffic Signal Systems Operation and Management

Host Agency: Indiana Department of Transportation

Signalized arterial represent a substantial component of the highway transportation network in the United States. The National Transportation Operations Coalition (NTOC) in their 2007 Traffic Signal Report Card noted that nationally 5 to 10 percent of all traffic delay is caused by improper traffic signal timings along major roadways. In 2007, the National Report Card for overall traffic signal systems operations was a D. The situation is not expected to improve as travel demand is forecast to grow significantly faster than network capacity. The increase in national attention on sustainable and livable communities necessitate a concentrated effort be placed upon improved management and operation of our nations traffic signal system inventory.

The Transportation Management Center (TMC) Pooled fund study (SPR-2(207)) initiated in 2000, has been very successful at generating consensus on best management practices for traffic management centers oriented mainly towards freeway operations. It is desirable to develop a similar pooled fund study oriented toward traffic signal operations and management that would complement SPR-2(207) and engage a broad cross section of agencies on the leading edge of active traffic signal management.

Develop a network of transportation agencies to:

1. Develop consensus on operational standards of performance,
2. Define a central management model that can leverage commercial wireless IP offerings that can be competitively outsourced, and
3. Management principles for using a central system to identify when and where resources are most needed to maximize return on investment.

The level of participation and associated funding commitments will allow for additional opportunities over time or in parallel to explore additional traffic signal initiatives beyond those described herein. For example, the evaluation of adaptive control field deployments and associated systems engineering guidance documents under development by FHWA.

FY 2012 - $25,000 FY 2013 - $25,000 FY 2014 - $25,000

AASHTO Technical Services Program (TSP)

These are new contributions for FY2012 and will be in each work program in the future.

AASHTO Equipment Management Technical Services Program (EMSTP)

The AASHTO Equipment Management Technical Services Program (EMSTP) was formerly called AETO and can be found at www.emtsp.org. It is associated with the AASHTO Subcommittee on Maintenance and was established in 2008.

Equipment fleets comprise a significant asset investment and are a large portion of all public works agencies' budgets and expenses. The effectiveness of such equipment fleet operations affects the public agencies' ability to adequately perform normal activities and successfully respond to emergency events. In addition, the rate of advancement of technology associated with roadway construction and maintenance equipment is so rapid that it is nearly impossible for individual public agencies to stay abreast of the latest technologies, evaluate these technologies, and implement the most cost-effective technologies to gain the advantages that they could provide.

The AASHTO Equipment Management Technical Services Program (EMSTP) will keep current data pertaining to new types of equipment along with all advancing innovation and technology directly related to equipment fleet. This technical service program will also help advance asset management principles in the management of these fleets. This information will disseminated throughout the state DOTs to reduce costs of maintenance operations.

Cost is $3,000 per year.

FY 2012: $3,000

AASHTO Load and Resistance Factor Design (LRFD)

Load and Resistance Factor Design (LRFD) Bridges and Structures Specification Maintenance (LRFD) is associated with the AASHTO Subcommittee on Bridges and Structures. On April 21, 2002, the AASHTO Board of Directors approved policy resolution PR-4-02 endorsing the project, "Long-Term Maintenance of Load and Resistance Factor Design (LRFD) Specifications." In order to continue funding for these purposes, a Transportation Pooled Fund, TPF-5(068) was set up with the Iowa DOT, and states were able to contribute to the fund. This pooled fund has been successfully in place since 2003. The AASHTO Highway Subcommittee on Bridges and Structures unanimously approved the need for continuing to fund this program at their annual meeting in May of 2006. The pooled fund program through Iowa DOT was extended until Fiscal Year 2010, at which point it was closed out. Because the LRFD specifications still need further research and development to maintain quality documents, AASHTO has determined the necessity of keeping this program in place and has now taken over the program as an AASHTO Technical Service Program. In December of 2009 FHWA determined that this program met the criteria for use of 100% State Planning and Research (SP&R) funds. This program continues to support the maintenance and updating of all the LRFD Design specifications. Cost is $10,000 per year.

FY 2012: $10,000

AASHTO National Transportation Product Evaluation Program (NTPEP)

Host Agency: AASHTO

National Transportation Product Evaluation Program (NTPEP) is associated with the AASHTO Subcommittee on Materials and can be found at www.ntpep.org. NTPEP was established by the AASHTO Board of Directors in 1994 to cooperatively test manufactured transportation products that are of common interest to all member departments and share the results from these laboratory and field evaluations. NTPEP is able to provide coordinated evaluations on various products and materials in the areas of traffic, safety, construction, and maintenance. The program is evaluated every four years for financial viability, its effectiveness, the funding mechanisms to support it, and the need for its continuance. NTPEP is run through a joint funding concept between participating industry and AASHTO members, with revenue from industry being used primarily for the testing of and reporting on their products, and with voluntary member dues used primarily for support services to administer NTPEP. Cost is $7,500 per year

FY 2012: $ 7,500

AASHTO Product Evaluation Listing (APEL)

AASHTO Product Evaluation Listing (APEL) is associated with the AASHTO Subcommittee on Materials and can be found at apel.transportation.org. APEL is a web-based technical service program that serves as a clearinghouse for state-level evaluation and testing of new and/or proprietary engineered transportation products. This program offers a substantial cost benefit to member departments, as well as to manufacturers of transportation products. The program allows manufacturers to submit products online for evaluation to multiple agencies. For the member departments, the program allows agencies to customize and automate the work flow process for new product evaluations. The program also shares individual member departments' products evaluations for the benefit of AASHTO, which lowers the evaluation costs. The APEL Council under the Subcommittee on Materials is charged with program guidance and development. Cost is $1,200 per year.

FY 2012: $ 1,200

AASHTO Technical Implementation Group (TIG)

TIG was established to identify and champion the implementation of a select few "ready to use" technologies, products, or processes that were likely to yield benefits to the users. TIG scans the horizon for outstanding advancements in transportation technology and invests time and money to accelerate their adoption by agencies nationwide. TIG is associated with the AASHTO Standing Committee on Highways, Research Advisory Committee.

Each year, TIG selects 3-4 highly valuable, but largely unrecognized procedures, processes, software, devices, or other innovations that have been adopted by at least one agency, are market-ready, and are available for use by other interested agencies. TIG's objective is to share information with AASHTO member agencies, local agencies, and their industry partners to improve the nation's transportation system. Cost is $6,000 per year.

FY 2012: $ 6,000

AASHTO Technical Service Program to Develop AASHTO Materials Standards (DAMS)

Technical Service Program to Develop AASHTO Materials Standards (DAMS) is associated with the AASHTO Subcommittee on Materials. The primary function of this AASHTO Technical Service Program is to support the participation of member departments at the Subcommittee on Materials annual meeting, which is convened for the discussion of outstanding ballot items, development of new standards, and revisions and updates to current standards. A secondary role may include the financial support for the involvement of professional writers in the development of new specifications or major revisions of current specifications. AASHTO Member Departments will be asked to sponsor this Technical Service Program by contributing a voluntary assessment of $5,000 per sponsor annually to fund the establishment and ongoing activities of the program. Cost is $5,000 per year.

FY 2012: $ 5,000

AASHTO Transportation System Preservation Technical Service Program (TSP^2)

Transportation System Preservation Technical Service Program (TSP2) is associated with the AASHTO Subcommittee on Maintenance. Its website is www.tsp2.org. It supports the research, technical, and program needs of the member states in their development and implementation of their own preservation programs for both pavement and bridges. AASHTO, in collaboration with the National Center for Pavement Preservation, has successfully implemented this technical service program to assist states with their pavement preservation efforts, including the establishment of regional pavement preservation partnerships.

An Oversight Panel guides the implementation and operation of the TSP2 program, including representation from the AASHTO Subcommittees on Bridges and Structures, Maintenance, Materials, and Asset Management, and Design's Joint Technical Committee on Pavements, as well as members from each of the AASHTO regions.

TSP2 has proven to be a successful program for pavement preservation and, with its recent expansion, bridges will be incorporated into the program. In this increasingly tight economy, participation in this program will help state DOTs preserve not only their pavements but their bridges as well. Cost is $20,000 per year.

FY 2012: $ 20,000