

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Sep 30, 2001**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Field Measurement of Water Cement Ratio for PCC - Phase II</b>	<b>Project ID: 0092-45-16</b>
<b>Administrative Contact:</b> Nina McLawhorn	<b>Sponsor:</b>
<b>WisDOT Technical Contact:</b> Error! Bookmark not defined.	<b>Approved Starting Date:</b> Dec 6, 1999
<b>Approved by COR/Steering Committee:</b> \$55,510.00	<b>Approved Ending Date:</b> Jun 30, 2002
<b>Project Investigator (agency &amp; contact):</b> Steve Cramer: UW-Madison	

**Description:** Error! Bookmark not defined.

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date
<b>\$55,510.00</b>	<b>\$18,503.33</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Progress This Quarter:**

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

This research is essentially complete and the draft final report has been in TOC review. A journal publication is being prepared

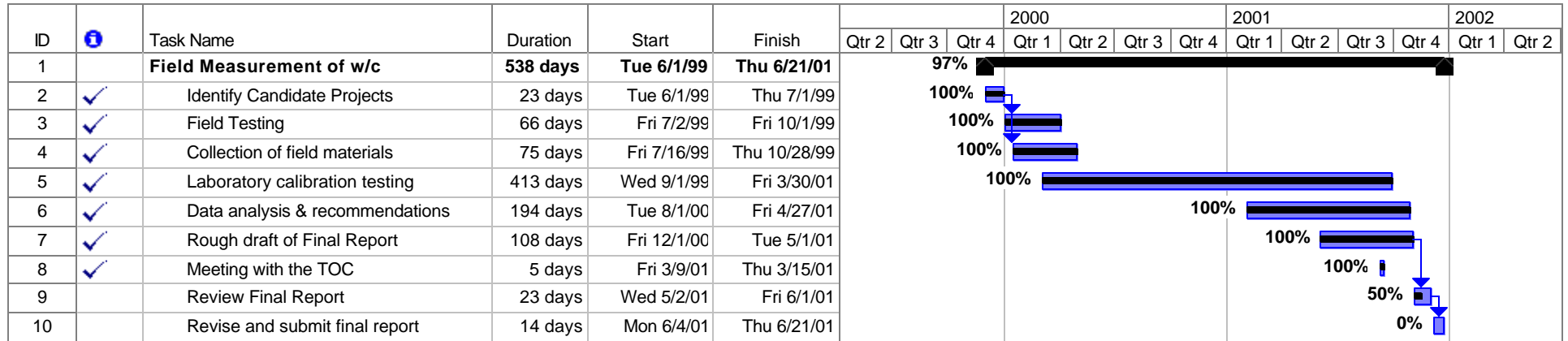
**Work Next Quarter:**

Upon receiving the TOC's comments on the draft final report, the report will be revised and submitted.

**Circumstances affecting progress/budget:**

None

**Gantt Chart:**



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

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Sep 30, 2001**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Effects of Aggregate Coatings and Films on Concrete Performance</b>	<b>Project ID: 0092-00-07</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, 1999</b>
<b>Approved by COR/Steering Committee: \$97,740.00</b>	<b>Approved Ending Date: Sep 30, 2001</b>
<b>Project Investigator (agency &amp; contact): Steve Cramer: UW-Madison</b>	

**Description: Error! Bookmark not defined.**

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date
<b>\$97,740.00</b>	<b>\$48,870.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Progress This Quarter:**

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

*Overview*

The project team has met once every two weeks during this quarter. Freeze-thaw durability, shrinkage, strength and rcp data have been collected during the last quarter. Data collection and analysis to date has shown minimal difference in concrete performance between unwashed coated aggregates and the corresponding aggregates washed. The research team has spent considerable time to identify an aggregate source that may better represent a perceived "problem aggregate". In Sept., the project team met with Prof. D. Mickelson of UW-Madison who is an expert in the geology of Wisconsin. From this meeting we decided to collect aggregate fines and create a coated aggregate that represents a more heavily coated aggregate for study. These mixes are termed Phase III mixes and using the input from the geologist we have targeted fines from northern Wisconsin.

*Phase III Mixes*

Two sources in North West Wisconsin have been identified for collection of wash waste fines. These fines will be characterized and used to manufacture a dirty aggregate for mixing in October.

*Phase III Aggregate Data*

Last quarter, California Cleanness and Methylene Blue Values were determined for the six mixes completed so far. This quarter p200 values were measured to determine how close the sampled aggregate came to the 1.5% DOT specification limit.

Aggregate	P200 Value	MBV - Adjusted Cleanness Value	MBV - Adjusted P200 Value
Source C – Unwashed	0.26	0.05	0.21
Source C – Washed	0.07	0.03	0.06
Source E – Unwashed	0.74	1.00	4.74
Source E – Washed	0.16	0.15	0.84
Source H – Unwashed	0.91	0.97	6.47
Source H – Washed	0.17	0.09	0.25

Aggregate used in a bridge deck in Tomahawk and Eagle River were added to the eight samples tested in Phase II of the project. Although the Eagle River was potentially considered an aggregate with a coating problem, our tests showed that it did not differ significantly from the Tomahawk aggregate.

Aggregate	Cleanness Value	MBV	MBV - Adjusted Cleanness Value
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Tomahawk	89.7	5.59	0.58
Eagle River	89.5	5.30	0.56

*Shrinkage Testing*

There does not seem to be a large difference in the relative shrinkage of washed and unwashed samples. Testing for mixes C, E, H, H' were completed (to 120 days) with testing for mixes E' and H' completed through 98 days.

*Freeze-Thaw Durability*

As of 10/02/01, 541 freeze/thaw cycles have been completed on mixes C, E, and C' in the West F/T Cabinet, while 307 cycles had been run on mix E' in the same cabinet. Meanwhile, 240 cycles have been completed on mixes H and H' in the East F/T Cabinet.

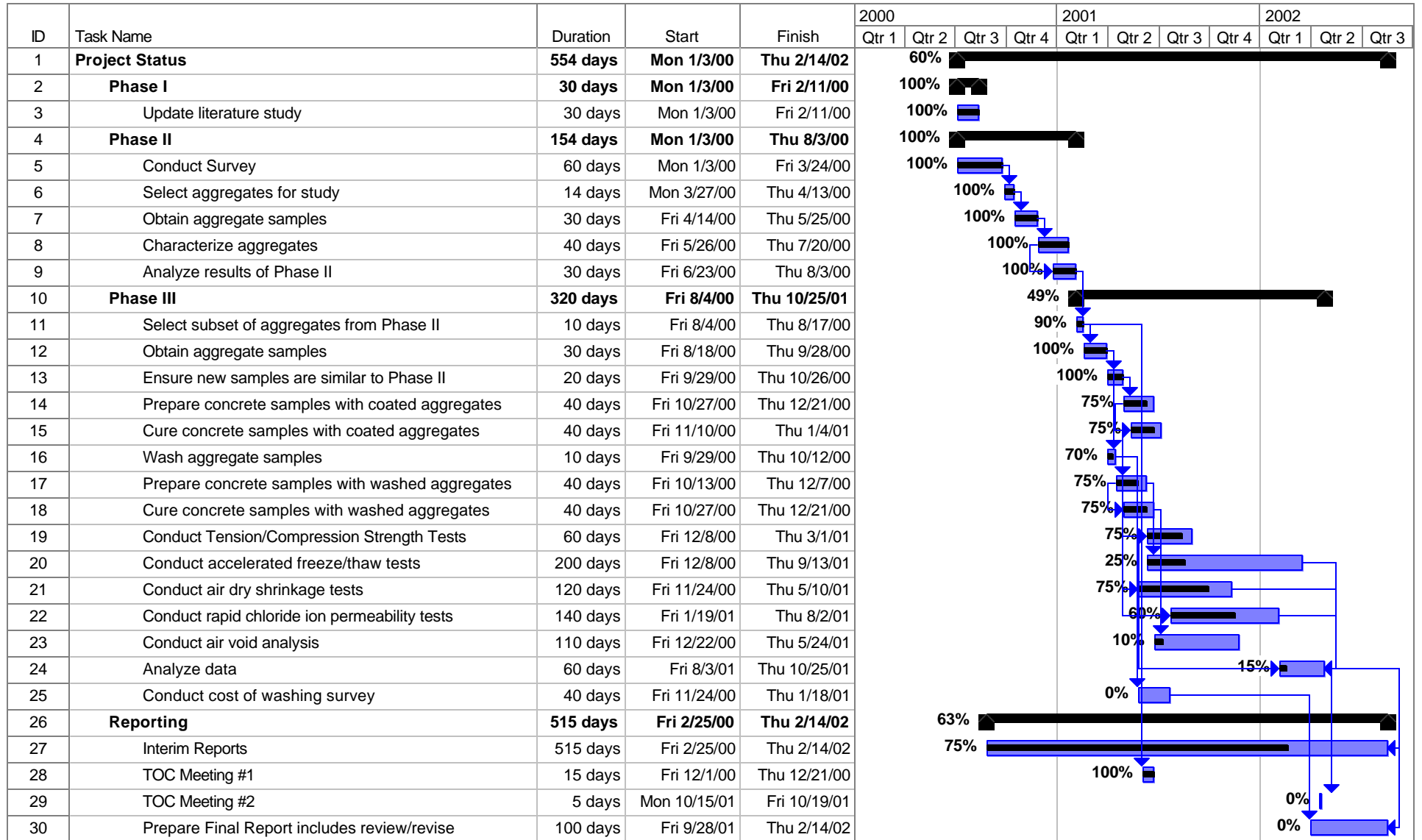
**Work Next Quarter:**

The plan is to obtain aggregate fine materials from a wash plant settling pond and/or obtain aggregates that have not proceeded through the wash plant. These aggregates are intended to represent a worst case scenario that we will then evaluate using the same protocol used previously.

**Circumstances affecting progress/budget:**

When proving the existence of factors that cause a difference in concrete performance, one requires fewer data points to prove a difference does exist and more data points to prove a difference doesn't exist. This research has progressed into the latter and additional work is needed to provide a firm conclusion to the research. The inability to obtain aggregates that have proven to degrade concrete performance has been a research obstacle causing considerable delay in completion. We expect to complete the Phase III mixes described above within cost of the project and then conclude the project. This will require an extension to the project ending date but not an addition of funds.

**Gantt Chart:**



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

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Sep 30, 2001**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Wet Pavements Accident Study of Longitudinal and Transverse Tined PCC Pavements</b>	<b>Project ID: 0092-00-08</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Error! Bookmark not defined.</b>	<b>Approved Starting Date: Dec 15, 1999</b>
<b>Approved by COR/Steering Committee: \$75,000.00</b>	<b>Approved Ending Date: Dec 14, 2001</b>
<b>Project Investigator (agency &amp; contact): Alex Drakopoulos: Marquette University</b>	

**Description: Error! Bookmark not defined.**

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date
<b>\$75,000.00</b>	<b>\$25,000.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Progress This Quarter:**

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

PI and a research assistant are dedicated to the project during this period (PI has no teaching responsibilities during this or the next quarter).

Wisconsin crash rates have been compiled for various weather conditions and in relation to roadway geometry.

State pavement engineers have provided specifications and have verified textures for PCC pavements in California and Washington State. 2695 miles of longitudinally textured (with ~79,000 accidents/year) and 289 miles of transversely tined PCC(with~ 7900 accidents/year) pavement have been identified in California. A total of approximately 763 miles of PCC pavement have been identified in Washington state, of which 250 miles have been longitudinally ground and the rest is transversely tined. Delivery of a database identifying the specific mileage where the two textures are present is expected soon.

Accident and roadway detail information is readily available for these two states. Analysis on data received from the Highway Safety Information System Lab continued by developing crash rates. Integration with weather information in order to develop crash rates under different weather conditions is proceeding. Contacts with Snow and Ice control personnel in Northern California provided information about winter maintenance details. A special database for winter/snow -related California accidents is expected to be delivered soon.

The original 1970 California reports that led to the implementation of longitudinal texture for the state have been reviewed and contact with the reports' author was established. The information will be included in the literature search part of the draft final report.

Colorado contacts are proceeding with data gathering. Since longitudinal texture is new to the state, the state may not have enough data for statistically valid conclusions. Contacts with Virginia are in progress.

North Carolina information has been requested. A response is awaited.

**Work Next Quarter:**

Analysis of California and Washington state data will be completed.

Contacts with Maine, Minnesota, Illinois, Utah, Michigan, and North Carolina will be completed. If pavement texture can be verified through State Pavement Engineers in a manner similar to California and Washington state, crash analysis can proceed in a very expedient manner for these states (and also NC) based on the analysis method developed for California data.

Contacts with Virginia will continue.

Analysis of all received information will be completed and draft final report compiled.

**Circumstances affecting progress/budget:**

Tasks 1, 2, 3 and 4 are 17%, 17%, 51% and 15% respectively of the total project budget--completed parts of tasks during the current quarter, indicated on the next page, total to 25.1% of the total project budget

**Gantt Chart:**

**WET PAVEMENT CRASH STUDY OF LONGITUDINALLY AND TRANSVERSELY TINED PCC PAVEMENTS STATEWIDE**

TASK	2000												2001																	
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D						
1. PCC Data and State Participation	70% completed (1)																													
2. Assembling Database and Interim Report		65% completed(2)																												
3. Analysis					60% completed (3)																									
4. Draft and Final Report																20% completed (4)														

Note: Timeline is revised to reflect a January 2000 start date, replacing the originally anticipated December 1999 start date.

(1) Enough information is available from California and Washington state for valid conclusions. Other state participation will enhance the validity of findings, but is not crucial for the study.

(2) All data analysis programs have been written. Minor effort will be needed if additional HSIS states are included in the analysis.

(3) Weather information integration in the analysis is not complete yet.

(4) Literature search chapter is almost complete. Wisconsin data analysis writeup is almost complete.

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October 1, 2000

Drakopoulos  
Civil Engineering (17)

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

**State of Wisconsin/Department of Transportation**  
**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Sep 30, 2001**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Portland Cement Concrete Pavement over Rubblized PCC</b>	<b>Project ID: 0092-00-11</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Error! Bookmark not defined.</b>	<b>Approved Starting Date: Mar 28, 2000</b>
<b>Approved by COR/Steering Committee: \$39,857.00</b>	<b>Approved Ending Date: Nov 28, 2005</b>
<b>Project Investigator (agency &amp; contact): James Crovetti: Marquette University-CEEN Hagg</b>	

**Description: Error! Bookmark not defined.**

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date
<b>\$39,857.00</b>	<b>\$5,693.85</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Progress This Quarter:**

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

Additional deflection data has been requested from State DOTs which have constructed PCC over rubblized PCC pavements.

**Work Next Quarter:**

Collected deflection data will be used to backcalculate in situ layer properties, particularly the effective slab thickness and modulus of subgrade reaction, k-value. These values will be compared to control section constructed without rubblization of the existing PCC to determine the effect of the rubblized PCC layer on computed values.

**Circumstances affecting progress/budget:**

Field data collection activities on other WisDOT sponsored research projects, particularly the development of subgrade deflection acceptance specifications, consumed available Marquette University research staff time. The constraints imposed by these projects precluded the completion of significant activities on this research project.

**Gantt Chart:**

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

WHRP Project 0092-00-11  
 Portland Cement Concrete Pavement Over Rubblized PCC  
 Gantt Chart of Project Activities Through September 30, 2001

Project Task	Calendar 2000											Calendar 2001											% Complete	
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
1. Literature Review	Actual																						90	
2. Data Refinement		Actual			Proposed																			50
3. Construction of Test Sections					Proposed																			0
4. Performance Monitoring							Proposed															0		
5. Interim Report 1						Proposed																		0
6. Interim Report 2																				Proposed			0	
7. Interim Report 3																								0
5. Final Report																								0

Proposed   
 Actual 

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**RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Sep 30, 2001**

<b>Program: SPR-0010(36) FFY99</b>	<b>Part: II Research and Development</b>
<b>Project Title: Early Opening of PCC Pavements to Traffic</b>	<b>Project ID: 0092-01-04</b>
<b>Administrative Contact: Nina McLawhorn</b>	<b>Sponsor:</b>
<b>WisDOT Technical Contact: Error! Bookmark not defined.</b>	<b>Approved Starting Date: Jun 18, 2001</b>
<b>Approved by COR/Steering Committee: \$58,648.00</b>	<b>Approved Ending Date: Dec 18, 2002</b>
<b>Project Investigator (agency &amp; contact): James Crovetti: Marquette University-CEEN Hagg</b>	

**Description: Error! Bookmark not defined.**

Total study budget	Current FFY budget	Expenditures for current quarter	Total Expenditures to date
<b>\$58,648.00</b>	<b>\$19,549.33</b>	<b>\$0.00</b>	<b>\$0.00</b>

**Progress This Quarter:**

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

Meetings with Subcontractor personnel have been held. Research reports on high performance concrete have been obtained and reviewed. Addition reports on the effects of early age loading have been requested for review. State specifications for strength requirements prior to opening have been obtained and reviewed.

A portable test device for early-age loading of the exposed dowel specimens was designed and will be fabricated prior to initial field sampling. A portable test device for 3<sup>rd</sup> point flexure testing of beam specimens was obtained. All other necessary equipment for field sampling has been secured.

Upcoming PCC paving projects were reviewed and an initial candidate project was selected. This project is part of the STH 57 reconstruction in Northern Ozaukee County. MU Research staff representatives have been in contact with WisDOT project engineers and contractor representatives to discuss our project needs. All are supportive of our research needs. Paving is expected to be completed early to mid October.

**Work Next Quarter:**

The draft interim report will be submitted for review. Field sampling on STH 57 will be conducted.

**Circumstances affecting progress/budget:**

None

**Gantt Chart:**

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

WHRP Project 0092-01-04  
 Gantt Chart of Project Activities

Project Task	Calendar 2001							Calendar 2002												% Complete
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
1. Literature Review/Survey		■	■																	50
2. Interim Report		■	■	■	■	■	■													25
3. Pavement Analysis					■	■	■													0
4. Field Sampling/Testing							■	■	■	■	■	■	■	■						10
5. Final Report													■	■	■	■	■	■	■	0

Proposed ■  
 Actual ■