

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2004**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Effect of Pavement Thickness on Superpave Mix Permeability and Density</b>	<b>Project ID: 0092-02-14c</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Error! Bookmark not defined.</b>	<b>Approved Starting Date: Nov 7, 2001</b>
<b>Approved by COR/Steering Committee: \$225,321.00</b>	<b>Approved Ending Date: Nov 7, 2004</b>
<b>Project Investigator (agency &amp; contact): Jeff Russell: UW-Madison</b>	

**Description:** It is well recognized that density that could be achieved in the field is significantly affected by the maximum aggregate size of aggregates, the gradation, and the lift thickness. It is also well known that permeability of asphalt mixtures is a function of aggregate gradation, density achieved, and distribution of air voids. With the shift in mixture designs to Superpave methods, gradations on the coarse side of the maximum density line are being widely recommended and used. These gradations are unique in their densification characteristics and are claimed to be more permeable. It is not clear whether this trend is due to changes in the air voids distribution, the lower densities being achieved, or both. This trend is of special importance to Wisconsin as the shift to Superpave mixtures is underway.

Wisconsin has traditionally used 75-mm dense graded HMA overlays placed in two lifts, a 44-mm binder lift and a 31-mm surface lift. These lift thicknesses are based on the traditional rule that lift thickness be twice the maximum aggregate size. Starting in the year 2000, Wisconsin has decided to move from Marshall design to Superpave mixture design. Superpave mixes tend to be harder to compact. Additionally, Superpave guidelines recommend the lift thickness be a minimum of 3 times the nominal maximum aggregate size. This poses two problems for Wisconsin:

1. The first is that the current design criteria for overlay thickness will result in thin-lifts of Superpave mixes that the AASHTO Lead States Committee has reported as having problems with pavement permeability and achieving pavement density.
2. The second is that these mixes may be impossible to compact in the field contributing to the permeability problem, even though they meet laboratory density criteria.

There is a need, therefore, for a study to evaluate the potential problems and to establish procedures to relate laboratory density to field study and to estimate or measure permeability during mixture design. The study also needs to define the relationship between lift thickness and aggregate gradations that will minimize the densification problem and address the permeability concerns.

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
<b>\$225,321.00</b>	<b>\$56,330.25</b>	\$11,058.02	<b>\$173,192.79</b>	<b>88 (%)</b>

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**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

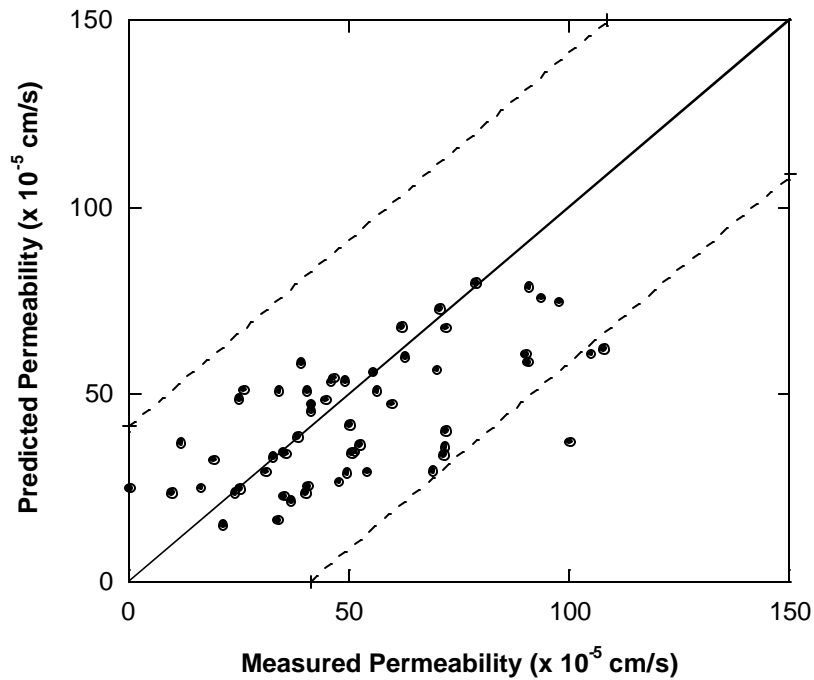
During the last quarter activities were focused on three main activities: (1) Data analysis, (2) laboratory work, and (3) writing of the Final Report. The following sections summarize the progress achieved for each activity. A work plan for next quarter is also described.

**Data Analysis**

The analysis of field data for density and permeability has been completed. The results and a summary of findings was presented to the TOC members and plans for completing the laboratory testing to verify recommended procedure was discussed and approved.

**Laboratory Work**

To validate the proposed compaction and permeability estimate procedure described in the previous quarterly report, the loose mixes from 10 projects were compacted. The lab permeability was then measured for these compacted specimens. The predicted permeability of field specimens was determined based on the compacted specimens. Figure 1 shows the correlation between the predicted permeability and permeability of field cores measured in the field.



**Figure 1 Predicted vs. Measured Permeability**

This result was presented to the TOC committee members in a meeting on June 2. The compaction and permeability estimation procedure used in this analysis was previously approved by the TOC in a previous meeting. The rest of loose mix from 6 projects will be compacted to validate this procedure in the next quarter.

**Writing of the Final Report**

The final report outline was reviewed and approved by the TOC. After the meeting on June 2, project team members have started working on the final report. The final report will be submitted to the TOC committees by August 1.

**Work Next Quarter:**

- A meeting to discuss the final report among team members is scheduled for July 14 at UW-Madison. The report draft will be completed and will be submitted to the TOC committees by August 1.
- Next project meeting with TOC members is scheduled on Friday, August 6. The conclusions, guidelines, and criteria will be discussed in this meeting.

**Circumstances affecting progress/budget:**

**None at this time.**

**Gantt Chart:**

PROJECT I.D.0092-02-14	STARTING DATE	COMPLETION DATE	MONTH	Report#																	
<b>PROJECT # WISDOT</b>	<b>7-Nov-01</b>	<b>7-Nov-04</b>	<b>15-July</b>	<b>11</b>																	
CONSULTANT FIRM NAME		% TIME ELAPSED	TOTAL PROJECT FUNDING				CONTRACT FUNDING				PERCENT OF										
<b>UW - MADISON</b>							100%														
NAME OF STUDY													PROJECT	TASK	TASK	PROJECT					
<b>THE EFFECT OF PAVEMENT THICKNESS ON SUPERPAVE MIX PERMEABILITY AND DENSITY</b>													PROJECT	COMPLETE	COMPLETE	COMPLETE					
<b>TASK *</b>	YEAR	2001				2002				2003				2004							
	MONTH	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	Qtr 7	Qtr 8	Qtr 9	Qtr 10	Qtr 11	Qtr 12	Qtr 13							
<b>TASK 1 :</b> Review national and regional research on consistent aggregate sources		█	█	█											10		100	10			
<b>TASK 2 :</b> Identify commercial HMA plants with consistent aggregate sources		█	█	█											8		100	8			
<b>TASK 3 :</b> Identify project for field comparisons					█	█	█	█	█	█					8		100	8			
<b>TASK 4 :</b> Evaluation of effect of directional hydraulic conductivity					█	█	█	█	█	█					10		90	9			
<b>TASK 5 :</b> Conduct field and laboratory studies					█	█	█	█	█	█					25		97	24.25			
<b>TASK 6 :</b> Analyze data and prepare guidelines					█	█	█	█	█	█	█				25		95	23.75			
<b>TASK 7 :</b> Prepare and submit final report													█	█	10		50	5			
Final Report review and revisions													█	█	2		0	0			
Final Report Submittal													█		2		0	0			
Scheduled																					
Completed													100			88					

**Note: Gantt chart shown in State Fiscal Year Quarters**

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2004**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Field Validation of Wisconsin Modified Binder Selection Guidelines</b>	<b>Project ID: 0092-03-13</b>
<b>Administrative Contact:</b> Nina McLawhorn	<b>Sponsor:</b>
<b>WisDOT Technical Contact:</b> Len Makowski	<b>Approved Starting Date:</b> Jan 31, 2003
<b>Approved by COR/Steering Committee:</b> \$125,006.00	<b>Approved Ending Date:</b> Jul 31, 2006
<b>Project Investigator (agency &amp; contact):</b> Hussain Bahia: UW-Madison	

**Description:** The study will be conducted over 36 months, and be completed in 5 phases:  
 Task 1: Select Field Section and Define Grades to be Compared  
 Task 2: Collect Samples and Conduct Testing  
 Task 3: Monitor Performance of Sections  
 Task 4: Database Development  
 Task 5: Reporting

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
<b>\$125,006.00</b>	<b>\$31,251.50</b>	\$13,371.00	<b>\$22,555.53</b>	<b>29 (%)</b>

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**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

Meetings

A meeting was held with all the parties involved in the project to coordinate the main field tasks during the construction season. Judie Ryan, Tom Brokaw and James Bongard from the DOT; Hussain Bahia, Rodrigo Delgadillo, Ahmed Faheem and Arif Kathri from UW-Madison. The main points addressed during the meeting were the collection of binder samples for testing, the steps to follow in finding projects for compaction with low shear viscosity temperatures and the main aspects of the performance database of the DOT.

A number of minor meetings and contacts were also carried out during the following weeks after the main meeting. The purpose of those meetings was to gather updates on the paving projects for the season and to pick up samples for projects already constructed.

Collection of Samples

A total of 25 binder samples of the binders of specific PG grades, pre-selected for the study, were collected for testing during this quarter. The main source of samples was the quality control samples of the binders tested in the DOT laboratory and retained from the 2003 projects. Also, some of the samples were obtained from this year's projects, directly from the asphalt plant during the paving.

Lab Work

Testing of the binders was started for the low temperature and rutting parameters. Some of the results of the testing are available but not processed. They will be reported in the next quarter.

**Work Next Quarter:**

For the next quarter, the main focus of the project will be completing the collection of samples and continuing with the testing of the obtained samples. Of main interest is finding projects where binders like PG76-34 or PG 70-34 could be used, because these are special grades that are specially difficult to find. Another important task will be coordinating with the DOT and contractors for using the low shear viscosity mixing and compaction temperatures in some projects using modified binders.

**Circumstances affecting progress/budget:**

The main problem in progress of this quarter was the difficulty to find some specific binder grades. Some grades like PG76-34 or PG70-34 are difficult to find because there are not projects for this season that specified those binders. This problem has been discussed with the DOT staff to seek help in solving it.

**Gantt Chart:**

PROJECT I.D. <b>PROJECT # WISDOT</b>		STARTING DATE <b>Jan-31-03</b>	COMPLETION DATE <b>Jul-31-06</b>	MONTH <b>OCT - 09</b>				REPORT # <b>3</b>						
CONSULTANT FIRM NAME <b>UNIVERSITY OF WISCONSIN - MADISON</b>			% TIME ELAPSED 43%	TOTAL PROJECT FUNDING 125.006				CONTRACT FUNDING 100%						
NAME OF STUDY <b>FIELD VALIDATION OF WISCONSIN MODIFIED BINDER SELECTION GUIDELINES</b>														
TASK *	YEAR	2003				2004				2005				
	MONTH	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	Qtr 7	Qtr 8	Qtr 9	Qtr 10	Qtr 11	Qtr 12	Qtr
<b>TASK 1 :</b> Defienc binder grades Select field sections														
<b>TASK 2 :</b> Collect samples Conduct testing														
<b>TASK 3 :</b> Monitor performance of sections														
<b>TASK 4:</b> Database development														
<b>TASK 5:</b> Reporting														
SHOW PROGRESS BY USE OF A BAR CHART:		SCHEDULED												
		COMPLETED												

**Note: Gantt chart shown in State Fiscal Year Quarters**

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2004**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Guidelines for the Surface Preparation/Rehabilitation of Existing Concrete and Asphaltic Pavements Prior to an Asphaltic Concrete Overlay</b>	<b>Project ID: 0092-04-05</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Len Makowski</b>	<b>Approved Starting Date: Oct 1, 2003</b>
<b>Approved by COR/Steering Committee: \$64,966.00</b>	<b>Approved Ending Date: Apr 1, 2005</b>
<b>Project Investigator (agency &amp; contact): Haifang Wen: Error! Bookmark not defined.</b>	

**Description:** Following are the research objectives:

Task 1: Review Wisconsin Procedures on Surface Preparation

Task 2: Review National Research on Surface Preparation

Task 3: Identify Projects for Field Comparisons

Task 4: Guidelines Development

Task 5: Prepare and Submit Final Report

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
<b>\$64,966.00</b>	<b>\$32,483.00</b>	\$19,113.09	<b>\$8,016.15</b>	<b>46 (%)</b>

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**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

The research team continued to work on the data collection and data analysis for review of previous asphalt overlay projects. On April 19, 2004, the research team met with the Project Committee, reporting the progress and the project status.

***Review of previous projects***

The research team substantially finished the data collection, including the data related to D1 projects (D2 project documents were collected in previous quarter). For D2 projects, the previous maintenance history was obtained from Mr. Anthony Barth, D2 Maintenance Unit, WisDOT. The maintenance history was collected from county forces by D2 per the request of the research team. A close examination of the maintenance history and pavement performance database indicated that, even though these two do not math each other exa ctly, in terms of time, maintenance history provides a basis to look into the performance variation in the database.

A spreadsheet containing all the variables reported in last quarterly reports are made which may affect the asphalt overlay performance. A data reduction and analysis is under the way. The projects are categorized into three types: overlay of existing asphalt pavements, existing concrete pavements, and existing composite pavements, respectively. The performance of existing pavements and the asphalt overlay was retrieved from WisDOT PIF database. The pavement performance database reports the visual inspection of the pavements. For instance, a severe transverse crack is reported as low severity after crack sealing. Even though crack sealing prevents water infiltrating into the pavement system, it disguises the appearance of the severe crack without fixing it. The severity level of the existing distresses remains and is not improved. Therefore, in the data analysis, the worse severity level was brought forward. For example, a pavement section with severe transverse crack was still considered as a severe crack section after crack sealing. It is learned that this strategy was also adopted by pavement unit of WisDOT for the purpose of correlation.

***Field study***

The research team selected several asphalt overlay projects in current construction season. The research team has finished field study at STH 33 in Columbia County, including distresses survey and construction monitoring. STH 33 is an asphalt overlay of existing asphalt overlay project next to town of Portage, Wisconsin.

Another asphalt overlay project is STH 38 overlay construction project in Racine County. The existing pavement is concrete pavement. The construction includes base patching, pavement replacement, surface repair, and asphalt overlay. The research project has finished distresses survey and FWD testing. Construction monitoring is underway.

The research team is also going to study another asphalt overlay project at STH 33 in Washington County. The anticipated starting date of the construction is July 20, 2004.

**Work Next Quarter:**

The research team will finish the field study and work on the data analysis.

**Circumstances affecting progress/budget:**

**Gantt Chart:**

Project I.D. <b>0092-04-05</b>	Starting Date <i>Oct. 1, 2003</i>	Completion Date <i>Apr. 01, 2005</i>	Quarter <i>2nd- 2004</i>	Report <b>3</b>	<b>PERCENT OF</b>							
CONSULTANT NAME <i>Bloom Consultants, LLC</i>		% Time Elapsed <b>46%</b>	Total Project Funding <b>100%</b>	Contract Funding <b>100%</b>	Project	Task Complete Last Report	Task Complete This Report	Project Complete				
Name of Study <b>Guidelines for the Surface Preparation/Rehabilitation of Existing Concrete and Asphaltic Pavements Prior to an Asphaltic Concrete Overlay</b>												
TASK	YEAR	2003	2004				2005					
	MONTH	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1					
<b>Task 1:</b> Review Wisconsin Procedure on Surface Preparation		■						9.8	100	100	9.8	
<b>Task 2:</b> Review National Research on Surface Preparation		■						9.8	80	100	9.8	
<b>Task 3:</b> Identify Projects for Field Comparisons			■	■	■	■		52.8	25	50	26.4	
<b>Task 4:</b> Guideline Development							■	15.7	0	0	0	
<b>Task 5:</b> Prepare and Submit Final Proposal							■	11.9	0	0	0	
Show Progress by Use of Bar Char	<b>Scheduled</b>	■							100			46
	<b>Completed</b>	■										

Note: Gantt chart shown in State Fiscal Year Quarters

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2004**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Life Cycle Cost Analysis of SMA Pavements and SMA Application Guidelines</b>	<b>Project ID: 0092-04-06</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Error! Bookmark not defined.</b>	<b>Approved Starting Date: Oct 1, 2003</b>
<b>Approved by COR/Steering Committee: \$54,867.95</b>	<b>Approved Ending Date: Oct 1, 2004</b>
<b>Project Investigator (agency &amp; contact): Harold VonQuintus: Error! Bookmark not defined.</b>	

**Description:** Following are the research objectives:

- Task 1: Information gathering and review
  - Task 1a: Collection and review of SMA literature
  - Task 1b: Identification of WisDOT SMA and standard e-mixture pavements
  - Task 1c: Collection and review of WisDOT policy information
- Task 2: Data Assembly
  - Task 2a: Development of life cycle models
  - Task 2b: Development of cost elements
- Task 3: Conduct life cycle cost analysis
- Task 4: Final Report
  - Task 4a: Draft final report
  - Task 4b: Revised final report

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
<b>\$54,867.95</b>	<b>\$27,433.97</b>	\$1,033.70	<b>\$18,533.00</b>	<b>34 (%)</b>

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**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

Work this quarter focused on identifying standard E-mix projects (in addition to 8 previously identified) to serve as comparisons for the 24 stone matrix asphalt (SMA) and 23 polymer-modified asphalt (PMA) projects being investigated. Reviews of the HMA mix design and other pavement databases resulted in the identification of some possible comparison projects, however, additional information (e.g., cross-section) is needed to confirm their suitability for use. The desired comparison projects should be similar to the SMA or PMA projects, in terms of cross-sectional design, traffic level, climate, and subgrade, but must include a standard E-mix surface instead of an SMA or PMA surface.

Also targeted, but with limited success, were unit cost data associated with the construction of the selected SMA, PMA, and conventional E-mix projects. The WisPrice software contains some project-level cost data, however, the data only cover projects back to 2000 and there are no construction project numbers that allow linkage to the SMA, PMA, and conventional E-mix projects.

**Work Next Quarter:**

During the next quarter, the project team will continue its efforts to identify standard E-mix companion projects and to obtain all available project-level cost data. The team will work closely with WisDOT on both these issues, so that the project database can be completed and the analysis of performance data can be conducted. The team will develop estimates of service life for each pavement surface type under different conditions, and will begin establishing the life-cycle models and cost parameters for each pavement type, which will feed directly into the LCCA.

**Circumstances affecting progress/budget:**

Progress has been significantly affected by the delay in finding conventional E-mix projects to serve as comparisons for the SMA and PMA projects. It is anticipated that if the final identification of comparison projects occurs by July 31, 2004, then at least a 6-month time extension to the project would be needed.



**Gantt Chart:**

RESEARCH TASK	2003				2004										EST. % COMP.
	Qtr 4				Qtr 1			Qtr 2			Qtr 3				
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	
1a. Collection and Review of SMA Literature		50	100												100
1b. Identification of WisDOT SMA & Std E-Mix Pavements		50	100												75
1c. Collection and Review of WisDOT Policy Information		50	100												100
2a. Development of Life-Cycle Models			10	50	100										40
2b. Development of Cost Elements			10	50	100										28
3. Conduct Life-Cycle Cost Analysis					10	25	75	100							0
4a. Prepare Draft Final Report								25	100	WHRP Review					0
4b. Prepare Final Final Report													100		0
<b>OVERALL % COMPLETION</b>		15	32	43	59	62	72	82	96	96	96	96	100		34

**Note: Gantt chart shown in State Fiscal Year Quarters**

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: June 30, 2004**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Testing Asphalt Mixtures for the AASHTO 2002 Mechanistic Design Procedure</b>	<b>Project ID: 0092-04-07</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Leonard Makowski</b>	<b>Approved Starting Date: April 2, 2004</b>
<b>Approved by COR/Steering Committee: \$75,000</b>	<b>Approved Ending Date: October 2, 2004</b>
<b>Project Investigator (agency &amp; contact): R. Christopher Williams, Michigan Technological Transportation Institute, Dillman Hall, Michigan Technological University, Houghton, MI 49931</b>	

**Description:** The Wisconsin Department of Transportation (WisDOT) currently uses the AASHTO 1972 Interim Guide for the Design of Pavement Structures for hot mix asphalt. This pavement design procedure is a strictly empirical pavement design approach, however with the latest research and available computer capabilities, mechanistic pavement design procedures have become more feasible. The AASHTO 2002 Guide for Design of New and Rehabilitated Pavement Structures and associated software has been built on the mechanical properties of the pavement layers while still using functions to predict pavement life, thus making it a mechanistic-empirical pavement design approach. This pavement design procedure also allows for default values of the mechanical properties to be used, which is based on previous measurements of these properties.

The intent of this project is to examine typical hot mix asphalt (HMA) pavements that are constructed in the state of Wisconsin. The analysis will compare the suggested pavement structures based on the current (1972) pavement design guide and that of the new (2002) pavement design guide. In order to develop the pavement structure as outlined by the 2002 Pavement Design Guide the mechanical properties of the HMA layers must be measured. These properties include Dynamic Modulus, Flow Time, and Flow Number, which have been found to be significant predictors of rutting and fatigue by Witczak et. al. (2002). Properties of the other layers in the system will be obtained from the WisDOT pavement design inputs.

A cross-section of typical HMA pavements has been formulated into a research project matrix, for the greatest benefit for the WisDOT. Michigan Technological University (MTU) will sample these mixtures during the 2004 paving season. These mixtures will then tested in accordance with the AASHTO 2002 Design Guide for the aforementioned testing procedures and compiled into a library of values for the WisDOT.

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date	Percent Complete
\$83,500*	\$83,500*	\$6,054.79	\$6,054.79	7.0 (%)

\* This includes \$8,500 in cost share.

**Progress This Quarter:**

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

During the second quarter of 2004, MTU has been working on a review of literature associated with Dynamic Modulus, Flow Time, and Flow Number as well as the collection of samples that are applicable to the research study. What follows is a more thorough description of each task outlined in the research project proposal.

**Literature Review:**

The focus of the literature review has focused on NCHRP projects 1-37A, 9-19, and 9-29, which are the main research projects that have been used for compiling the AASHTO 2002 Design Guide. Past work has been reviewed that has dealt with the three mechanical tests that are associated with the new pavement design guide. Currently this portion of the project is 45% complete.

**Materials Collection:**

It was determined for this study that 12-5gallon buckets of the loose HMA would be sampled from each job. The loose HMA is sampled directly from the back of one truck prior to it leaving the plant for the job site. In addition to the loose HMA being sampled, a 5gallon bucket of the liquid asphalt cement is sampled either directly of the storage tanks on-site or from the back of the truck delivering the liquid. The JMF for each job as well as the load ticket for the truck from which the material was sampled is also collected. Ten of the 20 jobs that are relevant to this project have been sampled and are outlined in the following figure.

Nominal Maximum Aggregate Size	Mix Type	Traffic Level		
		Low	Medium	High
25.0mm	Dense		O	OO
	Open			
19.0mm	Dense	O	XXO	X
	Open			O
12.5mm	Dense	XXO	XXX	XXO
	Open			O

**Figure 1 Current Project Matrix**

In the above matrix, an X represents mixtures that have been sampled from a single job and an O represents mixtures that have yet to be sampled.

At this time it has become clear that 25.0mm mixtures are not frequently used in the State of Wisconsin, the same is true for open-graded mixtures. It is the belief of the MTU research staff that some of these jobs should be reallocated to other cells, which would maintain the overall number of jobs for this project, while also making the later statistical analysis of the testing more robust. The following revised project matrix will be submitted to the TOC for comment.

Nominal Maximum Aggregate Size	Mix Type	Traffic Level		
		Low	Medium	High
25.0mm	Dense		O	O
	Open			
19.0mm	Dense	OAA	XXO	XAA
	Open			
12.5mm	Dense	XXO	XXX	XXO
	Open			

**Figure 2 Revised Project Matrix**

An A represents an alternative job within each cell. For the remaining jobs left to be sampled, contacts with various contractors within the state have been developed and futures projects have been identified to fill most of the gaps in the matrix.

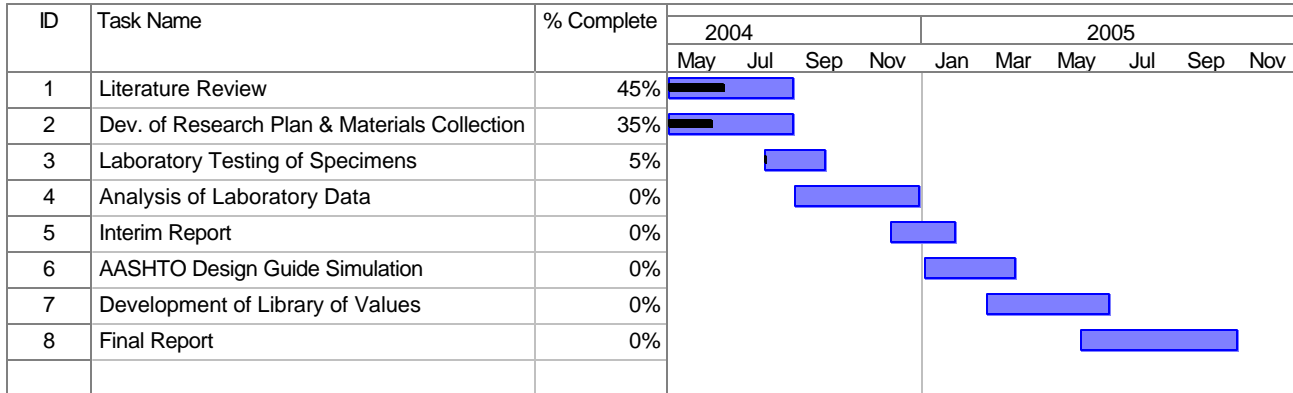
Currently this portion of the project is 35% complete.

**Laboratory Testing:**

Six of the ten jobs that have been sampled have been compacted and are ready to be cut down and tested in accordance with the AASHTO 2002 Design Guide testing procedure, this amounts to 144 specimens. This testing procedure is expected to be out July 15, 2004 and will be found at the following web-site: <http://www.trb.org/downloads/mepdg/>. Currently this portion of the project is 5% complete.

**Gantt Chart:**

Below is a Gantt chart of the tasks that are associated with research project as well as the relative completion of each task.



**Figure 3**

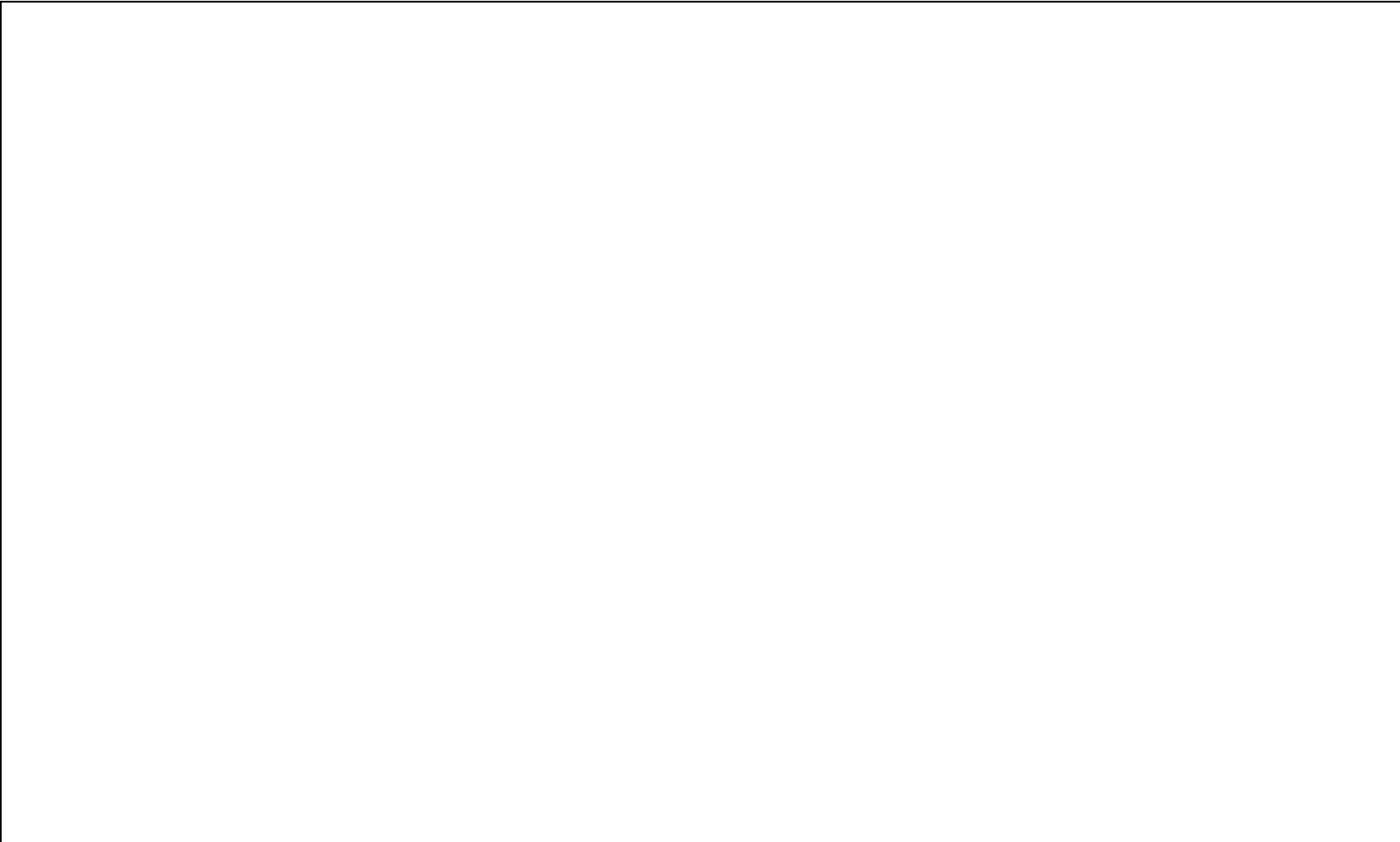
**MTU Gantt Chart**

**Work Next Quarter:**

During the course of the 4<sup>th</sup> Quarter of 2004, MTU will continue to sample materials that are deemed applicable to this research project. Specimens will be prepared from the sampled material and will begin to be prepared for testing in accordance with the AASHTO 2002 Design Guide. As new and relevant research publications become available, they will be incorporated into the literature review associated with this study.

**Circumstances affecting progress/budget:**

**Gantt Chart:**



**Note: Gantt chart shown in State Fiscal Year Quarters**