

**Bureau  
of  
Materials and Physical  
Research**

**Quarterly  
Management Report  
on  
Research Progress**

**Quarter Ending December 31, 2010**

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### Quarterly Progress

**I = In Progress**  
**C= Completed**



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Free-Cutting Brass Breakaway Couplings			<b>Last Edited:</b> 1/27/2011				
			<b>Function Code:</b> R27-26				
			<b>Project Number:</b> R27-26				
<b>QPR Author Name:</b> D. Kuchma		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-1571	<b>% Project Completed:</b> 99.9			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Review Relevant Standards		4/1/2007	10/1/2007	C	-	-	-
<b>Task 2:</b> Contract and Oversee Coupling Drop Tests		4/1/2007	12/31/2008	C	-	-	-
<b>Task 3:</b> Create Finite Element Analysis (FEA) Model of Coupling and Device		2/1/2007	12/31/2007	C	-	-	-
<b>Task 4:</b> Analyze Result of Drop Tests and Update FEA		1/1/2008	12/31/2008	C	-	-	-
<b>Task 5:</b> Make Suggested Changes to Design		1/1/2008	12/31/2008	C	-	-	-
<b>Task 6:</b> Contract for Full Crash Test? -- Deferred Until Phase 2		7/1/2008	6/30/2008	C	-	-	-
<b>Task 7:</b> Prepare and Finalize Report		7/1/2008	4/30/2009	I	I	-	-
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<b>Telephone:</b> 217-333-1571				University of Illinois at Urbana-Champaign			
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<b>Description of Research:</b>							
Finite element analysis of brass couplings to predict distribution of stresses. Experimental testing of single and four-couplings assemblies to evaluate their energy absorbing capacity.							
<b>Keywords:</b> breakaway couplings, brass, light poles, crash testing							
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<b>Meeting Dates / Minutes Available?</b>							
3/27/2007 / Yes							
7/23/2008 / Yes							
4/8/2009 / Yes							
<b>End User(s) and Result(s) Expected:</b>							
An evaluation of the energy absorbing capacity of different shapes of single, and multiple brass couplings. A prototype shape for brass couplings to use in full-scale crash testing.							
<b>Progress to Date:</b>							
The finite element analysis of single brass-couplings without notches has been completed and can be used to predict distribution of stresses in							

couplers. The experimental evaluation of the capacity of single brass couplings with single notches has been completed. Evaluation of the capacity of four-coupling connections with different shapes of notches and in different setup configurations was completed. Work is continuing on the analysis of the drop tests and suggestions regarding the coupling design.

The final report is still being drafted by the PI as of 9/30/10.

The PI sent his part of the draft report to the TRP Chair on 1/1/11. The TRP Chair is reviewing the report.

Last Updated: 1/27/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Impact of High RAP Content on Pavement Structural Performance		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-37					
		<b>Project Number:</b> R27-37					
<b>QPR Author Name:</b> Prof. Samuel H. Carpenter		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-4188	<b>% Project Completed:</b> 60			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review and Mixture Selection		7/1/2008	3/31/2009	I	C	-	-
<b>Task 2:</b> Develop Experimental Program/ Work plan		10/1/2008	3/31/2009	I	C	-	-
<b>Task 3:</b> Conduct the Experimental Program		4/1/2009	3/30/2011	I	I	-	-
<b>Task 4:</b> Data Analysis		7/1/2010	4/30/2011	I	I	-	-
<b>Task 5:</b> Prepare and Finalize Report		1/1/2011	6/30/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Prof. Samuel H. Carpenter				<b>Organization / Address</b>			
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<b>Description of Research:</b>							
Agencies in Illinois are attempting to use up to 50% RAP in HMA to realize an economic savings. Any structural behavior and durability differences from a standard Illinois Department of Transportation (IDOT) HMA resulting from the recycling operation have not been addressed. The performance properties of high RAP mixtures need to be investigated for their impact on pavement performance characteristics (McDaniel NCHRP 9-21 Report) and these will be investigated in this study through modulus, fatigue, stripping, wheel tracking and low temperature testing.							
<b>Keywords:</b> Hot mix asphalt (HMA), Reclaimed Asphalt Pavement (RAP), High RAP content, fatigue, dynamic modulus							
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<b>Meeting Dates / Minutes Available?</b>							

8/15/2007 / Yes  
5/12/2009 / Yes  
11/10/2009 / Yes  
2/16/2010 / Yes  
10/25/2010 / Yes

**End User(s) and Result(s) Expected:**

Literature review, final report with recommendations on RAP percentages and performance changes, and level of blending.

**Progress to Date:**

Task 1. Literature Review and Mixture Selection - Preliminary literature review has been completed. Latest TRB and AAPT papers have been incorporated in the literature review. It will be submitted soon.

Task 2. Develop Experimental Work Plan - The experimental plan was developed in May 2009 and accepted by the Technical Panel at the TRP meeting held in May 2009. A second TRP meeting was held on February 16, 2010 to discuss the progress of the project on the experimental work. The minutes of the meetings were taken and distributed.

Task 3. Conduct Experimental Work Plan - Hamburg Wheel Tracking test and Fatigue Beam test for all the District-1 mixes were completed. RAP for District 5 was acquired from Open Road Paving. Samples for extraction and Gmm of +3/8" RAP and -3/8" RAP were sent to BMPR, Springfield. The control (0% RAP) mix design for District-5 was finalized. The aggregates required for District-5 RAP mix designs and performance testings are fractionated. Mix design process for RAP mixes has been initiated. A third TRP meeting was held on October 25, 2010 to discuss the progress of the project on the experimental work.

Task 4. Data Analysis - District-1 data has been analysed.

Task 5. Prepare Final Report - Progress has been made in this regard.

Last Updated: 2/8/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Development of an Improved Specification for Maximum Plastic Concrete Temperatures		<b>Last Edited:</b> 2/4/2011					
		<b>Function Code:</b> R27-38					
		<b>Project Number:</b> R27-38					
<b>QPR Author Name:</b> J. Popovics		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217 244 0843	<b>% Project Completed:</b> 99			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Carry out a comprehensive literature review of practice in other states to determine temperature specifications in use and best practices with regard to hot weather concreting		10/1/2007	1/31/2008	C	-	-	-
<b>Task 2:</b> Carry out a comprehensive literature review of pertinent research on the effects of high plastic concrete temperature on performance and properties of concrete		11/1/2007	2/1/2008	C	-	-	-
<b>Task 3:</b> Assess the performance of concrete placed at higher temperatures through interviews of field personnel		6/1/2008	6/30/2009	C	-	-	-
<b>Task 4:</b> As needed by the findings of tasks 1 and 2, carry out laboratory tests to examine particular effects of high plastic concrete temperature on performance and properties of concrete		3/1/2008	6/30/2009	C	-	-	-
<b>Task 5:</b> Recommend improved specification, procedures and practical considerations to assure quality of concrete placed at higher temperatures		5/1/2009	4/30/2010	C	-	-	-
<b>Task 6:</b> Final Report and Training/Implementation		1/1/2010	6/1/2010	C	-	-	-
<b>Task 7:</b> Experimental test series on high temperature mixtures		1/1/2010	6/1/2010	C	-	-	-
<b>Principal Investigator:</b>							
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<b>Description of Research:</b>							
The main objective in this project is to develop improved specifications and procedures with regard to monitoring and maintaining plastic concrete temperatures to assure near and long-term concrete quality in the State of Illinois. An additional objective is to develop a better understanding of the effects of higher temperatures on fresh and hardened concrete properties overall, and to document this improved understanding.							
<b>Keywords:</b> concrete, high temperature, cracking							
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<b>Meeting Dates / Minutes Available?</b>		
6/5/2008 / No		
11/13/2008 / No		
10/29/2009 / Yes		
<b>End User(s) and Result(s) Expected:</b>		
Improved specifications and procedures with regard to monitoring and maintaining plastic concrete temperatures to assure near and long-term concrete quality in the State of Illinois.		
<b>Progress to Date:</b>		
The draft final report was submitted to the TRP and is in the process of being reviewed.		

Last Updated: 2/4/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Safety Impacts of Highway Shoulder Attributes in Illinois			<b>Last Edited:</b> 1/27/2011					
			<b>Function Code:</b> R27-40					
			<b>Project Number:</b> R27-40					
<b>QPR Author Name:</b> Zongzhi Li			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> (312)567-3556	<b>% Project Completed:</b> 100				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Information Search: 1a) Literature Review; 1b) Questionnaire Surveys			1/1/2008	6/30/2008	C	-	-	-
<b>Task 2:</b> Data Collection			4/1/2008	12/31/2008	C	-	-	-
<b>Task 3:</b> Preliminary Data Analysis			10/1/2008	12/31/2008	C	-	-	-
<b>Task 4:</b> Empirical Bayesian Before-After Evaluation of the Shoulder Paving Effect			1/1/2009	6/30/2009	C	-	-	-
<b>Task 5:</b> Cross-Sectional After Period Evaluation the Shoulder Paving Effect			1/1/2009	6/30/2009	C	-	-	-
<b>Task 6:</b> Identification and Mapping of the Potential for Safety Improvements for Highway Segments			7/1/2009	9/30/2009	C	-	-	-
<b>Task 7:</b> Ranking and Prioritization of Highway Segments for Shoulder Paving			7/1/2009	9/30/2009	C	-	-	-
<b>Task 8:</b> Report Preparation and Submission			10/1/2009	9/30/2010	C	-	-	-
<b>Principal Investigator:</b>								
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<b>Description of Research:</b>								
This research will primarily involve information search, data collection, preliminary data analysis, empirical Bayesian before-after evaluation of the shoulder treatment effect, cross-sectional after period evaluation the shoulder treatment effect, identification and mapping of high potential for safety improvements for highway segments, ranking and prioritization of highway segments for shoulder paving, and report preparation.								
<b>Keywords:</b> Crashes; safety; impacts; pavement; shoulder								
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<b>Meeting Dates / Minutes Available?</b>								
5/1/2008 / Yes								
10/1/2008 / Yes								
3/23/2009 / No								

8/25/2009 / Yes

10/15/2010 / No

**End User(s) and Result(s) Expected:**

The study will result in a better understanding of crashes and safety performance which occur in the presence/absence of paved shoulders as well as safety performance involving various widths of paved shoulders. A set of shoulder-related SPFs for two-lane and multilane rural roads will be developed for use to identify roadway segments with shoulder performance concerns and AMFs for use in predicting a benefit-cost relationship for proposed shoulder paving improvements. The findings will allow IDOT to update current guidelines and practices, identify critical shoulder improvement locations, assess the magnitude of the problems, and determine the most effective method for analysis.

**Progress to Date:**

The draft project final report was submitted to the TRP for review in December 2009.

Per the request of the TRP members, additional research tasks were added. Specifically, shoulder paving impacts were assessed by differentiating repaving the existing paved shoulder, widening the existing paved shoulder, and adding a new paved shoulder, respectively. The project due date was extended to September 30, 2010. The refined project final report was submitted to the TRP in August 2010.

Further, additional research tasks were requested from the TRP to estimate the standard deviations of paving, widening, and adding paved shoulders. The final project report that documents all the original research tasks and new research tasks was submitted to the TRP in November 2010, the proof reading check was done, and the report publication is underway.

Last Updated: 1/27/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Thin Quiet Long-Lasting High Friction Surface Layer		<b>Last Edited:</b> 2/4/2011					
		<b>Function Code:</b> R27-42					
		<b>Project Number:</b> R27-42					
<b>QPR Author Name:</b> Prof. Imad Al-Qadi		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-265-0427	<b>% Project Completed:</b> 48			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review		7/1/2008	12/31/2008	C	-	-	-
<b>Task 2:</b> Field Data Survey and Analysis		10/1/2008	6/30/2009	C	-	-	-
<b>Task 3:</b> Laboratory Experiment Program		4/1/2009	3/31/2010	I	I	-	-
<b>Task 4:</b> Field Testing		1/1/2010	3/31/2011	I	I	-	-
<b>Task 5:</b> Engineering Benefit Analysis		10/1/2010	6/30/2011	-	-	-	-
<b>Task 6:</b> Final Report		4/1/2011	6/30/2011	-	-	-	-
<b>Principal Investigator:</b>							
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<b>Co-Investigator:</b>							
<b>Name:</b> Prof. Sam Carpenter				<b>Organization / Address</b>			
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<b>Description of Research:</b>							
The aim of this study is to develop a cost effective mix for a new generation of wearing surface/ overlay cross-section used in Illinois. The new developed surface mix is to be designed for better performance that possesses good durability, good friction, and low noise features.							
<b>Keywords:</b> surface layer, raveling, friction, quiet pavement							
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<b>Meeting Dates / Minutes Available?</b>							
8/12/2008 / Yes							

11/7/2008 / Yes

6/11/2009 / Yes

12/4/2009 / Yes

5/4/2010 / Yes

**End User(s) and Result(s) Expected:**

a wearing surface mix design which is durable and provides sufficient friction.

**Progress to Date:**

TASK 1- Literature Review  
This task has been completed.

TASK 2- Field Data Survey and Analysis  
This task has been completed.

TASK 3- Laboratory Experiment Program  
This task is in progress.  
The following candidate mixes were selected for lab testing:  
- Dense-graded HMA with steel slag (control)  
- Stone mastic asphalt with steel slag (control)  
- HMA with quartzite  
- 4.75 SMA-graded HMA  
- Fiber reinforced HMA with steel slag  
- Sprinkle treatment

Rubberized SMA was changed to 4.75 SMA using PG 70-22 (SBS). The mix was adjusted.  
The asphalt content for precoating the sprinkle chips was changed from 1.5% to 0.75% by weight.

The following lab tests are being conducted for the considered mixes:  
- For dense-graded HMA with steel slag and SMA with steel slag: Raveling, rutting, fracture, dynamic modulus, and moisture susceptibility.  
- For HMA with quartzite, 4.75 SMA, fiber reinforced HMA with steel slag and sprinkle treatment: moisture susceptibility, raveling, rutting, fracture, and dynamic modulus.  
Significant part of the aforementioned tests have been completed.  
- All of lab tests are being conducted again for the modified mixtures: 4.75 SMA and sprinkle treatment with 0.75% precoated chips.

TASK 4- Field Testing  
This task is underway.  
The field construction has been completed in November 2010.  
- Location of the 3.27 mi section is on IL 72 from Barlett Road to Glen Lake Road in Hoffman Estates and Barrington.  
- Contracting Company is the field construction contractor.  
- 14 sections with various mixtures and different thicknesses have been completed.

Lab tests for field samples will be conducted.  
- Plant loose mix materials were sampled (1.5 tons at the plant).  
- 12 cores were sampled at each section for fracture and rutting tests.  
- GPR survey was conducted on paved sections after data was collected on milled surfaces to determine final layer thicknesses.

The field tests were conducted after construction:  
- Surface texture and noise measurements were conducted using laser and on-board sound intensity testing devices.  
- Friction measurements were conducted using locked-wheel tester.  
- Rut depths were collected at each section using a dipstick.  
- Field data will be collected periodically at approximately 4 month intervals.

TASK 5- Engineering Benefit Analysis  
This task is in progress.  
The cost data is being collected.

TASK 6- Final Report  
Work has not been started on this task.



<b>Project Title:</b> Travel Demand Modeling for Small & Medium Size MPOs in Illinois		<b>Last Edited:</b> 1/10/2011					
		<b>Function Code:</b> R27-48					
		<b>Project Number:</b> R27-48					
<b>QPR Author Name:</b> Rita Morocoima-Black		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-328-3313	<b>% Project Completed:</b> 70			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review Part I		1/1/2009	3/31/2009	C	-	-	-
<b>Task 2:</b> Identify MPOs		3/1/2009	5/30/2009	C	-	-	-
<b>Task 3:</b> Create MPO Modeling Group		5/16/2009	10/16/2009	C	-	-	-
<b>Task 4:</b> Review Existing Modeling Processes		11/1/2009	6/30/2010	C	-	-	-
<b>Task 5:</b> Identify Travel Demand Modeling Benefit		7/1/2010	10/30/2010	I	C	-	-
<b>Task 6:</b> Identify Resources Needed		10/1/2010	12/31/2010	I	C	-	-
<b>Task 7:</b> Literature Review Part II		1/1/2011	2/28/2011	I	I	-	-
<b>Task 8:</b> Implementation Plan		3/1/2011	4/30/2011	I	I	-	-
<b>Task 9:</b> Statewide Model Issues		5/1/2011	6/30/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Rita Morocoima-Black		<b>Organization / Address</b>					
<b>Telephone:</b> 217-328-3313		Champaign County Regional Planning Commission (CCRPC)					
<b>Email:</b> rmorocoi@ccrpc.org		Champaign Co. Regional Planning Commission (CCRPC), 1776 E. Washington St. Urbana, IL. 61802					
<b>Co-Investigator:</b>							
<b>Name:</b> Prof. Paul Metaxatos		<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-4713		Urban Transportation Center, UIC, 412 S. Peoria St., Suite 340, Chicago, IL 60607					
<b>Email:</b> pavlos@uic.edu							
<b>Description of Research:</b>							
<p>This research will establish the framework necessary for the development, maintenance, and application of small and medium size Metropolitan Planning Organization (MPO) urban travel demand models in several communities in Illinois, which will constitute the foundation for a statewide travel demand model. These models will help small and medium size communities assess transportation system performance, analyze deficiencies, and develop long range plans.</p>							
<b>Keywords:</b> Travel demand model, MPO, transportation planning							
<b>Technical Review Panel:</b>							
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**Meeting Dates / Minutes Available?**

1/26/2009 / No  
 7/23/2009 / Yes  
 10/1/2009 / No  
 1/28/2010 / No  
 3/25/2010 / No  
 5/27/2010 / Yes  
 7/27/2010 / No  
 1/18/2011 / No

**End User(s) and Result(s) Expected:**

The expected outcomes of this research are:

1. A common framework for the development and implementation of travel demand models in small and medium size MPOs in Illinois.
2. A set of urban travel demand models and analytical background data that would form the foundation of a Statewide Travel Demand Model for the State of Illinois.
3. Enhanced traffic forecasting factors based on region-level analysis of population, business growth, land-use, and traffic volumes.
4. A better understanding for IDOT of travel patterns within the urban areas and their relationships with state roads, which would lead to improved highway planning, and ultimately to a highway network better suited for Illinois's economic future.

The outcomes of this research will help small and medium size MPOs in Illinois to develop, maintain and apply travel demand modeling on a regular basis in their planning efforts. The framework created will help MPOs to update and maintain their model with minimal resources.

**Progress to Date:**

Task One: Literature Review Part I:

CUUATS staff prepared a draft report with available literature resources and research completed on statewide and regional travel demand modeling; as well as issues, benefits and applications of travel demand modeling specific to small and medium sized MPOs.

Deliverable #1: Report was submitted, presented and discussed with the study Technical Review Panel (TRP) on July 23th.

Task 2: Identify MPOs:

CUUATS staff has identified twelve small and medium sized MPOs in Illinois that will benefit from being actively involved in this study. Each MPO was contacted and a survey was distributed to each of them to investigate their current modeling processes, needs and benefits.

A survey questionnaire for the twelve small and medium sized MPOs in the State of Illinois was developed, to collect information about the existing and planned resources available for travel forecasting. The draft of this survey was submitted to the Technical Review Panel for review and comments. On February 18th, the survey was distributed using survey monkey to the twelve (12) small and medium sized MPOs in Illinois. A summary of the responses received was prepared.

CUATS staff conducted follow-up interviews during the last week of May and first week of June with all 12 MPOs to clarify discrepancies in the responses and to collect specific information about each MPO modeling capabilities and investigate further processes used by them for transportation planning needs and also to identify required functionalities of the travel demand model by each MPO based on the characteristics of their regions and their needs.

A summary of the phone interviews was distributed submitted, presented and discussed with the MPO Technical Review Panel (TRP) on July 23th.

Task 3: Create MPO Modeling Group:

CUUATS Staff presented the findings of Tasks 1 and 2 at the Illinois Fall Planning Conference in Chicago last October and also explained the need for creating an Illinois Model Users Group (ILMUG) and their benefits. The first meeting of the ILMUG occurred in January 28th at the Champaign County Regional Planning Commission. The agenda included a presentation from Ed Christopher from the FHWA about the CTTTP data and presentations from the East Central Intergovernmental Association and Champaign County Regional Planning Commission about use of their travel demand models (TransCAD and Cube, respectively) for specific projects.

Representatives from eight MPOs attended the first IL MPOs Model Users Group (ILMUG) meeting. The representatives from the MPOs that attended the ILMPOs Technical Model Group were:

- Brian Dickson, DeKalb Sycamore Area Transportation Study
- Melissa Douherty-O'Hara/Jennifer Sicks, McLean County Regional Planning Commission
- Dale Schultz, Joe Ziebert, Chris Benson, Springfield-Sangamon County Regional Planning Commission
- Jim Webb, Tri-County Regional Planning Commission
- Gary W. McIntyre, Rockford Metropolitan Agency for Planning
- Lalit Patel, Bi-State Regional Commission
- Angie Stenson, Danville Area Transportation Study

A second meeting of the ILMPOs was held in March 25th at the McLean County Regional Planning Commission. About members of 10 MPOs as well as IDOT and FHWA representatives attended this meeting.

**Task 4: Identify Modeling Needs for MPOs:**

**Task 4.1: Review Existing Modeling Processes:**

CUUATS Staff has reviewed existing processes used by MPOs for transportation planning needs in general and traffic forecasting in particular, based on information collected through the surveys, telephone interviews and documentation provided by each MPO. CUUATS staff received model documentation from the following MPOs:

DeKalb Sycamore Area Transportation Study included in the LRTP

Bi-State Regional Commission included in the LRTP

Rockford Metropolitan Agency for Planning (RMAP) provided all the travel demand model documentation in a CD.

McLean County Regional Planning Commission

Tri-County Regional Planning Commission

East Central Intergovernmental Association (ECIA)

Springfield-Sangamon County Regional Planning Commission responded that “the documentation developed for our Travel Demand Model was completed under an agreement that states that the information is proprietary. If there is a list of questions that you were hoping to have answered by reviewing the documentation you can email them to me and I will do my best to answer them”. Therefore, we sent a list questions to the MPO staff regarding its travel demand model.

**Task 4.2: Identify Travel Demand Modeling Benefit:**

CUUATS Staff completed the identification of the required functionalities of the travel demand model of each MPO based on the characteristics of their region and their needs. With that information, CUUATS staff identified how each MPO travel demand model can be improved to better serve these MPOs as part of their transportation planning processes.

Deliverable #2: Report was submitted, presented and discussed with the study Technical Review Panel (TRP) on May 27th. The document includes the outcomes from Tasks 3 and Tasks 4.1 and 4.2.

Last Updated: 1/10/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Trip Chaining Behavior of Senior Travelers & Applications to Public Transportation Planning		<b>Last Edited:</b> 1/15/2011					
		<b>Function Code:</b> R27-50					
		<b>Project Number:</b> R27-50					
<b>QPR Author Name:</b> Kouros Mohammadian		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 312-996-9840	<b>% Project Completed:</b> 100			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Survey Tool Development and Implementation of Training Program		8/16/2008	1/31/2009	C	-	-	-
<b>Task 2:</b> Participant Recruitment		2/1/2009	2/28/2010	C	-	-	-
<b>Task 3:</b> Survey Implementation		3/27/2009	3/30/2010	C	-	-	-
<b>Task 4:</b> Data Analysis		9/1/2009	6/30/2010	C	-	-	-
<b>Task 5:</b> Dissemination of Findings		11/1/2009	12/31/2010	I	C	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Kouros Mohammadian				<b>Organization / Address</b>			
<b>Telephone:</b> 312-996-9840				University of Illinois at Chicago			
<b>Email:</b> kouros@uic.edu				842 W Taylor St., Chicago, IL 60607-7023			
<b>Description of Research:</b>							
This study's main objective was to conduct a survey of senior citizens' travel/activity behavior in the Chicago region to better understand their trip chaining behavior. The research team used GPS-based trajectories of seniors' travel patterns and trip chaining behavior, followed by activity/travel prompted recall interviews to understand their underlying travel/activity schedule processes.							
<b>Keywords:</b> Seniors, Transit, GPS Survey, Prompted Recall							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
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<b>Meeting Dates / Minutes Available?</b>							
2/22/2010 / Yes							
<b>End User(s) and Result(s) Expected:</b>							
The results can be used to plan more efficient transit services targeting senior travelers and to change their attitude toward public transportation. The study findings can also help transportation and transit agencies to further promote effective transportation solutions for an aging population.							
<b>Progress to Date:</b>							
Task 1: Survey Tool Development and Implementation of Training Program							
The research team developed the survey and prepared the survey protocol document and survey manual. UIC's Institutional Review Board approved the survey protocol in late December 2008. Five undergraduate research assistants were recruited and trained.							
Task 2: Participant Recruitment							
Recruitment packages were mailed to more than 1000 households and follow-up phone calls were scheduled. As a result more than 150 households							

agreed to participate in the survey.

#### Task 3: Survey Implementation

This task was successfully completed in March 2010. Overall, 101 households completed the GPS prompted recall survey including 50 elderly households and 51 non-elderly households.

#### Task 4: Data Analysis

Preliminary analysis was performed for a Master's thesis that was completed in June 2010. A draft report presenting the results of the data analysis was submitted to the TAG on June 28, 2010.

#### Task 5: Dissemination of Findings

One paper was presented at the Transportation Research Board (TRB) Annual Meeting in January 2010 in Washington, DC. This paper was also accepted for publication in the journal, Transportation Research Records. Another paper was presented at the Innovations in Transportation Modeling (ITM) Conference in Tempe, AZ in May 2010. Two other papers were presented at the 2010 WCTR Conference in Lisbon, Portugal and at the 32nd Time Use Conference (IATUR) in Paris, France.

One more paper has been accepted for presentation at the 2011 TRB Annual Meeting.

Last Updated: 1/15/2011  
Approved By TRP Chair: 11/13/2009



<b>Project Title:</b> Guidelines, Site Selection, and Design for Implementing Truck Parking/Rest Facilities in Chicago's South Suburbs		<b>Last Edited:</b> 2/16/2011					
		<b>Function Code:</b> R27-51					
		<b>Project Number:</b> R27-51					
<b>QPR Author Name:</b> Peter Beltemacchi		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 312-567-3261	<b>% Project Completed:</b> 99			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Coordination of Ongoing Work		12/1/2008	9/30/2010	I	C	-	-
<b>Task 2:</b> Develop Trucker's Guidance		1/1/2009	9/1/2010	C	-	-	-
<b>Task 3:</b> Develop Policy Guidance		1/1/2009	9/1/2010	C	-	-	-
<b>Task 4:</b> Develop Design Guidance		1/1/2009	9/1/2010	C	-	-	-
<b>Task 5:</b> Develop Site Guidance		1/1/2009	9/1/2010	C	-	-	-
<b>Task 6:</b> Prepare & Finalize Reports		9/1/2009	9/30/2010	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Peter Beltemacchi				<b>Organization / Address</b>			
<b>Telephone:</b> 312-567-3261				College of Architecture IIT			
<b>Email:</b> Beltemacchi@iit.edu				Illinois Institute of Technology Chicago IL 60616			
<b>Co-Investigator:</b>							
<b>Name:</b> Laurence Rohter, P.E.				<b>Organization / Address</b>			
<b>Telephone:</b> 708-442-6163				Civil Engineering IIT			
<b>Email:</b> rohter@iit.edu							
<b>Description of Research:</b>							
<p>For this study, the research team will develop a brochure and ancillary electronic information that will help truckers safely and efficiently navigate south suburban freight corridors. This information would include truck parking and rest facility locations, truck route maps, restricted route maps, and emergency information. This information can help make the south suburbs a choice destination to rest, refuel, and pass through, especially since it is 10-11 hours away from many major cities, such as Pittsburgh; Charleston, West Virginia; Memphis, and Sioux Falls. This choice will be further enhanced with a major proposed interchange at I-57 and I-294.</p>							
<b>Keywords:</b> truck, parking, design guide, engineering, handbook, brownfields, delivery, Interstate 80							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Chuck Abraham (Chair)		312-793-3510		Charles.Abraham@illinois.gov			
Patty Broers		217-782-3547		Patricia.Broers@illinois.gov			
<b>Meeting Dates / Minutes Available?</b>							
2/1/2009 / Yes							
4/16/2009 / Yes							
2/15/2010 / Yes							
<b>End User(s) and Result(s) Expected:</b>							

The research team will review existing policies and rules that negatively affect the trucking support industry in the south suburbs and examine ways of eliminating or modifying them. This effort may ultimately help encourage trucking-dependent and manufacturing industries to stay, expand, or relocate to this area.

Besides examining the negative impacts of some rules and policies, the research team will also create a guide for developing environmentally-friendly and energy-efficient truck parking facilities as well as identify and design several truck parking facilities.

#### **Progress to Date:**

The Illinois Center for Transportation gave the research team notice to proceed in mid-November; with a start date of November 1, 2008. The first month of this study was dedicated to developing staff resources and coordinating with the South Suburban Mayors and Managers' Association, which represents 42 municipalities in the study area. The research team determined that a trial project would be useful and chose to investigate potential truck parking at the World Music Center in Tinley Park, after discussion with one of the study's consultants.

- For Quarter Jul-Sep 2010, Good progress has been made on the final report. Draft sections were submitted in Aug-Sep. These interim sections were also part of the thorough review cycle with the consultants, which have now been incorporated.

The recommendations are:

Centralized Project Coordination

1) Someone somewhere needs to be continually monitoring local opportunities for implementing truck parking.

Policy Change

2) Guidelines for incorporating truck parking inside and outside the gate should be incorporated into revised ordinances for industrial developments and zoning.

Scalability and Scope

3) Relative to truck only facilities, preference should be given to smaller size developments.

4) Aggressively pursue shared facilities (autos and trucks) which would require only minimal investments in heavier duty pavements and signing. One solution is park-and-ride where autos have daytime usage and trucks nighttime.

Pilot Program

5) Start a truck parking development in order to strategically focus various public/private interests.

Information Technology

6) Establish security camera coverage of selected public areas to park.

One solution is to install cameras at important locations, feeding to local security, and relayed to the web.

7) Establish reserved slots.

One solution is based on a "2way" web application.

Promotion and Marketing

8) Maintain a web based promotional and informational campaign.

Incorporating Inter-modal

9) Develop adequate near-site truck parking to even out traffic flows and storage requirements.

Idle Reduction Strategies

10) Invest in various hotel supplies as plug-ins.

One solution could be accomplished in conjunction with electrical developments for passenger cars.

The TRP Chairman is reviewing the final report. Comments for finalization are under discussion.

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For Quarter Mar-Jun 2010, effort was put into consolidating research materials and summarizing work to date in order to conduct an outreach program with the various stakeholders. Texts have been updated and new graphics have been drawn. In order to keep an orderly timeline, a no cost time extension was requested and is being processed, to bring the developmental work to a conclusion by Sep1 ,2010, with project completion scheduled for Sept 30. Significant efforts are slated for the summer intersession period.

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For Quarter Jan-Mar2010; A formal review meeting was held with the Technical Review Panel and a majority of the student researchers. At this meeting the draft report was presented based on reviews of all potential types of sites and their potential build needs. The result was a consistent status of work that would be needed to provide more spaces. Resulting tasks were to do stakeholder distribution and intake , freight industry/development peer review and to generate a list of investment steps that can be undertaken. For example identified to date is: conversion of existing asphalt parking spaces to concrete in select locations, an overall continuity of championing additional sites, and a companion over-reaching website to consolidate and focus sites that are available on a dynamic basis. This work will continue into the next quarter as an extension has been granted to do the necessary and productive outreach activities needed. It is also intended to do a website upgrade.

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For Quarter Jan-Mar2009; The ratification of the formal sites has been completed and work has begun on a descriptive website. The local tourism board has been contacted and is in support. Next is to implement the sample website and provide in/outreach.

The potential RTA sites were reviewed and a baseline weighting criteria applied. Of the four highest ranked sites a "AA" rating went to the "PACE Homewood Park-N\_Ride" site after discussion with the Real Estate Consultant. A "C" rating was given to the "METRA RI Lenox Station". The methodology might be improved by using the COD Selector Tool developed for similar situations by CNT. This is being pursued for inclusion.

Pavement design and environmental improvements were researched in this quarter and a co-ordination meeting was held with SSMMA and others on April 16, 2009.

Good progress has been made and drafting efforts are underway for interim reports. Interim reports will need to be run through a thorough review cycle with consultants and others, and improvements made as requested. Draft website at <http://mypages.iit.edu/~tparking/>

An Interim Report was drafted by the originally scheduled end of this project, 12/1/09, which incorporated the results of our research activities in policy, design, and site guidance.

Various parallel activities such as CMAP's Freight study and SSMMA's desire to focus on intermodal development highlight the need to finalize the work with careful review and analysis with the stakeholders base. Research expenditures are on target for progress achieved.

The TRP Chair is reviewing the draft final report that has been revised by IIT.

Last Updated: 2/16/2011  
Approved By TRP Chair: 11/13/2009



<b>Project Title:</b> Studying & Minimizing Traffic Related Work Zone Crashes in Illinois		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-52					
		<b>Project Number:</b> R27-52					
<b>QPR Author Name:</b> K. El Rayes		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> (217) 265-0557	<b>% Project Completed:</b> 99.9			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Conduct Literature Review and Site Visits		9/16/2008	3/16/2009	C	-	-	-
<b>Task 2:</b> Gather and Analyze Data and Reports on Work Zone Crashes in Illinois		12/3/2008	7/30/2009	C	-	-	-
<b>Task 3:</b> Conduct Field Evaluations of Temporary/Portable Rumble Strips		6/30/2009	10/30/2009	C	-	-	-
<b>Task 4:</b> Develop Recommendations to Improve Work Zone Layouts and Merge Techniques		11/2/2009	3/15/2010	C	-	-	-
<b>Task 5:</b> Make Final Recommendations		3/15/2010	7/15/2010	C	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> K. El Rayes		<b>Organization / Address</b>					
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<b>Co-Investigator:</b>							
<b>Name:</b> L. Liu		<b>Organization / Address</b>					
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<b>Email:</b> lliu1@uiuc.edu							
<b>Description of Research:</b>							
<p>This research project plans to study and answer a number of important and challenging research questions, including: (1) What are the probable causes of work zone crashes in Illinois? (2) What are the probable work zone layout factors, if any, that contribute to an increase in traffic-related crashes? (3) How can work zone layouts and merge techniques be improved to minimize and control the probable causes of work zone crashes in Illinois? (4) How practical is the proposed ICHSP strategy of adding temporary rumble strips within and prior to work zones and how effective is it in enhancing work zone safety?</p>							
<b>Keywords:</b>							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							

10/15/2008 / Yes

1/20/2010 / Yes

**End User(s) and Result(s) Expected:**

The expected outcomes of this project are (1) comprehensive literature review and site visits report; (2) comprehensive analysis of work zone crashes in Illinois; (3) recommendations for improving work zone layouts and merge techniques; (4) evaluation of the practicality and effectiveness of temporary rumble strips; and (5) final recommendations to improve IDOT traffic control standards and specifications.

**Progress to Date:**

As of June 30, 2010, the research team completed the five tasks of the project and submitted their four interim reports. The first interim report outlines the main findings of the first task of literature review, and it was completed and submitted as planned on March 16, 2009. This report presented a comprehensive review of current practices and recent research studies on: (1) effective work zone layout and strategies; (2) temporary traffic control devices and transportation management plans for work zone areas; (3) merge techniques and queue detection systems for construction areas; (4) relevant and recent Federal and US DOTs rules on work zone safety and mobility; (5) methods and factors for analyzing work zone crash data to determine work zone crash characteristics and contributing factors; (6) statistical methods for analyzing both work zone crashes and roadway crashes; and (7) temporary rumble strips and their characteristics and possible deployment locations.

The research team has also completed the second task of gathering and analyzing data and reports on work zone crashes in Illinois, and they submitted its interim report as scheduled on July 30, 2009. The main findings of this second interim report includes (1) a comprehensive set of data on the most recent work zone crashes in Illinois from all available resources, including the National Highway Traffic Safety Administration (NHTSA 2007), the Highway Safety Information System (HSIS 2009), and police crash reports of fatal work zone crashes; (2) statistical analyses to investigate and compare the impact of fifteen work zone crash variables on the frequency and severity of work zone crashes; and (3) identified correlations among the available crash variables in the gathered data set to investigate probable causes and contributing factors of work zone crashes in Illinois.

The third task focused on conducting field evaluations of temporary rumble strips in Rantoul, IL to study and evaluate the practicality and effectiveness of three commonly used temporary rumble strips in work zones. During the field experiments, a total of 27 different temporary rumble strip pattern arrangements were tested. The objectives of these experiments were to: (1) analyze the practicality and ease of using temporary rumble strips within and prior to work zones; and (2) study the effectiveness of temporary rumble strips in generating sound levels to enhance the alertness of drive-by motorists. The third interim report detailing the gathered data and the conducted analysis in this task was submitted as scheduled on October 30, 2009. The main findings of this third interim report include: (1) a comprehensive review of temporary rumble strip practices, characteristics, and possible deployment locations; (2) description of the experiment setup, site preparation, rumble strip types, and the equipment utilized in the field tests; (3) evaluation of the practicality and ease of use of temporary rumble strips in terms of the measured time and effort to install and remove the strips within work zones; (4) evaluation of the effectiveness of temporary rumble strips that are placed prior to work zones to generate auditory stimulus to alert motorists of the approaching work area and prompt them to reduce their speed; and (5) evaluation of the effectiveness of temporary rumble strips that are placed at the edge of work zones to alert inattentive drivers if they encroach into the work area in a similar way that the permanent rumble strips are used to alert drivers when they drift off the road.

The fourth task focused on developing practical recommendations to improve work zone layouts and to enhance the utilization of temporary rumble strips prior to and at the edge of work zones. The recommendations were based on the main findings of: (1) a comprehensive analysis of work zone crashes in Illinois and their contributing factors which were reported in the second interim report of this project; (2) field experiments to evaluate the efficiency and effectiveness of temporary rumble strips which were reported in the third interim report of this project; and (3) an online survey on work zone practices that was conducted in February 2010 to gather feedback and recommendations from IDOT resident engineers. The main findings of this completed fourth task were outlined in the fourth interim report that was submitted as planned on March 15, 2010.

The research team completed the fifth and final task that focused on making final recommendations to improve existing IDOT traffic control Standards and Specifications based on the main findings of the aforementioned tasks. The final report covering the main findings of this completed task was submitted as scheduled on September 15, 2010.

The report is still under review by the TRP.

Last Updated: 2/8/2011  
Approved By TRP Chair: 10/15/2009



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Storm Water Pollution, Erosion & Sediment Control Products Demonstration & Training Center			<b>Last Edited:</b> 2/3/2011					
			<b>Function Code:</b> R27-54					
			<b>Project Number:</b> R27-54					
<b>QPR Author Name:</b> Prasanta Kalita			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-0945	<b>% Project Completed:</b> 75				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Earth work construction			6/30/2009	12/31/2009	C	-	-	-
<b>Task 2:</b> Site Preparation for Earthwork			4/30/2009	6/30/2010	C	-	-	-
<b>Task 3:</b> Internal Preliminary Review of Educational module			1/15/2009	12/31/2010	I	I	-	-
<b>Task 4:</b> Approval for the construction project from authorities			4/30/2009	6/30/2009	C	-	-	-
<b>Task 5:</b> Temporary Grass cover Establishment			7/1/2009	9/30/2009	C	-	-	-
<b>Task 6:</b> Irrigation system design			7/1/2009	12/31/2010	I	C	-	-
<b>Task 7:</b> Erosion control products aquisition			7/1/2009	9/30/2010	I	I	-	-
<b>Task 8:</b> Installation of Erosion Control Products-Winter Shut-down			10/1/2009	12/31/2010	C	-	-	-
<b>Task 9:</b> Erosion control plot installation			1/15/2010	12/31/2010	I	C	-	-
<b>Task 10:</b> Installation of ditch checks for sediment control			7/1/2010	12/31/2010	I	C	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Prasanta Kalita			<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-0945			UIUC Agricultural & Biological Engineering					
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<b>Co-Investigator:</b>								
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<b>Description of Research:</b>								
Centrally located Urbana-Champaign is easily accessible from all parts of Illinois through major highways. University of Illinois is ideal for establishing this center immediately and with future expansion potential. Furthermore, the proximity of the proposed site to Advanced Transportation Research and Engineering Laboratory (ATREL) provides a unique opportunity to promote interaction and joint training at reduced costs. For example, if research is required to access interactions between SWM BMPs and pavement practices this proximity would allow for collaboration. Additionally, the University of Illinois is partnering with the Construction Engineering Research Laboratory (CERL) of the US Department of Army for developing the training center.								
<b>Keywords:</b> Storm water, sediment control, best management practices, education, training								
<b>Technical Review Panel:</b>								
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Meeting Dates / Minutes Available?
12/11/2008 / No
4/30/2009 / Yes
11/24/2009 / Yes
4/20/2010 / Yes
8/10/2010 / Yes
12/2/2010 / Yes

**End User(s) and Result(s) Expected:**

There are a multitude of anticipated outcomes that could generate from this proposal. First, we will develop a state-of-the art research, demonstration, and training center. Second, we will utilize this facility to evaluate the performance of IDOT identified storm water management and erosion control BMPs. Third, we will use evaluation study results to recommend improved BMP practices and installation guidelines. Fourth, we will provide IDOT with staff training in a timely and cost effective manner. Fifth, the research and training resulting from the proposed facility will help reduce IDOT construction and maintenance costs.

**Progress to Date:**

A series of meetings have been conducted with the IDOT Technical Review Panel members lead by Mr. Tom Ripka. These meetings helps all parties to mutually agree on various structures need to constructed at the University of Illinois demonstration facility. The construction site has been identified and earth work construction work is ready to begin. Two educational modules have been prepared and the drafts are under review at present. The preliminary irrigation system has been designed and is under review at present.

For the period of April-June, following progress has been made:

1. We had a formal meeting with the IDOT Techical committee at the U of I campus -construction site. Accordingly, we have worked on revising some of the construction plans. The input from the IDOT members were very valuable in revising the plan.
2. After the meeting, the U of I and the CERL researchers met several times during the last three months.
3. Most of the last two months have been spent in dealing with a lot of paper works. Since the construction area is more than 1 acres, permits are needed from IDNR and IEPA (SWPPP and other forms). We also needed to sign a memorandum of understanding between the U of I and the ILICA (Illinois Land Improvement Contractors Association), since ILICA will perform the construction works ate the U of I South Farm for this project. This involved several meetings and conference calls and involvement of the U of I legal office. Finally, most of the formal processes are taken care of and we have fixed a date to begin the construction works. The construction will start on Aug 03, 2009.
4. We have also completed a detail survey of the construction area recently.
5. The two educational modules that we have prepared are in the internal review process by the project investigators. Once the review is completed, those will be sent to the IDOT technical Panel for their input and comments.

For the period of July-September, the following progress has been made:

1. Construction started on August 3 with the help of ILICA (Illinois Land Improvement Contractors Association). A detention pond, three ditches - each of length 200 ft, and a 300 ft long berm of height 12.5 ft were constructed.
2. For temporaty protection after construction, grass seeds were broadcasted at the rate of 10 lbs/acre on flat areas and along slope of the retention basin with fescue mix. Also, grass seeding at the rate of 12 lb/acre with oats was broadcasted on the berm slopes on both sides.
3. Initial design calculation for the irrigation system is being carried out.
4. Continuous effort are being to develop the teaching modules. We have developed two modules earlier that are being checked on. Another two modules are being developed (winter shut-downs and resources).
5. Selected erosion control product manufactures are being contacted for delivering their products for evaluation. One of the products have been delivered; discussions will be carried for its evaluation shortly.

For the period from October-December 2009, the following progress was made:

1. Extension of ditch: As suggested by IDOT, one of the ditches was extended to 300 ft on November 7 and 8 with the help of ILICA (Illinois Land Improvement Contractors Association). Now the demonstration site has 3 ditches (2 - 200 ft long and 1 - 300 ft long) with 3 different slopes (2, 3 and 4%).

2. Installation of water level controlling device: On November 24, 2009, two sections of drainage tile were removed from the branch that drains water from the detention pond, and a flow regulator structure was installed in their place. This structure allows the water level in the detention pond to be controlled via insertion or removal of a series of 6-inch gates in the regulator's column. Assuming an adequate flow into the pond at a given time, the water level can then be controlled in intervals of 6 inches.

3. Hydro-seeding and Installation of erosion blankets (winter shutdown): On December 18, 2009, three types of erosion control blankets were installed on 30% surface area of the berm. For the remaining 70%, it was planned to apply hydromulching with 4 different types of materials. However, due to cold weather conditions, only one type was applied with limited ground coverage, and therefore, it was decided to continue this operation when weather condition improves.

4. Teaching modules: As discussed at the November 24, 2009 meeting, and suggested by IDOT, the already developed three teaching modules are being revised. There will be now five modules as listed below:

- Module 1 - Fundamentals of science, regulation, design, installation, maintenance, removal and inspection
- Module 2 - Science behind Soil erosion and sediment
- Module 3 - Regulation related to soil erosion
- Module 4 - Design (Urban design, rural design), Installation, Maintenance and Removal of sediment control devices
- Module 5 - Inspection (Performance and evaluation criteria for Blankets, TRM, Inlet protection devices) of sediment control devices

At present, we are working to complete module 1 on "Fundamentals of science, regulation, design, installation, maintenance, removal and inspection".

For the period from January-March 2010, the following progress was made:

1. Preparation of erosion plots and installation of runoff and sediment collection system: 12 erosion test plots have been established on 3:1 side of the berm. This will enable us to test three erosion products (with three replications) at once. Remaining three plots will be used as control (bare). Each test plot is 12 m long and 2.5 m wide. The perimeter of the test plot is isolated using an impermeable barrier (galvanized iron sheet) that's bottom edge has been buried at least 10 cm below the test surface. Three sides of the plot (top and two sides) have the barriers while a runoff collecting system (a triangular metal plate that diverts the runoff into the collecting tank) is placed at the end of the plot. Runoff and sediment collection tanks have been installed at the bottom of each plot. The sizes of the tanks are determined based on highest amount of runoff that will be generated from a 25 year 24 hour rainfall (can be simulated by the sprinkler system only). Based on that, ten metal tanks of 300 gallon capacity have been installed to collect runoff from ten test plots. This will enable us to collect runoff and sediment from three treatments (with three replications) and a control plot during simulated sprinkler experiments. Two 100 gallon metal tanks have been installed at the base of two control plots which will collect runoff and sediment from natural events.

2. Installation of weather station: A weather station has been installed at the site in March. The station records following meteorological data: rainfall, soil moisture, temperature, relative humidity, wind direction and velocity.

3. Irrigation System: The sprinkler irrigation system has been designed, and is under review.

4. Field classroom: A classroom has been made ready at the field site and furnished to accommodate about 30 people.

5. Teaching modules: Module 1 on "Fundamentals of science, regulation, design, installation, maintenance, removal and inspection" has been prepared and sent to IDOT for review. The draft of module 2 on "Science behind Soil erosion and sediment transport" is ready and will be sent to IDOT for review within a week. The drafts of module 3 on "Regulation related to soil erosion", module 4 on "Design (Urban design, rural design), Installation, Maintenance and Removal of sediment control devices" and module 5 on "Inspection (Performance and evaluation criteria for Blankets, TRM, Inlet protection devices) of sediment control devices" are being prepared and will be sent to IDOT by the end of April, 2010. The handout for participants to go with module 1 is almost ready for IDOT review.

For the period from April-June 2010, the following progress was made:

1. Preparation of erosion plots and installation of collection system: After collecting runoff and sediment samples from few natural events this spring, the erosion plots are being improved. The new plots would be more stable than earlier ones since they have wooden borders along with metal borders which will provide a better barrier for runoff from the plot. Since there were some issues with old runoff collection system, most of the collection tanks have been reinstalled so that runoff from the surrounding area can't enter into the collection system

2. Irrigation system design: The materials needed to build and install sprinkler irrigation system have been purchased and the system will be installed on the berm in next few weeks.

4. Teaching modules: As per IDOT's recommendation, module 1 on "Fundamentals of science, regulation, design, installation, maintenance, removal and inspection" has been revised. The draft of module 2 on "Science behind Soil erosion and sediment" is ready and will be sent to IDOT for review soon. The drafts of module 3 on "Regulation related to soil erosion", module 4 on "Design (Urban design, rural design), Installation, Maintenance and Removal of sediment control devices" and module 5 on "Inspection (Performance and evaluation criteria for Blankets, TRM, Inlet protection devices) of sediment control devices" are being prepared and will be sent to IDOT as they are ready.

For the period from July-September 2010, the following progress was made:

1. Rainfall simulator system: The rainfall simulator system has been assembled and the system is being calibrated to produce rainfall of different intensities.

2. Erosion plots: Four erosion plots have been established. These new plots are more stable than earlier ones since they have wooden borders along with metal borders which provide a better barrier for runoff from the plot. Similarly, five new plots are being set up to test how different cover conditions (compost, mulch and hydromulch) affect vegetation growth on 3:1 side of the berm.

3. Installation of ditch checks: For demonstration and evaluation purpose, three type of ditch checks: geo-ridge berm, sediment log and triangular silt dike have been installed in the ditches with 4%, 3% and 2% slope respectively.
4. Teaching modules: As per IDOT's recommendation, module 1 on "Fundamentals of science, regulation, design, installation, maintenance, removal and inspection" has been revised. The draft of module 2 on "Science behind Soil erosion and sediment" is ready and will be sent to IDOT for review soon. The drafts of module 3 on "Regulation related to soil erosion", module 4 on "Design (Urban design, rural design), Installation, Maintenance and Removal of sediment control devices" and module 5 on "Inspection (Performance and evaluation criteria for Blankets, TRM, Inlet protection devices) of sediment control devices" are being prepared and will be sent to IDOT as they are ready.

For the period from October-December 2010, the following progress was made:

1. Teaching modules: On December 2, 2010 an in-depth discussion on class topics was conducted with IDOT TRC members. Based on feedbacks at that meeting, revisions have been made for the first class on "Fundamentals of stormwater pollution and erosion and sediment control." A test run of the class was conducted on January 5, 2011 to IDOT TRC members. The draft of Class 2 on "Science behind Soil erosion and sediment" is ready and will be sent to IDOT for review soon. The draft of class 3 on "Design, Installation, Maintenance, Removal and Inspection of sediment control devices" is being prepared and will be sent to IDOT as it gets ready.
2. Rainfall simulator system: The rainfall simulator system was tested under various pressures to determine the distribution and intensity of rainfall. Because the wind at the experimental site had a significant effect on the amount of rainfall reaching the plot, alternative sprinkler nozzles and sprinkler tree heights were also tested in the laboratory at pressures of 10, 20, 30, and 40 PSI, yielding a coarser drop size and greater rainfall intensity.
3. Ditch check demonstration: Following comments on the initial installation of ditch checks in the channels, the issues were addressed and additional ditch checks were installed for demonstration and evaluation purposes. V-notch weirs were installed near the inlet of each channel to measure channel flow. Qualitative evaluations were performed under various flow conditions for each sequence of ditch checks.
4. Vegetation evaluation and demonstration: Five new vegetation plots were established on the western portion of the 3:1 face of the berm. Vegetation was applied in five different manners: 1) Seed alone, 2) Seed followed by compost, 3) Seed followed by mulch, 4) Seed followed by hydromulch, 5) Seed mixed with hydromulch.
5. Winter shut down: Hydro mulching was performed with a local company on all the bare soil surfaces during the first week of November, 2010. All the sprinkler equipment and pipe assemblies were removed from the site and stored at the storage building.

Last Updated: 2/3/2011

Approved By TRP Chair: 10/21/2009



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Instrumentation & Monitoring of Extreme Integral Abutment Bridges in Illinois		<b>Last Edited:</b> 1/14/2011					
		<b>Function Code:</b> R27-55					
		<b>Project Number:</b> R27-55					
<b>QPR Author Name:</b> Scott M. Olson		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011		
<b>Telephone:</b> 217-265-7584	<b>% Project Completed:</b> 45				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Finalize construction and monitoring plan for IABs		8/16/2008	10/16/2008	C	-	-	-
<b>Task 2:</b> Select three 'extreme' IABs for instrumentation		10/16/2008	11/16/2008	C	-	-	-
<b>Task 3:</b> Install and monitor instrumentation		11/16/2008	3/16/2011	I	I	-	-
<b>Task 4:</b> Compare monitoring program data to Project R27-25 numerical results		3/16/2011	7/16/2011	-	-	-	-
<b>Task 5:</b> Submit final project report		7/16/2011	8/15/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Scott M. Olson				<b>Organization / Address</b>			
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<b>Co-Investigator:</b>							
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<b>Description of Research:</b>							
<p>The primary objectives of this project are to: (1) evaluate and select candidate integral abutment bridges in at least one IDOT district that are "extreme" (i.e., exceed current usage limitations for IABs) in terms of span length or bridge skew; (2) modify construction documents and schedules to implement instrumentation plans developed in Project R27-25; (3) procure and install the required instruments and data acquisition systems at the selected bridges; and (4) monitor and interpret the instrument measurements. We will also develop a structure to facilitate long-term (on the order of 10 or more years) monitoring of the selected bridges.</p>							
<b>Keywords:</b>							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							

9/17/2009 / Yes

6/21/2010 / No

**End User(s) and Result(s) Expected:**

Anticipated end users are IDOT Headquarters Bridge Division, Districts, Local Agencies, and consultants to IDOT, as well as potentially improving design and construction in other states. The result should include revising the Bridge Manual to expand the use of integral abutment bridges, improve design methods and construction procedures, and verify performance of these structures.

**Progress to Date:**

Progress through 9/30/2008

1. Selected first IAB for instrumentation (IL Route 108 over Macoupin Creek located 1.8 miles east of IL Route 4 east of Carlinville).
2. Developed instrumentation plan for first IAB in concert with IDOT engineers.
3. Held kick-off meeting with contractor, IDOT, and University of Illinois personnel to discuss instrumentation plans.

Progress through 12/31/2008

1. Contracted with URS Corporation to review instrumentation plan, assist with field installation of instruments, and to install and set-up data acquisition system.
2. Identifying second IAB for instrumentation.
3. Contacted manufacturer for procuring instruments.

Progress through 3/31/2009

1. Identified first two integral abutment bridges for instrumentation. In the process of identifying third bridge.
2. Observed Stage 1 pile driving at first bridge (IL 108 over Macoupin Creek). Reference piles were driving at this time. Contractor will contact project team to deliver production piles that will be instrumented.
3. Visited second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria) to discuss instrumentation plans with contractor and IDOT resident engineer John Kantz.

Progress through 6/30/2009

1. Piles from first bridge (IL 108 over Macoupin Creek) delivered to Newmark Lab (University of Illinois) for instrumenting.
2. Installed strain gages and gage protection system on instrumented piles and set-up strain gages in data acquisition system for first bridge (IL 108 over Macoupin Creek).
3. Set up load test to calibrate strain gages for instrumented piles for first bridge (IL 108 over Macoupin Creek). Calibration test planned for first or second week of July.
4. Discussed construction progress at first bridge (IL 108 over Macoupin Creek) with IDOT resident engineer. Resident engineer expects to need instrumented piles during first week of August.
5. Procured quartzite boxes for protecting reference piles at first bridge (IL 108 over Macoupin Creek). This task was performed after Stage 1 abutment construction was complete so that the right size boxes were procured. These boxes will be delivered to the project site with the instrumented piles.
6. Contracted with URS Corporation to install data acquisition systems and solar power equipment at project sites.
7. Discussed construction progress with IDOT resident engineer at second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria). Resident engineer indicated that construction is proceeding slowly as a result of considerable rainfall at the site. He doesn't know when contractor will be ready to install reference piles.

Progress through 9/30/2009

1. Laboratory calibration/load test performed on piles from first bridge (IL 108 over Macoupin Creek). Laboratory calibration indicated that strain gage and strain gage protection system installation, i.e., welding, did not significantly influence strain gage calibration factors.
2. Contractor picked up piles for first bridge (IL 108 over Macoupin Creek) and installed them at bridge. The strain gages appear to have survived pile driving and are working properly. Installed PVC conduits to house/protect instrument cables. Installed inclinometer casing at two instrumented pile locations. Reference piles installed and encased in bentonite.
3. Programming for data acquisition system (being performed by subcontractor, URS Corporation) is nearly complete.
4. Discussed construction progress with IDOT resident engineer at second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria), as well as with Technical Review Panel. Resident engineer indicated that construction is still proceeding slowly as a result of considerable rainfall and other construction issues at the site. Reference piles have been installed at the south end of the bridge, but not the north. Contractor has not delivered piles to be instrumented to the University of Illinois at this time.
5. Discussed third bridge (IL 16 over Embarras River) with Bill Kramer and Technical Review Panel during TRP meeting. Letting for this bridge was postponed until 2010; however, PIs and TRP believe that this is still the best option for the third instrumented bridge. Discussed possibility of extending project in order to accommodate delayed schedules for second and third bridges.

Progress through 12/31/2009

1. Instrumented piles installed at first bridge (IL 108 over Macoupin Creek) were checked again after abutment and bridge deck poured. Instruments appear to be functioning properly.
2. Additional (and final) solar panel equipment and data acquisition components for first bridge ordered through University Purchasing Office during second week of December, but order will not be made until after classes resume as the Purchasing Office is not open during the break. Programming for the data acquisition system is complete. Following acquisition of the final equipment, URS and UIUC will complete the instrument and data acquisition installation at the first bridge (IL 108 over Macoupin Creek).
3. Continued discussing progress at second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria) with Resident Engineer. As of this progress report, UIUC has not received the piles that are to be instrumented with strain gages. The Resident Engineer has indicated that he will contact the project team as soon as progress resumes at the bridge.
4. Developing proposal to extend timeline for project. PI intentionally delayed completing proposal until after current reporting period to assess the

work completed before student currently assigned to the project graduated. The PI will discuss the current project status with the TRP Chair and TRP during next reporting period.

Progress through 3/31/2010

1. Coordinated with URS Corporation to install data acquisition system, power supply, and wire in instruments during second quarter of 2010 at first bridge (IL 108 over Macoupin Creek).
2. Contractor for second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria) contacted PI regarding delivering piles to be instrumented to Newmark Lab at Illinois. Piles not delivered by end of quarter.
3. Hired undergraduate student hourly to assist with installing instruments on piles for second bridge. This will minimize impact to budget until new graduate student joins project in Fall 2010.

Through 6/30/2010

1. Installed strain gages on two H-piles for second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria) in Newmark Laboratory on Illinois campus.
2. Observed driving of instrumented piles, installed conduit system to get strain gage cables outside of abutment footprint and ran cables, and installed casing for inclinometers.
3. Met with TRP to discuss current progress and discuss options for third bridge, which has not to date been let by the district. TRP and IDOT personnel currently deliberating on whether to wait for the originally selected third bridge or select a new third bridge.

Through 9/30/2010

1. Repaired inclinometer casings at second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria), after contractor had cut-off casings that extended above the abutment.
2. Kurt Holloway, a new graduate student in structures, obtained all SAP project files that were developed for project R27-25. Project researchers reviewed all pertinent results, Kurt and started performing analyses for parametric study agreed upon by TRP and researchers during last quarter's TRP meeting.

Through 12/31/2010

1. Developed new FE models for parametric analysis and began performing preliminary runs for comparing with results from initial ICT project.
2. Began developing site-specific FE bridge models for first bridge (IL 108 over Macoupin Creek) and second bridge (Airport Rd. over UPRR and Kickapoo Creek in Peoria).
3. Status of third bridge still uncertain.

Last Updated: 1/14/2011  
Approved By TRP Chair: 1/27/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Transfer & Development Lengths in Prestressed Self-Consolidating Concrete Bridge Box & I-Girders			<b>Last Edited:</b> 2/16/2011					
			<b>Function Code:</b> R27-56					
			<b>Project Number:</b> R27-56					
<b>QPR Author Name:</b> B. Andrawes			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-244-4178	<b>% Project Completed:</b> 98				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Design of SCC Mixes			7/16/2008	10/15/2008	C	-	-	-
<b>Task 2:</b> Conducting SCC Qualifying Tests			10/16/2008	4/15/2009	C	-	-	-
<b>Task 3:</b> Conducting Pull-Out Tests			1/16/2009	7/15/2009	C	-	-	-
<b>Task 4:</b> Casting of Girders and Measuring the Transfer Length			4/16/2009	10/15/2009	C	-	-	-
<b>Task 5:</b> Conducting Flexural Tests			10/16/2009	4/15/2010	I	C	-	-
<b>Task 6:</b> Prepare and Finalize Final Report			4/16/2010	2/28/2011	I	I	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> B. Andrawes			<b>Organization / Address</b>					
<b>Telephone:</b> 217-244-4178			UIUC					
<b>Email:</b> andrawes@illinois.edu			Dept. of CEE 3122 Newmark CE Lab, MC 250 205 N. Mathews Urbana, IL 61801					
<b>Description of Research:</b>								
<p><b>Task (1): Design of SCC Mixes</b> This task will focus on defining the design of SCC mixes that will be used in the project. The PI will contact large number of Illinois precasters who are working on the development of SCC to obtain detailed information on the type and design of their SCC mixes as well as the type and size of precast elements they produce.</p> <p><b>Task (2): Conducting SCC Qualifying Tests</b> The SCC mixes identified in the previous task will be subjected to wide range of tests (J-ring, L-box, etc.) to examine its plasticity and physical properties and compare it with typical properties of SCC. Concrete cylinders will also be cast and tested at various ages to specify the mechanical properties of the SCC mixes.</p> <p><b>Task (3): Conducting Pull-Out Tests</b> The SCC mixes that was selected in Task (1) and passed the qualifying tests in Task (2) will be used in conducting a series of pull-out tests. The primary aim of these tests is to evaluate the bond strength between the concrete and prestressing strands. Concrete blocks (24in-wide x 36in-length x 24in-depth) will be used in these tests.</p> <p><b>Task (4): Casting of Girders and Measuring the Transfer Length</b> Based on the pull-out test results, two SCC mixes will be recommended and selected to be used in casting the girders. Two types of girders will be involved in this project. The first type is the 27''x48'' bridge deck box girders with void, while the second type is the 42'' I-girders. The transfer length of four full-scale girders will be measured during this task.</p> <p><b>Task (5): Conducting Flexural Tests</b> During this task, the precast girders will be transported by the precaster to the Newmark Structural Engineering Laboratory (NSEL) at the University of Illinois at Urbana-Champaign where the flexural tests will take place.</p>								
<b>Keywords:</b> Self Consolidating Concrete, Prestressed Girders, Bridges, Transfer and Development Length								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>		
3/26/2009 / Yes		
<p><b>End User(s) and Result(s) Expected:</b>                  Completing essential step towards adopting the technology of SCC in the state of Illinois.</p>		
<p><b>Progress to Date:</b>                  All tasks have been completed for this project. The final report has been submitted to the TRP chair on January 19, 2011 requesting his approval.</p>		

Last Updated: 2/16/2011



<b>Project Title:</b> Superiority & Constructability of Fibrous Additives for Bridge Deck Overlays			<b>Last Edited:</b> 1/14/2011					
			<b>Function Code:</b> R27-57					
			<b>Project Number:</b> R27-57					
<b>QPR Author Name:</b> Dr. Mohammad Alhassan			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 260-481-6389	<b>% Project Completed:</b> 75				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Relevant Literature Review and Examination of the U.S. DOTs Practices			1/1/2009	10/1/2010	C	-	-	-
<b>Task 2:</b> Establishment of Target Performance Criteria			1/1/2009	3/31/2009	C	-	-	-
<b>Task 3:</b> Selection of Overlay Mixtures without Fibrous Additives			1/1/2009	3/31/2009	C	-	-	-
<b>Task 4:</b> Selection of Synthetic Fiber Types			1/1/2009	3/31/2009	C	-	-	-
<b>Task 5:</b> Proportioning of LMC and MSC Mixtures with Fibrous Additives			1/1/2009	3/31/2009	C	-	-	-
<b>Task 6:</b> Evaluation of the Mixtures Performance Characteristics			5/1/2009	9/30/2010	I	C	-	-
<b>Task 7:</b> Analysis of Test Results and Recommendation of Fibrous Overlay Mixtures			6/1/2009	10/31/2011	I	I	-	-
<b>Task 8:</b> Selection of Demonstration Bridge for Installation of the Recommended Overlays			4/1/2010	8/31/2011	I	I	-	-
<b>Task 9:</b> Life-cycle Cost Analysis			5/1/2010	10/1/2011	I	I	-	-
<b>Task 10:</b> Submit, Edit & Finalize Project Report			10/31/2010	12/31/2011	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Dr. Mohammad Alhassan			<b>Organization / Address</b>					
<b>Telephone:</b> 260-481-6389			Indiana-Purdue Fort Wayne (IPFW)					
<b>Email:</b> alhassan@engr.ipfw.edu			IPFW-Engineering Department Room ET 327A 2101 East Coliseum Blvd Fort Wayne, IN 46805-1499 USA					
<b>Co-Investigator:</b>								
<b>Name:</b> Dr. Suleiman Ashur			<b>Organization / Address</b>					
<b>Telephone:</b> 260-481-6080			Indiana-Purdue Fort Wayne (IPFW)					
<b>Email:</b> Ashur@engr.ipfw.edu								
<b>Description of Research:</b>								
<p>This research project studies the advantages that the fibrous additives can add to the performance of bridge deck concrete overlays. Three types of concrete overlays will be evaluated; latex-modified concrete (LMC), microsilica concrete (MSC), and fly ash concrete (FAC) overlay. Various types and contents of synthetic fibers will be investigated resulting in a total of 14 different overlay mixes. The major concern is whether a specific combination of fibers will provide post-crack residual strength measured according to ASTM C1609 while maintaining adequate constructibility.</p>								
<b>Keywords:</b> Concrete Overlay, Bridge Deck, Fibrous Additives, Fibers, LMC, MSC, Fly ash, Toughness, Residual strength, Constructibility								
<b>Technical Review Panel:</b>								
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Meeting Dates / Minutes Available?		
	1/16/2009 / Yes	
	3/6/2009 / No	
	10/9/2009 / Yes	
	5/5/2010 / Yes	
End User(s) and Result(s) Expected:		
<p>The principal expected outcome from the research project is a synthesis submitted to the IDOT/ICT that documents the entire experimental procedures, obtained results, analysis of the results, and recommendations/guidelines on the design and construction of high performance, durable, and crack resistant LMC and MSC overlay mixtures with fibrous additives. This in turn will lead to substantial life-cycle cost savings, aesthetic product, good riding quality, and enhancement in the overall structural behavior and performance of bridges. The findings of the study will be presented at the TRB meetings and gathering of other organizations, such as ACI, PCI, ASCE, PCA, etc. The results will also be published in refereed journals and conference proceedings.</p>		
Progress to Date:		
<p>As of December 31st, 2010, the progress in R27-57 is summarized as follows:</p> <p>(Task 1) Relevant Literature Review and Examination of the Practices of U.S. DOTs: The relevant documents available in literature were reviewed. A survey was conducted to examine the practices and experience of other DOTs in terms of fibrous overlays. Overlay suppliers and fiber companies were continuously contacted for new applications.</p> <p>(Task 2) Establishment of Target Performance Criteria: This task is completed and involved and adoption/establishing of criteria for performance characteristics and constructability. Recommendations to the performance criteria for the fibrous overlays will be made based on the research findings.</p> <p>(Task 3) Selection of Bridge Deck Overlay Mixtures without Fibrous Additives: Plain overlay mixtures were proportioned according to IDOT specifications including latex-modified concrete (LMC), microsilica concrete (MSC), and fly ash concrete (FAC).</p> <p>(Task 4) Selection of Synthetic Fiber Types: Seven fiber types from three different fiber companies were selected including macro and micro fiber types with various configurations.</p> <p>(Task 5) Proportioning of Bridge Deck Overlay Mixtures with Fibrous Additives: A total of 14 overlay mixtures were proportioned including ten LMC, two MSC, and two FAC. The fibrous mixtures from the same overlay type have the same base mix design but different fiber combination.</p> <p>(Task 6) Evaluation of the Mixtures Performance Characteristics: Extensive laboratory program was conducted to evaluate the major performance characteristics of 14 overlay mixtures. The effects of the fibrous additives on the workability, air content, and ability to finish the fibrous mixtures were evaluated for each overlay type and fiber combination. Compressive and flexural strength tests were conducted at various ages. Drying shrinkage strains were monitored for all mixtures over a one-year period (completed). Permeability tests were conducted according to ASTM C1202. Direct tensile bond strength tests were conducted for representative plain and fibrous overlay mixtures to allow for the comparison between the companion fibrous and plain overlay mixtures. The tests were conducted at 7 and 28 days. The fibrous mixtures experienced bond strengths exceed the target criteria. The fibrous additives did not reduce the bond strength. The hydro-demolishing method of surface preparation was found to be adequate and effective. Four slab-overlay segments with representative plain and fibrous overlay mixtures were kept outside the laboratory since January 2010 in the open environment under actual weathering conditions for long term monitoring of their cracking tendency. Their direct tensile bond strengths will be tested after two full winter/summer cycles (Summer 2011). Toughness and Post-Cracking Residual Strength: The flexural performance test according to ASTM C1609 was completed for representative fibrous overlay mixtures.</p> <p>(Task 7) Analysis of Test Results and Recommendation of Fibrous Overlay Mixtures: The obtained results and observations are being analyzed. Encouraging results regarding the advantages of fibrous additives on the performance of bridge deck concrete overlays were obtained. The results reveal that certain types and combinations of the selected fibrous additives that are constructable (have good workability and can be finished without fiber climbing), provide internal confinement to the concrete pronounced through the compression failure mode, improve the flexural strength, reduce the drying shrinkage, and add toughness and residual strength without adversely affecting the bond strength, permeability, and compressive strength. Recommendations will be drawn based on the laboratory test results and the field demonstration projects (Task 8).</p> <p>(Task 8) Selection of Demonstration Bridges for Installation of the Recommended Overlays: A demonstration project with fibrous LMC overlay was conducted on August 6th of 2010 (Irving Park Rd over EJ&amp;E RR Structure Number 016-0948). This is the first documented DOT LMC overlay project with fibers nationwide. Specimens were obtained to verify the strength and permeability criteria. The selected bridge received fibrous LMC overlay on one side and plain LMC on the other side. The performance of these overlays will be evaluated after few months in service. Other projects with MSC and FAC with synthetic fibers will be selected soon. The fiber type and combination will be selected by the research team and TRP of the project. Special provisions will be added to the project contract documents to accommodate the fibrous overlay. The project period was extended to December 2011 without extra cost since the demonstration projects require long time to commence. In addition, this will allow for including the relative overlay projects in 2011.</p> <p>(Task 9) Life-cycle Cost Analysis (in progress): Useful Data was obtained from IDOT and the survey regarding the typical cost of the LMC and MSC overlays and regarding the expected service life. The cost of the FAC overlay will be available after the first project.</p>		

Last Updated: 1/14/2011  
Approved By TRP Chair: 1/21/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Evaluation of Wireless Detection Systems at RR Crossings & Signalized Intersections			<b>Last Edited:</b> 2/7/2011					
			<b>Function Code:</b> R27-58					
			<b>Project Number:</b> R27-58					
<b>QPR Author Name:</b> Prof. Ray Benekohal			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-244-6288	<b>% Project Completed:</b> 98				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature review			7/1/2008	12/31/2008	C	-	-	-
<b>Task 2:</b> Develop testing criteria and methods			7/1/2008	9/30/2008	C	-	-	-
<b>Task 3:</b> Obtain the needed equipment			7/1/2008	9/30/2008	C	-	-	-
<b>Task 4:</b> Install the detectors and prepare them for testing			9/1/2008	9/30/2008	C	-	-	-
<b>Task 5:</b> Data collection and analysis			10/1/2008	3/31/2010	C	-	-	-
<b>Task 6:</b> Report progress and findings			10/1/2008	12/30/2010	I	C	-	-
<b>Task 7:</b> Prepare reports			4/1/2010	12/30/2010	I	I	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Prof. Ray Benekohal			<b>Organization / Address</b>					
<b>Telephone:</b> 217-244-6288			UIUC - CEE					
<b>Email:</b> rbenekoh@illinois.edu			Newmark Civil Engineering Lab 205 N Mathews Ave. Urbana, IL 61801					
<b>Description of Research:</b>								
<p>The performance the wireless vehicle detection system (Sensys brand) under variety of traffic and environmental conditions is evaluated. The evaluation is based on measure of effectiveness such as missed calls, false calls, stuck on calls, and dropped calls. Two intersections will be instrumented for data collection. The testing criteria and conditions will be decided. Field data at the two instrumented intersections will be collected and analyzed to determine the performance of the new detectors.</p>								
<b>Keywords:</b> vehicle detection at intersections, wireless vehicle detection, magnetic sensors for traffic, Sensys								
<b>Technical Review Panel:</b>								
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Patty Broers			217-782-3547			Patricia.Broers@illinois.gov		
<b>Meeting Dates / Minutes Available?</b>								
10/8/2008 / Yes								
12/3/2009 / Yes								
<b>End User(s) and Result(s) Expected:</b>								
The proposed research potentially would improve traffic operation and safety at railroad grade crossings and at signalized intersections. Accurate								

detection can reduce train-vehicle crashes at railroad crossings, increase on-time train operations, and improve traffic signal operation at intersections.

**Progress to Date:**

The first report of the study is already published by ICT (Publications page).

The research team spent about three months to get very detailed information about each error such as cause of error, type of vehicles involved, time of error, and video of the vehicle involved. This information was needed to convince the manufacturers that the error indeed happened. The information was presented to the manufacture of the sensor.

The second report of the study (the adverse weather conditions) has been reviewed by ICT and then TRP. It is ready for ICT for publish it.

Data collection and analysis for the relocated sensor condition are completed. A report was prepared and reviewed by ICT and is sent to TRP for review and approval.

Last Updated: 2/7/2011



<b>Project Title:</b> Evaluation of Performance of Solar Powered Flashing Beacons		<b>Last Edited:</b> 2/7/2011					
		<b>Function Code:</b> R27-59					
		<b>Project Number:</b> R27-59					
<b>QPR Author Name:</b> Prof. Ray Benekohal		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-366-6006	<b>% Project Completed:</b> 98			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature review		7/1/2008	12/31/2008	C	-	-	-
<b>Task 2:</b> Testing criteria and methods		7/1/2008	12/31/2008	C	-	-	-
<b>Task 3:</b> Obtain flashing beacons		1/1/2008	4/1/2008	C	-	-	-
<b>Task 4:</b> Install beacons and prepare them for testing		7/1/2008	9/1/2008	C	-	-	-
<b>Task 5:</b> Data collection and analysis		9/1/2008	11/30/2010	I	C	-	-
<b>Task 6:</b> Report progress and findings		7/1/2008	12/30/2010	I	C	-	-
<b>Task 7:</b> Prepare and Finalize Report		4/1/2010	12/30/2010	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Prof. Ray Benekohal				<b>Organization / Address</b>			
<b>Telephone:</b> 217-366-6006				UIUC - CEE			
<b>Email:</b> rbenekoh@illinois.edu				205 N. Mathews Ave. Urbana, IL 61801			
<b>Description of Research:</b>							
<p>Use of solar powered flashing beacons on state highway system is increasing. The beacons feasibility, reliability, and performance have improved with the advancement in technology, including the use of LED modules. However, the duration of time the beacons can function depends on the battery type used, environment it is operating at, and the flashing mode used. The flashing mode and visibility of the beacon change as the battery charge level decreases. Furthermore, the environmental conditions (temperature, cloud, etc.) affect on the battery charge level and thus its flashing mode and visibility. This research will determine the performance of the flashing beacons in a variety of lighting conditions, modes of flashing operation, and its compliance with the requirements.</p>							
<b>Keywords:</b> flashing beacon, solar panel, stop controled intersection, rural intersections, flashing red yellow lights							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
10/8/2008 / Yes							
12/3/2009 / Yes							

**End User(s) and Result(s) Expected:**

The proposed research would lead to improved traffic safety and operation at intersections, reduction in crashes at sites where these portable flashing beacons are used, and a reduction in crashes at stop controlled intersections.

**Progress to Date:**

Solar powered flashing beacons have been installed in the Traffic Operations Lab (TOL) to determine the performance of the flashing beacons in a variety of lighting conditions, modes of flashing operation, as well as their compliance with the flashing requirements. Testing in room temperature for JSF and Carmanah Flashing beacons is completed and report on findings was approved for publication and is available on the ICT website. Testing in severe hot (72c), cold temperature (-20c), and mild cold is completed and a report is being prepared. a few tests are being conducted to determine the intensity of the lights in outdoor conditions. Draft Final Report is submitted to ICT for review.

Last Updated: 2/7/2011



<b>Project Title:</b> Mechanistic-Empirical Design, Implementation & Monitoring for Flexible Pavements		<b>Last Edited:</b> 2/3/2011					
		<b>Function Code:</b> R27-60					
		<b>Project Number:</b> R27-60					
<b>QPR Author Name:</b> Marshall Thompson		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011		
<b>Telephone:</b> 217-333-3930	<b>% Project Completed:</b> 90				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Develop revised full-depth HMA design procedure		8/1/2008	12/31/2008	C	-	-	-
<b>Task 2:</b> Review/revise IDOT's rubblized PCCP HMA overlay thickness procedure		9/15/2008	6/30/2009	C	-	-	-
<b>Task 3:</b> Provide ad hoc engineering services to IDOT		7/1/2008	6/30/2011	I	I	-	-
<b>Principal Investigator:</b>				<b>Organization / Address</b>			
<b>Name:</b> Marshall Thompson				U of IL			
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<b>Co-Investigator:</b>				<b>Organization / Address</b>			
<b>Name:</b> Imad Al-Qadi				UIUC - CEE			
<b>Telephone:</b> 217-893-0705 x 222							
<b>Email:</b> alqadi@illinois.edu							
<b>Description of Research:</b>							
Conduct evaluation and engineering analyses of IDOT's full-depth HMA pavement design and rubblized PCCP HMA thickness design procedures and provide/justify modifications based on Best Demonstrated Available Technology (BDAT). Ad hoc engineering services concerning the issues will be provided on an as-requested basis.							
<b>Keywords:</b> full-depth HMA, mechanistic-empirical design, rubblized PCCP, flexible pavements							
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<b>Meeting Dates / Minutes Available?</b>							
9/4/2008 / Yes							
4/13/2009 / Yes							
12/15/2009 / Yes							

12/10/2010 / No

**End User(s) and Result(s) Expected:**

Provide improved full-depth HMA design and rubblized PCCP HMA overlay thickness design procedures for the IL DOT.

**Progress to Date:**

## Task 1

Activities have progressed and a DRAFT report submitted (10-22-08) to IDOT for review. Additional project inputs will be provided as needed relative to issues concerning Task 1. The DRAFT report was revised and submitted (12-08) to the TRP Chair. Thompson continues (as of 9-30-2010) to provide technical support to IDOT as they develop modifications to the FULL-DEPTH HMA design procedure.

## Task 2

\* This task has mostly been completed (as of 12-31-09). A listing and FWD data for some of IDOT's rubblization projects have been provided by the TRP Chair. The current IDOT HMA overlay approach for rubblized PCCP has been reviewed. At the 12/15/2009 TRP meeting, it was recommended that the current approach be continued. A Fatigue Endurance Limit (FEL) and the modified HMA Modulus - Temperature relations should be included when the procedure is incorporated into the NEW CHAPTER 54.

\* This Task is still in progress. Some of the potential modifications will be impacted by the decisions/policies IDOT makes concerning the HMA FULL-DEPTH Design

## Task 3

\* Thompson cooperated (July - Sept. Quarter) with IDOT BM&PR concerning problems connected with the IL 13 full-depth HMA project in Harrisburg, IL.

\* During the July - Sept. - 2009 Quarter, rehabilitation plans for I-57 at Pesotum were reviewed and inputs provided to IDOT.

\* Thompson provided (Oct. - Dec. Quarter) inputs to IDOT concerning I-57 Rubblization - HMA overlay projects in District 9.

\* Thompson participated (10-19-09) in a CIRWAP implementation meeting @ Dunn Co. in Decatur. The meeting was facilitated by Kevin Burke (the CIRWAP Chair).

\* A TRP meeting was held in Springfield (BM&PR) on 12-15-09. An up-date and recommendations on rubblization activities were presented. There was discussion concerning pertinent aspects of the Bureau LR&S Chapter 37 revision.

\* Thompson provided input concerning District 9 rubblization/HMA overlay thickness policy.

\* Thompson reviewed/commented on District 5 rubblization/HMA Overlay proposals for I-57 (from Champaign north to Thomasboro).

\* Thompson is following up on some limited distress that has developed on the Henry County Sand pit Road project. The project was constructed in 1997. The pavement section was 3.5-inch Modified B AC mix and 16-inch aggregate base.

\* Thompson has initiated activities pertinent to up-dating the Bureau LR&S Chapter 37 revision. Some issues are dependent on the final version of the Bureau Design & Environment Chapter 54.

\* During the March - June, 2010 Quarter the following activities were conducted.,

+ Thompson reviewed/commented on IDOT document on working platform requirements.

+ Thompson visited a Henry County Cold-In-Place-Recycling with asphalt emulsion project. A new Wirtgen stabilization machine was successfully utilized.

+ Thompson visited the Henry County - Sand Pit Road project. The project was constructed in 1996 (aggregate base + surface treatment) and received an HMA OL in 1997. Limited rutting has occurred, but HMA fatigue is evident throughout the project. County Engineer Brandau has not yet developed a rehabilitation strategy.

+ Thompson evaluated the HMA fatigue algorithm utilized in the Asphalt Institute HMA OL design procedure. The algorithm is:  

$$N = 1.46E-9 * (HMA \text{ Strain})^{4.086}$$

The exponent of 4.086 is larger than IDOT's recently selected value of 3.5.

+ Thompson continues activities pertinent to up-dating the Bureau LR&S Chapter 37 revision. Some issues are dependent on the final version of the Bureau Design & Environment Chapter 54.

+ Thompson visited the Cold-In-Place Recycling project near Royal, IL (Champaign County) in August. An "improved" Wirtgen mix-in-place stabilization machine was utilized. The HMA surface was constructed "full-width."

During the October - December, 2010 Quarter the following activities were conducted:

\* BLR&S Chapter 37 (Pavement Design) continued to be reviewed by Thompson.

+ Several significant issues have been identified and pertinent comments forwarded to BM&PR and BLR&S for their review/comment.

+ Design Time – Design Time Pavement Temperatures have been established based on IDOT's modified HMA fatigue Algorithm.

\* Significant effort has been devoted to BLR&S (Chapter 37) and BDE Chapter 54 asphalt (PG BINDER selection/recommendations). LTTP Bind (V1.2) criteria and reliability level – depth effects have been utilized to consider the issue. Some preliminary inputs have been provided to IDOT.

\* The R27-60 TRP met in Springfield (Bureau of Materials & Physical Research Office) on December 10, 2010. Thompson (Project PI) briefed the TRP on recent activities.

Last Updated: 2/3/2011  
Approved By TRP Chair: 5/25/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Mechanistic-Empirical Design, Implementation & Monitoring for Rigid Pavements			<b>Last Edited:</b> 2/3/2011					
			<b>Function Code:</b> R27-61					
			<b>Project Number:</b> R27-61					
<b>QPR Author Name:</b> Jeffery Roesler			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-265-0218	<b>% Project Completed:</b> 80				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Evaluation of IDOT's Video Survey of Interstate Concrete Pavement			1/1/2009	3/31/2011	I	I	-	-
<b>Task 2:</b> Assist IDOT in Implementing JPCP and CRCP Design Framework into BDE Manual			1/1/2009	3/31/2011	I	C	-	-
<b>Task 3:</b> Evaluation of Extended-Life Concepts for Concrete Pavements			7/1/2009	12/31/2010	I	C	-	-
<b>Task 4:</b> Review of IDOT's Concrete Patching Requirements			1/1/2009	6/30/2010	C	-	-	-
<b>Task 5:</b> Concrete Pavement Services			1/1/2009	6/30/2011	I	I	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Jeffery Roesler			<b>Organization / Address</b>					
<b>Telephone:</b> 217-265-0218			University of Illinois					
<b>Email:</b> jroesler@illinois.edu			205 N. Mathews Urbana, IL, 61801					
<b>Description of Research:</b>								
<p>The University of Illinois has provided IDOT a framework for the design of jointed plain and continuously reinforced concrete pavements under a previous research project (IHR-57). The design framework needs to be further refined before final implementation by IDOT into their BDE Manual. Implementation will require review of existing video survey data, extended-life concepts for rigid pavements, and adjustment of the inputs and design equations developed previously as necessary. IDOT also desires a state-of-the-art review on opening strength requirements for concrete patches. The PI will also provide IDOT with technical services related to concrete pavement design, analysis, and materials.</p>								
<b>Keywords:</b> Concrete Pavement, CRCP, JPCP, Design, Analysis								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
4/28/2009 / Yes								
10/22/2009 / Yes								
6/21/2010 / Yes								
12/7/2010 / No								

**End User(s) and Result(s) Expected:**

The expected outcomes of this research are an updated JPCP method and a new CRCP design method in the BDE manual. The research will also provide IDOT with a document reviewing opening strength requirements for concrete patches and provide IDOT with short duration technical advice and services on concrete pavement-related issues.

**Progress to Date:**

In the 4th quarter 2010, a technical note on dowel bar misalignment studies was finished summarizing recent studies on dowel misalignment field measurements and several laboratory studies that addressed the effects of dowel misalignment on the joint performance. Another purpose of this report was to verify the reasonableness of IDOT's proposed tolerances for misalignment (skew and translation). This technical note has been submitted to IDOT for review. A summary of the current status of two-lift paving was given to the TRP in December 2010. Comparisons were also made between the proposed JPCP method and the CRCP method for similar inputs and maximum concrete thickness. CRCP crack spacing variation summary using the video survey vans was begun again in the 4th quarter and should be finished in early 2011. In the first quarter of 2011, another task will be reviewing the temporary concrete pavement design standards being used by IDOT.

Last Updated: 2/3/2011  
Approved By TRP Chair: 5/25/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Material Quality Testing Risk Assessment & Multi-State Peer Exchange			<b>Last Edited:</b> 1/10/2011					
			<b>Function Code:</b> R27-62					
			<b>Project Number:</b> R27-62					
<b>QPR Author Name:</b> Timothy Murphy			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 773-874-9800	<b>% Project Completed:</b> 100				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Review IDOT testing and evaluation procedures, policies, and practices to determine areas for analysis.			3/1/2009	6/30/2009	I	C	-	-
<b>Task 2:</b> Conduct interviews with IDOT Central & District Lab units, Bureau of Bridges & Structures, Construction on current.			3/1/2009	9/30/2009	I	C	-	-
<b>Task 3:</b> Gather information on the select practices of other lead states.			6/1/2009	8/31/2009	I	C	-	-
<b>Task 4:</b> Organize and conduct a Multi-State Peer Exchange-Materials Testing Workshop with a minimum of four states.			6/1/2009	10/31/2009	I	C	-	-
<b>Task 5:</b> Provide documentation that summarizes the findings of the study by publishing completed final report.			8/1/2009	6/30/2010	I	C	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Timothy Murphy			<b>Organization / Address</b>					
<b>Telephone:</b> 773-874-9800			Murphy Pavement Technology, Inc.					
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<b>Co-Investigator:</b>								
<b>Name:</b> Lisa J. Taccola			<b>Organization / Address</b>					
<b>Telephone:</b> 773-874-9800			Murphy Pavement Technology, Inc.					
<b>Email:</b> ltaccola@murphypavetech.com								
<b>Description of Research:</b>								
Review IDOT inspection, sampling, and testing as well as evaluation procedures, policies, and practices to determine areas for enhancement specific to the acceptance of roadway materials. Conduct interviews with BMPR and Districts, Bureau of Bridges and Structures as well as Construction. Gather information on the practice of other lead states. Use information gathered to organize and conduct a Multi-State Peer Exchange - Materials Testing Workshop. Provide documentation that summarizes the findings of the study by publishing a completed final report.								
<b>Keywords:</b> Material Testing, Quality Assurance, Efficiencies								
<b>Technical Review Panel:</b>								
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>				
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Matt Mueller		217-782-4423		matthew.mueller@illinois.gov				
<b>Meeting Dates / Minutes Available?</b>								
<b>End User(s) and Result(s) Expected:</b>								
Determining if Illinois can reduce its level of testing for material acceptance or if the risk warrants continued testing and reestablishment of key testing capability/staffing.								
<b>Progress to Date:</b>								

The work efforts this quarter consisted of:

- Continued translating information collected from the peer exchange into an outline and continued working on the final report detailing the results and findings from the questionnaire and the Peer Exchange.

The report is being finalized to include TRP comments.

Last Updated: 1/10/2011



<b>Project Title:</b> Evaluation of the Long-Term Durability of Joints Cut Using Early-Entry Saws on Rigid Pavements		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-63					
		<b>Project Number:</b> R27-63					
<b>QPR Author Name:</b> Thomas Van Dam		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 906-487-7454	<b>% Project Completed:</b> 100			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Project Initiation Meeting		11/1/2008	12/31/2008	C	-	-	-
<b>Task 2:</b> Literature Review		12/1/2008	8/1/2009	C	-	-	-
<b>Task 3:</b> Field Monitoring		8/1/2009	8/30/2009	C	-	-	-
<b>Task 4:</b> Durability Testing		9/1/2009	4/30/2010	C	-	-	-
<b>Task 5:</b> Data Analysis		4/1/2010	7/31/2010	I	C	-	-
<b>Task 6:</b> Final Report		6/1/2010	9/30/2010	I	C	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Thomas Van Dam				<b>Organization / Address</b>			
<b>Telephone:</b> 906-487-7454				Applied Pavement Technology, Inc.			
<b>Email:</b> TVanDam@appliedpavement.com				115 W. Main St., Suite 400 Urbana, IL 61801			
<b>Co-Investigator:</b>							
<b>Name:</b> Kurt Smith				<b>Organization / Address</b>			
<b>Telephone:</b> 217-398-3977				Applied Pavement Technology, Inc.			
<b>Email:</b> KSmith@appliedpavement.com							
<b>Description of Research:</b>							
<p>This project will establish the current national state-of-the-practice regarding the use of early entry sawing for concrete pavements, and discuss how it differ from IDOT's current conventional wet sawing technique. Differences in freeze-thaw durability and resistance to deicers between conventionally sawed joints and early entry sawed joints will be determined. Based on the collected data, is will be determined whether the early entry saw technique is viable for IDOT work.</p>							
<b>Keywords:</b>							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
11/20/2009 / Yes							
7/23/2010 / Yes							

**End User(s) and Result(s) Expected:**

- A brief synthesis on the early-entry sawing technique, including current practices in other states.
- A thorough documentation of the construction process for an early-entry sawing project including a summary document, field notes, photographs, and video clips.
- A final report, detailing the construction monitoring, laboratory testing, and data analysis, will be provided. It will include definitive conclusions that IDOT can use in determining the viability of using early entry sawing technique and recommendations for future work will be made.

**Progress to Date:**

The project is completed and the final report is posted on the ICT website (publications page).

Last Updated: 1/27/2011  
Approved By TRP Chair: 11/23/2009



<b>Project Title:</b> Development of a Highway Incident Management Operational & Training Guide			<b>Last Edited:</b> 12/9/2010				
			<b>Function Code:</b> R27-64				
			<b>Project Number:</b> R27-64				
<b>QPR Author Name:</b> Huaguo Zhou		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 618-650-2815	<b>% Project Completed:</b> 75			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Needs Assessment		7/1/2009	9/30/2009	C	-	-	-
<b>Task 2:</b> Survey		7/19/2009	1/15/2010	C	-	-	-
<b>Task 3:</b> Literature Review		8/1/2009	6/30/2010	C	-	-	-
<b>Task 4:</b> Develop Outline		4/19/2010	6/30/2010	C	-	-	-
<b>Task 5:</b> Develop Training Materials		7/1/2010	12/30/2010	I	C	-	-
<b>Task 6:</b> Finalize the Guide		1/1/2011	4/1/2011	-	-	-	-
<b>Task 7:</b> Publish the Guide		4/1/2011	6/30/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Huaguo Zhou		<b>Organization / Address</b>					
<b>Telephone:</b> 618-650-2815		SIUE					
<b>Email:</b> hzhou@siue.edu		Department of Civil Engineering Southern Illinois University Edwardsville Edwardsville, IL 62026-1800					
<b>Co-Investigator:</b>							
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<b>Description of Research:</b>							
<p>This research project involves conducting an extensive survey of existing training modules and materials, identifying the needs of the target audience (including IDOT Districts, the Illinois State Toll Highway Authority, IDOT ETP and other incident responders), and subsequently developing training modules. The training modules will incorporate best practices from other state DOTs, and established highway corridors (such as I-95 Corridor).</p>							
<b>Keywords:</b> Highway Incident Management, Training, safety							
<b>Technical Review Panel:</b>							
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Larry Matkaitis							
Jeff Regan							

<b>Meeting Dates / Minutes Available?</b>
10/15/2009 / Yes 1/20/2010 / Yes 4/19/2010 / Yes 6/21/2010 / Yes 9/20/2010 / Yes 12/6/2010 / Yes
<b>End User(s) and Result(s) Expected:</b> The final guide and training material consist of three parts: the instructor's guide, student manual, and PowerPoint slides.
<b>Progress to Date:</b> <ol style="list-style-type: none"><li>1. Revised the draft training materials based on the comments from TRP members.</li><li>2. Presented the draft final training materials at the TRP quarterly meeting on December 6, 2010. (95% complete task 5 training materials)</li><li>3. Finalize the plan for two pilot trainings.</li></ol>

Last Updated: 12/9/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Effectiveness of Innovative Speed Enforcement Techniques in Illinois			<b>Last Edited:</b> 1/10/2011					
			<b>Function Code:</b> R27-66					
			<b>Project Number:</b> R27-66					
<b>QPR Author Name:</b> Hani Mahmassani			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 847-491-2282	<b>% Project Completed:</b> 54				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review			11/1/2009	3/30/2010	C	-	-	-
<b>Task 2:</b> Interview with ISP Personnel			4/1/2010	5/30/2010	C	-	-	-
<b>Task 3:</b> Accident Data and Sampling Strategy			3/1/2010	8/31/2010	I	I	-	-
<b>Task 4:</b> Data Collection			6/1/2010	6/30/2011	I	I	-	-
<b>Task 5:</b> Data Analysis and Model Estimation			2/1/2011	9/30/2011	I	I	-	-
<b>Task 6:</b> Evaluation			9/1/2011	4/30/2012	-	-	-	-
<b>Task 7:</b> Recommendation and Final Report			4/1/2012	10/30/2012	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Hani Mahmassani			<b>Organization / Address</b>					
<b>Telephone:</b> 847-491-2282			Northwestern University					
<b>Email:</b> masmah@northwestern.edu			600 Foster Street Evanston, IL 60208-4055					
<b>Description of Research:</b>								
The study will involve a literature search of recent research and publications, conducting interviews with identified ISP representatives, obtaining and analyzing data, identifying and selecting roadway segments or corridors to evaluate, evaluating various enforcement techniques applied to the selected routes, and based on the data captured from enforcement technique variations recommendations will be developed.								
<b>Keywords:</b> speed enforcement, ISP, resources, patrol								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
3/11/2010 / Yes								
6/10/2010 / Yes								

**End User(s) and Result(s) Expected:**

The analyses will result in a better understanding of the presence/absence and duration of speed enforcement on Illinois highways. Best practices for patrol and saturation patrol procedures will be provided from the research. In addition, there should be a better understanding of how the reduction of speed correlates to the reduction of severe crashes. The findings will allow IDOT and ISP to better allocate resources and ultimately reduce speed related fatalities on Illinois highways.

**Progress to Date:**

## 1. Completion of literature review

- Review of data collection approaches
- Review of estimation and analysis methodologies

## 2. Request and obtain archive data

- Crash data from National Highway Traffic Safety Administration (NHTSA)
- Traffic data from IDOT
- Speed enforcement information from ISP

All needed data has been obtained and analyzed for the purpose of designing the data collection experiments and selecting the locations.

## 3. Design and conduct the Illinois State Police (ISP) interview

- Question design
- Interview Date: April 29, 2010
- A summary report has been completed and submitted to TRP for review

## 4. Technical Review Panel (TRP) meetings

- March 11, 2010
- June 10, 2010

A meeting is being scheduled for late October/early November

## 5. Experimental design

- design of speed enforcement strategies
- design of a preliminary survey

Considerable effort has been devoted during the reporting period to this task. The experimental design has been elaborated, and criteria for location selection discussed with the ISP. Initial locations have been proposed and we are iterating these with the ISP because of sensor availability limitations on initially identified locations.

## 6. The researchers have obtained geometric database as well as

crash database for the period of 2001 to 2009. These data have been analyzed in support of the experimental design procedure and test location selection.

7. Working with ISP and IDOT, the researchers have identified preliminary survey locations; however, in discussions with IDOT, preference was expressed for locations that already have sensors installed, rather than using mobile detection equipment on the initially selected locations.

Accordingly, we have revised the locations and will be submitting those to ISP to initiate the actual data collection.

## 8. In the process of

- Finalizing the preliminary survey location and identifying the statewide survey locations, in iteration with ISP and IDOT
- Continue analyzing the archival data and devising appropriate methodology to (1) test the existence and extent of the halo effect, and (2) test the effectiveness and efficiency of each enforcement technique.
- Requesting the installation of the speed detection equipment on the preliminary survey location.

Last Updated: 1/10/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Improved Design for Driven Piles Based on a Pile Load Test Program in Illinois			<b>Last Edited:</b> 2/14/2011					
			<b>Function Code:</b> R27-69					
			<b>Project Number:</b> R27-69					
<b>QPR Author Name:</b> James H. Long			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-2543	<b>% Project Completed:</b> 75				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Collecting field information during pile during			1/1/2009	7/31/2011	I	I	-	-
<b>Task 2:</b> Collecting/Interpreting information on static load test results in Illinois and the Midwest			2/1/2009	9/30/2011	I	I	-	-
<b>Task 3:</b> Interpreting Results from Tasks 1 and 2			9/1/2009	9/30/2011	I	I	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> James H. Long			<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-2543			UIUC - CEE					
<b>Email:</b> JHLong@illinois.edu			Newmark Civil Engineering Lab 205 North Mathews Urbana, IL 61801					
<b>Description of Research:</b>								
The research work plan is separated into 4 tasks: 1) Collecting information on the performance of piles during driving and restrrike, 2) Collecting/Interpreting information on static load test results in Illinois and the Midwest, 3) Interpreting results from 1 and 2 to assess and improve methods for limiting driving stresses and methods for predicting pile capacity, and 4) writing and submission of the final report.								
<b>Keywords:</b> Piles, Pile Driving, Pile Capacity, Bearing Capacity, Pile Stresses								
<b>Technical Review Panel:</b>								
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>				
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Terry McCleary		815-830-6405		terrymcclearyengineering.com				
<b>Meeting Dates / Minutes Available?</b>								
1/14/2009 / Yes								
3/25/2010 / Yes								
<b>End User(s) and Result(s) Expected:</b>								
It is estimated that IDOT can increase the maximum nominal required bearing design stress from 9.6ksi to between 12 and 18ksi which would								

translate into \$2.5 to \$6 million in annual savings. Additional savings will result from using better design procedure to account for site conditions in a more specific manner. The final report will discuss more economical recommendations for limiting stresses on piling, better prediction methods for stresses during driving and for pile capacities, resistance factors for driven piling based on local calibrations that consider effects of pile setup, collections of static and dynamic load test data focused on Illinois soils and geology, and training on the use of PDA and CAPWAP.

**Progress to Date:**

We have made progress on tasks 1, 2, and 3.

Task 1: We have completed 9 sites (Jules, Chandlerville, Greenville, East St. Louis –Pedestrian Bridge, Deer Creek, Mahomet, Godfrey, Freeport, East St. Louis -15th St. Bridge). We have conducted 17 PDA/CAPWAP analyses. A total of 1 static load test has been conducted at the Chandlerville site. We continue to work with IDOT on contract specifications for PDA measurements and testing and are continuing to plan and schedule more PDA testing.

Task 2: We have been looking at pile load test results and also have been reviewing new formulations for determining resistance factors with better accuracy. We are in the process of interpreting load tests from Illinois in which there is PDA information. We have conducted a static load test in Chandlerville (October 5, 2009). Among the test locations different wait times between end of driving (EOD) and the beginning of restrike (BOR) allow for comparison of setup with time. Dynamic stresses during driving have been analyzed from PDA results and research efforts have been made to predict pile stresses using dynamic and empirical factors. This will provide an alternative to using a wave equation analysis program (WEAP) as proprietary software is required and at this time not part of current practice. K-IDOT is being examined to increase the accuracy of pile length estimates.

Field testing in progress: The Godfrey site located in Madison County is currently planned to be revisited for a restrikes. The wait time is now greater than 1 month and will provide excellent data for determining setup.

Future field tests planned: dynamic testing of piles driven to rock to examine stresses during driving through PDA testing to examine refusal and seating criteria (testing date to be determined).

An IDOT presentation will be scheduled in January 2011.

Last Updated: 2/14/2011  
Approved By TRP Chair: 1/27/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Calibration & Refinement of Illinois' Earthquake Resisting System Bridge Design Methodology		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-70					
		<b>Project Number:</b> R27-70					
<b>QPR Author Name:</b> James M. LaFave & Jerome F. Hajjar		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> (217) 333-8064	<b>% Project Completed:</b> 66			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Receive prototype bridges from IDOT		1/1/2009	1/15/2009	C	-	-	-
<b>Task 2:</b> Literature review and scope definition		1/1/2009	9/30/2009	C	-	-	-
<b>Task 3:</b> Analyze prototype bridges, fuse components, and specimens		1/16/2009	1/31/2010	C	-	-	-
<b>Task 4:</b> Develop fuse test matrix and drawings		7/1/2009	3/31/2010	C	-	-	-
<b>Task 5:</b> Fabricate specimen and load frame		10/1/2009	4/30/2010	C	-	-	-
<b>Task 6:</b> Conduct tests		1/1/2010	4/1/2011	I	I	-	-
<b>Task 7:</b> Reduce test data		1/31/2010	4/30/2011	I	I	-	-
<b>Task 8:</b> Identify parametric range of bridges and objectives and conduct system analyses		7/1/2009	6/30/2011	I	I	-	-
<b>Task 9:</b> Assess new R and phi factors and provide recommendations for ERS adjustments		2/1/2010	12/31/2011	I	I	-	-
<b>Task 10:</b> Write final report		6/30/2011	12/31/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> James M. LaFave & Jerome F. Hajjar		<b>Organization / Address</b>					
<b>Telephone:</b> (217) 333-8064		UIUC - CEE					
<b>Email:</b> jlafave@illinois.edu & jf.hajjar@neu.edu		UIUC Dept. of Civil and Environmental Engineering, 3108 Newmark Civil Engineering Laboratory, MC-250, 205 North Mathews Ave., Urbana, Illinois 61801-2352					
<b>Co-Investigator:</b>							
<b>Name:</b> Larry A. Fahnestock		<b>Organization / Address</b>					
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<b>Co-Investigator:</b>							
<b>Name:</b> Douglas A. Foutch		<b>Organization / Address</b>					
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<b>Description of Research:</b>							
The key work stages include: Stage 1: Refinement and calibration of the first "fuse" capacity and seismic redundancy level that exists between superstructure and substructure through a series of experiments and analyses of bearing subassemblies. Stage 2: Computational simulation of response of bridge systems, including documentation of the progression of damage in the bridge; required seat widths; anticipated peak forces in the substructure; and evaluation of changes in stiffness or strength during the seismic event. Stage 3: Refinement of strength reduction factors and R-factors used for design of typical Illinois bridges and development of a simplified approach for pushover analysis.							
<b>Keywords:</b> Bridges; Bridge Bearings; Superstructure; Substructure; Seismic							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>
12/12/2008 / Yes
4/14/2009 / Yes
7/1/2009 / Yes
10/8/2009 / Yes
1/14/2010 / Yes
4/15/2010 / Yes
7/22/2010 / Yes
11/1/2010 / Yes

**End User(s) and Result(s) Expected:**

Results will include verification of bearing fuse capacities and prevention of span loss during a seismic event. New bridges will be expected to have enhanced safety and robustness; require less design effort since safe and effective configurations will be identified; and have reduced costs as compared to current approaches. Outcomes include: 1. Refined bearing fuse design criteria; 2. Improved bridge detailing methods as they relate to the overall seismic system performance; 3. Initial assessment for revised design values of R-factors for bridge systems and strength reduction factors for substructure design; 5. Time permitting, an appropriate method of pushover analysis.

**Progress to Date:**

The project began in December 2008 with a TRP meeting to discuss project objectives and expected outcomes.

A graduate research assistant and Ph.D. student, Joshua Steelman, started on this project at its inception in January 2009 and remains on the project. Graduate research assistant and M.S. thesis student Evgueni Filipov started on this project in August 2009 and remains on the project. Undergraduate students are also helping out in the lab from time to time, where appropriate.

Task 1 on receiving prototype bridges from IDOT is completed.

Deliverable #1, the project workplan, was approved by IDOT in April 2009.

Task 2 on literature review has resulted in the submittal of the literature review, representing Deliverable #2. The review includes descriptions of prior experimental and computational research, with a focus on bridge bearings. As part of this report, a comprehensive set of tables is included that lists prior experiments on bridge bearings. Deliverable #2, the literature review, was approved by IDOT in October 2009.

Task 3 on analyzing prototype bridges and fuse assemblies has now been completed as part of designing the test setup and developing the test matrix. 3-D analysis models of prototype bridges, as well as 3-D continuum models of bearing and retainer assemblies, have been developed and analyzed successfully, and the model and results were presented to IDOT at the July 2009, October 2009, and January 2010 TRP meetings. This has resulted in: a) confidence that the ultimate strengths of the test specimens are achievable by the test setup; and b) certainty that the scope of the parametric study (for Task 8) can be established based upon these initial results.

TRP meetings in October 2009 & January 2010 focused primarily on a thorough review of the experimental test setup (test frame, loading protocols, sensor layout, etc.), the specimen test matrix (and experimental schedule), and the initial matrix for parametric analyses (including both detailed bearing and system analyses). Feedback was received on details of the specimens and progression of damage anticipated and desired within them. There was agreement that the challenges of testing in 3-D (two lateral directions of loading) may be beyond the scope and budget of the project.

Fabrication and setup for laboratory testing is now complete, and the necessary bearing materials have been delivered (with a few minor exceptions

vs. what had been ordered, which is being addressed). Sensor layouts, experimental control, and data acquisition have also all been developed & finalized for testing.

The final version of Deliverable #3, on the testing plan and related preliminary analysis results, was approved by IDOT as of April 2010.

The parametric analysis is also progressing well (evolving from Task 3 on toward Tasks 8 & 9). The matrix of analyses (and analysis approaches) has been fleshed out, including bridge spans, properties, foundation and soil conditions, and key parameters to be varied, and appropriate models have been developed to capture the expected behavior of the bearings and other key components such as the substructure, foundation, backwalls, etc. And, with the experiments now well underway, those results are then in turn informing some refined component models for continued use in these analyses.

TRP Meeting #6 was held in mid-April 2010 at the on-campus location of testing. Subsequent to that, a draft of Deliverable #4 (the systems analysis plan, including the scope, approach, and parameters for this part of the study) was submitted to IDOT for review and comment; a final version of this deliverable was then provided to IDOT by approximately the beginning of the quarter (early-July 2010).

TRP Meeting #7 was held in mid-July 2010, again at the on-campus location of testing. Since lab testing was underway, the experimental data to date was reviewed, and a demonstration test was conducted in the lab during this meeting to show everyone how the whole test set-up works; modeling and ground motion issues were also discussed at this meeting. Since then, laboratory testing of additional bearings has continued, and the project's research team even made a few presentations about the work in progress, both at a national earthquake engineering conference in Toronto and also at a couple of Illinois ACEC bridge seminars.

TRP Meeting #8 was held in early-November 2010, at the on-campus location of testing. The main focus of the meeting was on all of the monotonic and cyclic tests of elastomeric bearings conducted so far, plus some preliminary retainer testing and laboratory upgrades of an actuator in anticipation of faster testing for bearings with teflon sliding surfaces. There was also discussion to finalize all of the key nonlinear component models for use in the bridge systems analysis models, as the parametric study is about to begin. At around the time of this TRP meeting, the project's research team also provided IDOT with two additional related reports (at their request) -- one summarized guidelines, with implementation, for scaling of ground motions for various purposes (including design), while the other was a post-test summary assessing features of the elastomeric bearing material properties in light of typical AASHTO and ASTM approaches.

Last Updated: 2/8/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Field Implementation and Evaluation of the Simple Cost-Effective Scour Sensor		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-71					
		<b>Project Number:</b> R27-71					
<b>QPR Author Name:</b> Farhad Ansari		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011		
<b>Telephone:</b> 312-996-2437	<b>% Project Completed:</b> 100				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Planning meeting with IDOT personnel		2/1/2009	2/28/2009	C	-	-	-
<b>Task 2:</b> Instrumentation system design and development		2/1/2009	3/31/2009	C	-	-	-
<b>Task 3:</b> Purchasing of instruments and software		2/1/2009	4/30/2009	C	-	-	-
<b>Task 4:</b> Operational software design, calibration inputs and development of automated data acquisition and data transfer system		2/1/2009	6/30/2009	C	-	-	-
<b>Task 5:</b> Machining and fabrication of sensor rods, and installation of the fiber optic sensors within the sensor rods		7/1/2009	7/31/2009	C	-	-	-
<b>Task 6:</b> Dry runs in the laboratory		7/1/2009	7/31/2009	C	-	-	-
<b>Task 7:</b> Installation of the sensors, instrumentation, and interface software		8/1/2009	8/31/2009	C	-	-	-
<b>Task 8:</b> Field tests		9/1/2009	10/31/2009	C	-	-	-
<b>Task 9:</b> Demonstration of system		9/1/2009	10/31/2009	C	-	-	-
<b>Task 10:</b> Final Report		12/1/2009	6/1/2010	C	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Farhad Ansari		<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-2437		UIC 2095 Engineering Research Facility 842 W. Taylor Street (M/C 246) Chicago, Illinois 60607-7023					
<b>Email:</b> fansari@uic.edu							
<b>Description of Research:</b>							
The work plan will include the following tasks:							
Task 1. Instrumentation system design and development of sensor multiplexing strategies, data acquisition, and data transfer activities. A meeting with IDOT-TRP will be arranged to finalize the plans.							
Task 2. Purchase of the fiber optic interrogation instrument, sensor multiplexer, dedicated computer and interface software							
Task 3. Operational software design, calibration inputs and development of automated data acquisition and data transfer system							
Task 4. Machining and fabrication of sensor rods, and installation of the fiber optic sensors within the sensor rods. It is planned to fabricate 10 to 16 sensors for a three span bridge.							
Task 5. Dry runs in the laboratory to fine tune the sensor/software interaction and the data acquisition and transfer process. This experiments will be simulated for the sake of software optimization and do not require submergence of the sensors in the water							
Task 6. Meeting with IDOT personnel to identify the bridge, establish installation plans, request for installation assistance, and possibly coordinate with USGS for use of their instrumentation box							
Task 7. Installation of the sensors, instrumentation, and interface software at the multi-span bridge site with several piers.							
Task 8. Field tests by simultaneous monitoring of several scour sensors. Evaluate scour depth detection capability, numerical calibration scheme and data acquisition and processing of the system.							
Task 9. Demonstration of the system to IDOT-TRP							
Task 10. Final Report documenting the system design, installation procedures, scour monitoring results, and software operations for IDOT's use.							
<b>Keywords:</b> Bridge, piers, scour, remote monitoring, floods							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Dave Copenbarger (Chair)		217-785-5306		Dave.Copenbarger@illinois.gov			

<b>Meeting Dates / Minutes Available?</b>
<p><b>End User(s) and Result(s) Expected:</b></p> <p>The outcome of the project will be design and installation details, field implementation, instrumentation and software for the scour sensor. A multi-span bridge over salt creek river has been selected for permanent installation of scour sensors. Altogether, twelve to fourteen sensors sensors will be installed at the bridge piers and they will be wired to the field interrogation unit through a multiplexer. Wireless remote data acquisition system and software will be developed for monitoring from IDOT and UIC sites. User friendly software, field installation and instruction manuals will be developed for use by IDOT personnel.</p>
<p><b>Progress to Date:</b></p> <p>As of 3/31/10, revisions to the final report are being made.</p> <p>The final report has been submitted to ICT for final editing and posting.</p> <p>The final report is complete and will be posted to the ICT website (publications page) within the next quarter.</p>

Last Updated: 2/8/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Distance Technology Transfer Course Content Development		<b>Last Edited:</b> 1/10/2011					
		<b>Function Code:</b> R27-73					
		<b>Project Number:</b> R27-73					
<b>QPR Author Name:</b> James Hall		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-206-7860	<b>% Project Completed:</b> 50			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Flagger Course Content Assessment and Online Training Design		2/1/2009	8/1/2009	C	-	-	-
<b>Task 2:</b> Flagger Online Course Materials Development		4/1/2009	2/1/2011	I	I	-	-
<b>Task 3:</b> Flagger Online Course Deployment		2/1/2009	2/1/2011	I	I	-	-
<b>Task 4:</b> Learning Management System Vendor Assessments		2/1/2009	6/1/2009	C	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> James Hall		<b>Organization / Address</b>					
<b>Telephone:</b> 217-206-7860		UIS					
<b>Email:</b> Jhall1@uis.edu		One University Plaza, MS UHB 4021 Springfield, IL 62703-5407					
<b>Co-Investigator:</b>							
<b>Name:</b> William Buttlar		<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-5966		UIUC-CEE					
<b>Email:</b> buttlar@illinois.edu							
<b>Description of Research:</b>							
<p>This project, through the Technical Review Panel, would first identify up to three IDOT courses that would yield high benefits for distance learning conversion using such criteria as training importance, impact on operations and anticipated technology transfer audience. Then, course content would be specifically developed for each course consistent with the distance training needs of IDOT. Digital course content would potentially include text, PowerPoint, audio, video, and online testing. This project would include beta testing of the delivery mode. In addition, feedback regarding effectiveness of the delivery will be documented.</p>							
<b>Keywords:</b> Technology Transfer, distance learning, e-learning							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
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<b>Meeting Dates / Minutes Available?</b>							
1/27/2009 / Yes							
7/24/2009 / No							

1/7/2010 / Yes

5/12/2010 / Yes

12/14/2010 / Yes

#### End User(s) and Result(s) Expected:

IDOT has an important training function to meet the technology transfer needs currently taught through LTAP and STTP. Decreasing staffs and increasing travel costs have limited IDOT's ability to deliver training in a timely and accessible manner. Distance training has proven to be an effective method to deliver specialized technical content, while enabling individuals to take courses anytime and anywhere through the Internet and/or other electronic media. Benefits would accrue from increased accessibility and flexibility. In addition, IDOT could build on the digital course content in future years.

#### Progress to Date:

TRP meeting on 1/27/2009.

During February and March 2009, UIS assisted with IDOT's Learning Management System Vendor assessment by attending online vendor presentations and providing feedback to IDOT on capabilities and limitations.

Initial online course development activities is on the "Flagger" traffic control training course for both local agencies and IDOT operations. On March 12 and on March 16, the UIS project team met with TRP Chair Kevin Burke and with instructor Roy Williamson to outline and schedule course development activities. On March 23, the UIS team met with IDOT Flagger instructor group including representatives from Local Roads and Streets, Safety Operations, District 6, District 9 and several local agencies. Course content and module development was discussed and the UIS videorecording of a future Flagger course delivery was scheduled.

UIS staff worked closely with Roy Williamson of the Bureau of Local Roads and Streets on the Flagger course content. UIS videorecorded the Flagger course at UIS on April 10, 2009 and had a transcript prepared. On April 29, UIS also videorecorded various demonstrations of flagger operations on the roadway. A Flagger content working group was formed consisting of Kevin Burke, Aaron Weatherholt, Roy Williamson, Marshal Metcalf (Safety Operations), Bob Gielow (District 8), and Regina Jones (District 9) to discuss the specifics of the course content and to decide what to add, include, adjust and eliminate. The Flagger course development efforts will first focus on the Flagger recertification portion of the course.

Deb Antoine, UIS Computer Assisted Instruction Specialist, developed several Flagger online course components. UIS is focusing on the Operations portion of the Flagger course at first to demonstrate the different course components and how the course would flow in an online environment. The course components will be prototyped initially using the Moodle online courseware.

On June 24, 2009, a project status meeting was held at UIS with Kevin Burke, Mark House and Patty Broers from IDOT, Bill Buttlar, Joshua Houston and Meg Griffin from UIUC, and James Hall, Shari McCurdy Smith, Deborah Antoine and Emily Boles from UIS. The agenda included an update on IDOT's Learning Management System, UIS Flagger content development, and UIUC/ICT content delivery capabilities. This group also identified activities to prepare for the July 24, 2009 TRP meeting.

7/24/09 Project Meeting in Springfield 9-10:30 am

Bill Buttlar, Josh Houston, Meg Griffin in attendance for UIUC, James Hall, Deb Antoine and Shari McCurdy in attendance from UIS.

UIS discussed the status of the Flagger course and demonstrated online video and PowerPoint examples of the Flagger training course and a "Moodle" option to display course materials. The IDOT acquisition of the course software was discussed. UIS will assist in integrating online course materials in the courseware when IDOT acquires it.

UIUC discussed  
 ICT Facts and Capabilities, servers, storage  
 Reflective Cracking short course possibility  
 Technical Training and refresher courses  
 Aggregates  
 Superpave  
 THE Conference  
 Real-time, remote venue  
 Post-event, online conference

8/7/09 Conference Call  
 Patty Broers, Kevin Burke, Sheila Beshears, James Hall, Bill Buttlar, Meg Griffin  
 Discussed Aggregate Gradation course  
 IDOT was to send course materials to Bill and James  
 James and Bill to meet to put together a work plan  
 Scott Hughes is the technical contact

Other UIUC tasks for this quarter  
 Research of UIUC offerings and resources – CS, GSLIS, etc.  
 IT/Infrastructure  
 Identification of issues associated with hosting a course, such as Flagger  
 Server upgrades to facilitate hosting

Discussions with other campus units regarding IT support for online courses

Ongoing UIS tasks for October through December 2010

Assist with IDOT deployment of online courseware  
Working to finalize Flagger online course materials.  
Prepare for January 7, 2010 Technical Review Panel Meeting.

1/7/10 Web Conference - IDOT, UIUC, UIS

IDOT

- IDOT presented an update on the Learning Management System.

UIS

- James Hall provided an update on the Flagger online course materials and also discussed a schedule to begin conversion of the Work Zone Safety course.

UIUC

- Bill presented Gradation Course outline, timeline – UIUC was instructed to go ahead with the planning and coordinate with Scott Hughes.
- Reflective Crack Control discussion - including that this will probably not be appropriate for this project. UIUC will hold on this in the context of this project.
- ICT Web Server – UIUC to purchase server after further discussion of specifications. Josh Houston has developed specs and is revising them based upon feedback from UIS and Kevin Burke. The revised server specs will be ready before the next project meeting in May and discussed/finalized at that meeting.

2/9/10 Gradation Course Filming in Rantoul

- Filmed entire half-day gradation course in the UIUC ATREL labs. Ritch Strom of The office of Continuing Education in Engineering (OCEE) provided the videotaping services.
- Discussed course organization with Scott Hughes.
- Completed course outline and have started assembling Moodle-based online course, including video editing using Adobe Premiere

2/11/10 Flagger and Work Zone Course meeting at UIS

The UIS project team met with Marshall Metcalf and Kevin Burke define the online course modules and develop the work plan to bring the Work Zone Safety Course to the online environment. UIS demonstrated the online Flagger components discussed the process of integrating content with IDOT's KMSI system. Mary Elizabeth Smith of UIS replaced Deb Antoine on the project.

2/24/10 at UIS

Audio recorded Marshal Metcalf's Work Zone course presentation and converted to text format to develop script for slide preparation.

5/12/10 Technical Review Panel Meeting

IDOT provided an update on their Learning Management System (LMS) implementation. UIS updated progress on Flagger and Work Zone Safety online course content development. UIUC updated progress on the Gradations course for Materials and Physical Research. Future potential online courses were discussed.

6/16/10 at UIS

UIS project personnel met with Kevin Burke to outline the remaining tasks to finalize Flagger online course content and to load to IDOT's LMS.

9/30/10

The following has been done during the quarter for the Aggregate Gradation Course.

July 2010

- Revisions to gradation course per June meeting with Scott Hughes.
- Creation of calculation section of the gradation course, including skills practice and quiz questions.
- Closed captioning prepared for videos.

August 2010

- 8/9 TRP meeting in Springfield.
- Communication and review with Scott Hughes of the calculation section of the course.
- Conversion of course information from html files to PowerPoint and Word files to facilitate upload to KMSI per recommendation from KMSI and IDOT. Results of this conversion were unsatisfactory. Further coordination with KMSI and IDOT to determine method to upload html files.
- Final revisions to gradation videos.

September 2010

- 9/13 Meeting to discuss overall TRP project. In attendance: Kevin Burke, Imad Al-Qadi, Bill Buttlar, and James Hall.
- Final revisions to gradation course materials and submission for review to IDOT.

12/31/2010 Report

December 2010

12/14/10 Technical Review Panel Meeting

IDOT provided an update on their Learning Management System (LMS) implementation. UIS updated progress on completing the remaining Flagger course content deployment. UIUC updated progress and demonstrated the completed Gradations course for Materials and Physical Research. A potential online course was discussed for future investigation and development.

UIUC Progress Last Quarter

October

- 10/1 Meeting at Bureau of Materials. Presented an overview of the complete online Gradation Course. Scott Hughes suggested revisions. Course was to be presented to others for further IDOT review.
- Revisions to gradation course materials, including video, course content, and quizzes, in accordance with IDOT feedback from 10/1 meeting.

November

• Revisions to course materials after further feedback from IDOT: new Gradation Handbook file to upload, further edits to Wash video, edits to closed captioning, adjusted settings on video so students must watch from start to finish, minor changes to text, edits to quiz questions, reloading as section quizzes only, no final quiz, edits to Skills Practice.

December

- 12/14 Meeting in Springfield to discuss overall project status, updates, and next steps.
- More minor revisions to Gradation Course.
- 12/16 Participation in Webinar on AASHTO Winter Training materials.

UIS Progress Last Quarter

12/16/2010

Participation in Webinar on AASHTO Winter Training materials.

12/20/2010 at UIS

UIS project personnel met with Kevin Burke to finalize the course content for Module 2 for the Flagger online course content. This will complete the Flagger modules and, upon incorporation to IDOT's LMS, will be available for review by the subject matter expert group.

12/21/2010 at IDOT

James Hall met with Marshal Metcalf to review the course content for the online version of the Work Zone course.

Last Updated: 1/10/2011  
Approved By TRP Chair: 11/2/2009



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Green Friendly Best Management Practices (BMP) for Interstate Rest Areas		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-74					
		<b>Project Number:</b> R27-74					
<b>QPR Author Name:</b> Khaled El-Rayes		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-265-0557	<b>% Project Completed:</b> 99.9			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Develop Energy Cost Baseline Data and Conduct On-Site Assessments		1/1/2010	3/31/2010	C	-	-	-
<b>Task 2:</b> Conduct a Comprehensive Literature Review		1/1/2010	3/31/2010	C	-	-	-
<b>Task 3:</b> Identify and Analyze Potential Green Friendly BMPs		4/1/2010	6/30/2010	C	-	-	-
<b>Task 4:</b> Develop a Decision Support Tool		7/1/2010	9/30/2010	C	-	-	-
<b>Task 5:</b> Final Recommendations/Report		9/1/2010	10/31/2010	I	C	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Khaled El-Rayes				<b>Organization / Address</b>			
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<b>Co-Investigator:</b>							
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<b>Description of Research:</b>							
<p>Energy costs have risen at the Rest Areas and even though presently we have seen a decline in fuel costs they will inevitably increase over time. This means we can expect both higher visitation numbers and increased annual energy bills for these sites. Any preventative measures, especially in the area of "Green Friendly" techniques, that will save money and at the same time show our commitment by the State to be more environmentally conscious would be very beneficial and well received.</p> <p>The information provided by this project would allow us to look at each individual site and determine what modifications could be made from the simple to the complex for generating energy savings (dollars) while being "Green Friendly" (environmentally aware). When added to the fact that this would take place at state facilities that are now experiencing nearly 40 million visitors a year, this would go a long way to improve the fiscal and environmental image of Illinois on both a state and national level.</p>							
<b>Keywords:</b> green, BMP, rest area							
<b>Technical Review Panel:</b>							
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**Meeting Dates / Minutes Available?**

10/5/2009 / Yes

1/20/2010 / Yes

8/27/2010 / Yes

**End User(s) and Result(s) Expected:**

Recommended practices to save energy (dollars) and be environmentally aware.

**Progress to Date:**

As of June 30, 2010, the research team completed the first three tasks of the project. The first interim report outlining the main findings of the first two tasks was completed and submitted as planned on March 30, 2010. This report presented (1) a detailed analysis of the energy and water consumption of all Illinois rest areas; (2) an onsite assessment of three selected rest areas; and (3) a comprehensive literature review of energy saving measures and sustainable construction as well as decision-making techniques that can be used for upgrading rest areas.

The final report is still under review by the TRP.

The third research task was completed and its main findings were reported in the second interim report that was submitted as planned on June 30, 2010. This interim report presented (1) a detailed Life-Cycle Cost (LCC) analysis and an environmental impact analysis to evaluate the impact of implementing a number of promising “green friendly” upgrade measures such as LED and induction lighting, motion activated lighting, thermal glass pane windows and doors, geothermal HVAC systems, active and passive solar practices, energy efficient hand dryers, and water saving plumbing fixtures in three selected rest areas; (2) feasibility analysis of potentially “green friendly” measures such as indoor temperature control devices; rain gardens, and gray water systems; (3) an analysis of potential LEED points that can be achieved by various upgrade measures; and (4) a draft energy audit report that was conducted by the “Smart Energy Design Assistance Center” (SEDAC) for the Prairie View rest area.

The fourth research task was completed and its main findings were reported in the second interim report that was submitted as planned on September 30, 2010. This interim report presented (1) development of a Decision Support Tool (DST) for optimizing upgrade decisions for rest area buildings; and (2) an application example to illustrate the capabilities of the developed DST in optimizing upgrade decisions for rest areas buildings.

The fifth and last research task focused on developing recommendations for upgrading three selected rest areas and its findings were reported in a final report that was submitted as planned on December 31, 2010.

Last Updated: 2/8/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Clearview Font in Traffic Signs: Assessing IDOT Experiences and Needs		<b>Last Edited:</b> 1/10/2011					
		<b>Function Code:</b> R27-75					
		<b>Project Number:</b> R27-75					
<b>QPR Author Name:</b> Hani Mahmassani		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011		
<b>Telephone:</b> 847-491-2276	<b>% Project Completed:</b> 41				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Synthesis and State of Practice Assessment		5/15/2010	11/15/2010	I	C	-	-
<b>Task 2:</b> Interview with Personnel Overseeing Highway Signage		8/15/2010	2/15/2011	I	I	-	-
<b>Task 3:</b> Field Survey		1/15/2011	9/15/2011	-	-	-	-
<b>Task 4:</b> Visual Inspection and Photographic Records		1/15/2011	9/15/2011	-	-	-	-
<b>Task 5:</b> Assessment of Highway Users Experience		1/15/2011	2/15/2012	-	-	-	-
<b>Task 6:</b> Final Report Preparation		12/15/2011	5/15/2012	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Hani Mahmassani				<b>Organization / Address</b>			
<b>Telephone:</b> 847-491-2276				Northwestern University			
<b>Email:</b> masmah@northwestern.edu				600 Foster Street Evanston, IL 60208-4055			
<b>Description of Research:</b>							
<p>The Clearview font has many advantages over previous font practices, such as night legibility and lack of smearing effect. Some of the potential concerns include incompatibility with commonly used background sheeting and sight distance. However, experience in other states to date, as well as experimental studies in the literature, suggest that the advantages appear to outweigh the concerns.</p> <p>The main objective of this study is to determine Illinois' progress in using the Clearview font and whether its use has proven successful. While most previous in the literature were mostly done in an experimental setting, this study (R27-75) aims to determine how the implementation of the Clearview font for signs has affected Illinois and its motorists in a real-world context. Accordingly, the study team is examining the implementation of this font from the perspectives of both installers and motorists. This project will also monitor media reports about the Clearview font and/or this research project.</p> <p>The main field research portion of this study will include both intercept and follow-up surveys with motorists who have encountered Clearview signs. An important aspect of this project will be developing questions that adequately query user perceptions. Some questions will be whether motorists notice a difference between Clearview signs and other signs and how eligible Clearview signs are to them. This will be done for illuminated and non-illuminated locations in order to compare motorist reactions.</p> <p>The final task is the final report, which is accompanied by an interim report in April followed by the final report a year later. There will also be quarterly progress reports along with meetings of the panel every four months.</p>							
<b>Keywords:</b> Clearview font, highway signage, user experience							
<b>Technical Review Panel:</b>							
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Connie Shanahan							

Meeting Dates / Minutes Available?
8/30/2010 / Yes
<b>End User(s) and Result(s) Expected:</b>  Ultimately, the results of this research will provide guidance for IDOT about use of the Clearview font, based on its performance to date in locations on Illinois highways. In addition to extent of deployment and experience to date, the study will ascertain whether it is making a positive difference for highway users.
<b>Progress to Date:</b>  Note: Following our meeting with the TRP, the tasks have been renumbered to reflect logical sequential order. The task numbers in this report follow the revised numbering requested by the TRP.  1. Most of the effort to date has been devoted to Task 1: Literature Synthesis and State of Practice Assessment. An extensive review of both existing practice and existing experience with Clearview has been conducted; in addition, the human factors literature for previous studies of user perception and response is also being reviewed for state of the art analysis methodology.  2. In the process of devising the set of questions for Task 2: Interview with Personnel Overseeing Highway Signage, and setting up appropriate contacts. The study team has determined that it would be beneficial to hear first-hand via phone interview about experience in selected other states as well.  3. In the process of specifying techniques for field work.

Last Updated: 1/10/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> LED Roadway Lighting Evaluation and Field Testing			<b>Last Edited:</b> 2/8/2011					
			<b>Function Code:</b> R27-76					
			<b>Project Number:</b> R27-76					
<b>QPR Author Name:</b> Rahim Benekohal			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> (217) 244-6288	<b>% Project Completed:</b> 60				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature review			11/1/2009	6/30/2010	I	C	-	-
<b>Task 2:</b> Decide on test conditions and methods			2/1/2010	3/30/2010	I	C	-	-
<b>Task 3:</b> Obtain LED luminaries			3/1/2010	12/30/2010	I	C	-	-
<b>Task 4:</b> Install LED luminaires and prepare for testing			4/1/2010	12/30/2010	I	C	-	-
<b>Task 5:</b> Data collection and analysis			4/1/2010	12/30/2010	I	I	-	-
<b>Task 6:</b> Prepare Reports			7/1/2011	10/31/2011	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Rahim Benekohal			<b>Organization / Address</b>					
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<b>Description of Research:</b>								
<p>This research will allow IDOT to evaluate the possibility of using LED light on highways. LED lighting may use less energy than high intensity discharge (HID) lamps commonly used in roadway lighting. Research will be done on the current state of technology in LED roadway lighting and identify the best commercially available LED roadway luminaires for IDOT lighting applications. Obtain luminaires for field testing, field verify photometry, and calculate results of their performance for typical IDOT roadways. Compare LED performance to existing light sources and provide economic justification for or against the use of LED roadway lighting.</p>								
<b>Keywords:</b> LED, luminaires, photometry, lighting								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
8/25/2009 / Yes								
9/22/2009 / No								

3/17/2010 / No

12/7/2010 / Yes

**End User(s) and Result(s) Expected:**

The outcome of this study will provide valuable information in determining the conditions where IDOT can reduce costs and/or improve roadway lighting by using LED. IDOT staff would benefit from this study by gaining knowledge on how well LED roadway lighting works before purchasing them. The results of field testing would provide a bench mark on how much of the manufacturer's claims is achievable in Illinois conditions. The study would also quantify the benefits and costs of using LED for roadway lighting instead of traditional sources.

**Progress to Date:**

Literature review has been completed. A draft report has been prepared and under review by authors. A questionnaire was sent to nearly 60 LED manufactures/distributors. Their responses were tabulated and submitted to TRP. Plan for data collection was discussed with TRP and is finalized. Illuminance and luminance measuring (Light meters) devices were purchased. Four light poles were installed in the test site with cooperation of the Village of Rantoul. High pressure sodium (HPS) luminaires were installed and field data was collected. Four LEDs from GE Company and Relume were obtained, installed, and field data were collected. Four LEDs from Cooper Lighting was obtained, installed, but field data has not been collected due to snow in and around the road. Data will be collected after the snow is melted. Met with TRP and discussed the data collected and some preliminary findings.

Last Updated: 2/8/2011  
Approved By TRP Chair: 1/12/2010



<b>Project Title:</b> Evaluating Pavement Markings on Portland Cement Concrete (PCC) & Various Asphalt Surfaces		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-77					
		<b>Project Number:</b> R27-77					
<b>QPR Author Name:</b> Carmine Dwyer		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-356-4500	<b>% Project Completed:</b> 20			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Panel Meetings		12/8/2009	11/30/2012	I	I	-	-
<b>Task 2:</b> Literature Review		12/8/2009	4/30/2010	C	-	-	-
<b>Task 3:</b> Surveys		1/1/2010	4/30/2010	C	-	-	-
<b>Task 4:</b> Field Evaluations		5/1/2010	7/31/2012	I	I	-	-
<b>Task 5:</b> Data Processing and Analysis		10/1/2010	8/31/2012	-	-	-	-
<b>Task 6:</b> Pavement Marking Guide		8/1/2012	11/30/2012	-	-	-	-
<b>Principal Investigator:</b>							
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<b>Co-Investigator:</b>							
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<b>Description of Research:</b>							
This research will evaluate the pavement marking system compatibility with different PCC and hot-mix asphalt (HMA) pavement types.							
<b>Keywords:</b> pavement, durable,							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
12/8/2009 / Yes							

5/13/2010 / Yes

9/14/2010 / Yes

**End User(s) and Result(s) Expected:**

To determine matrix of compatibility of marking systems with different PCC and HMA pavements.

**Progress to Date:**

Project Kickoff meeting was held December 8, 2009 at IDOT BMPR.

Literature review was completed in April 2010. Review included TxDOT Pavement Marking Handbook, pavement marking data from the National Transportation Product Evaluation Program's DataMine, the current (Apr 22, 2010) Notice of Proposed Amendment to minimum retroreflectivity standards in the MUTCD.

Both the Industry and Transportation Agency surveys were conducted and responses tallied.

Meeting with TRP was held on May 13, 2010 at IDOT BMPR. Purpose of the meeting was to present the results of the literature review and the two surveys. Then discussion began on the criteria for selecting pavement marking test locations. The panel decided to evaluate 6 marking types under the following variables:

- 1) ADT (high and low)
- 2) Climate (Northern IL, Central IL, Southern IL)
- 3) New striping vs. re-striping (maintenance striping)
- 4) Pavement Type (PCC, HMA, surface treatment)
- 5) Application Type (surface vs. recessed)

ARA and members of the TRP have been working together to identify locations of striping being placed this year (2010) that fulfill all the marking types and variables selected for analysis.

ARA created pavement marking installation inspection sheets for each marking type. These installation inspection sheets will be provided to the RE's/inspection crews of the pavement marking sites selected for this study.

On Tuesday, Sep 14, ARA conducted a Webex to provide the TRP with information on the selected test sites. A majority of the required sites were found. The details of each site are described by a matrix of variables selected by the TRP at the previous meeting. The selected sites were listed in two main categories (New Construction and Maintenance Striping) and then plotted on a map. Since IDOT maintenance crews will be providing rolling lane closures for data collection, the nearest IDOT Maintenance Facilities were also plotted on the map. Grouping the sites with nearest Maintenance Facility, a schedule was developed for data collection. The schedule is approximately 1 week in Northern IL, 2 weeks in Central IL, and 1 week in Southern IL. ARA and the TRP Chairperson are in the process of determining how many of the test site markings have been placed and are ready to be tested. Data collection is to begin in October.

Data collection began October 18, 2010 and was completed on Dec 3, 2010. The test schedule was frequently adjusted because many of the test sites were not completed until later in the year. However, the 2011 and 2012 data collection efforts will follow the original schedule. During scheduling and testing a few of the test sites were eliminated from the study. Some were eliminated simply because they were never placed. Others were eliminated due to poor installation of materials or a change in material type. However, a majority of the test sites are now included in the study. Next, the research team will summarize the data in a report to be submitted to the TRP.

Last Updated: 1/27/2011



<b>Project Title:</b> Evaluating the Effects of Various Asphalt Binder Additives/Modifiers of Moisture Sensitivity in HMA		<b>Last Edited:</b> 2/8/2011					
		<b>Function Code:</b> R27-78					
		<b>Project Number:</b> R27-78					
<b>QPR Author Name:</b> Imad Al-Qadi		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 893-0705 x222	<b>% Project Completed:</b> 40			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review		2/25/2010	8/25/2010	I	I	-	-
<b>Task 2:</b> Experimental Program Development		5/25/2010	7/5/2010	C	-	-	-
<b>Task 3:</b> Lab Testing		6/30/2010	5/25/2011	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Imad Al-Qadi		<b>Organization / Address</b>					
<b>Telephone:</b> 893-0705 x222		UIUC-CEE					
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<b>Description of Research:</b>							
This research evaluates various methods used to enhance asphaltic mixture moisture resistance. This includes the use of polymer modification, liquid anti-strip (A-S) additive, polyphosphoric acid (PPA) modified polymer, and hydrated lime slurry.							
<b>Keywords:</b> HMA, binder, additives, modifiers, moisture							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
2/16/2010 / Yes							
<b>End User(s) and Result(s) Expected:</b>							
IDOT, asphalt industry, asphalt plants and paving contractors. Documented performance of asphalt binder additives/modifiers on HMA pavements.							
<b>Progress to Date:</b>							
Task 1: Literature Review: Literature has been compiled and this task is expected to be completed during the next quarter.							

Task 2: Experimental Program Development:

This task is completed

Task 3: Lab Testing:

Rock samples were collected from the quarry for preparing blister samples, adhesion and surface energy tests.

Aggregate samples passing sieve #4 and retained on sieve #8 from each stockpile were sent to Texas A & M labs to measure their surface energy components.

Mix design and measuring optimum asphalt content for both mixes were completed.

Tensile strength ratio (TSR) was measured for both mixes following the modified IDOT Lottman test. The N70 mix failed with a value of (84%), and N90 passed with a value of (85.8%).

The TSR conditioning process, with five freezing and thawing (FT) cycles, was completed.

Measuring Gmm values with liquid antistriper (LA), SBS and PPA, were performed.

Task 4: Construction & ATLAS Testing:

No action this quarter

Task 5: Final Report

No action this quarter

Last Updated: 2/8/2011  
Approved By TRP Chair: 10/15/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Designing, Producing & Constructing Fine-Graded Hot Mix Asphalt (HMA) on IL Roadways			<b>Last Edited:</b> 2/18/2011					
			<b>Function Code:</b> R27-79					
			<b>Project Number:</b> R27-79					
<b>QPR Author Name:</b> William Buttlar			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-5966	<b>% Project Completed:</b> 55				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> National Literature Review			9/1/2009	12/1/2009	C	-	-	-
<b>Task 2:</b> Phone Interviews			9/15/2009	12/15/2009	C	-	-	-
<b>Task 3:</b> Collect Related Agency Specifications			9/15/2009	12/31/2009	C	-	-	-
<b>Task 4:</b> Develop HMA Blends			6/1/2010	12/30/2010	I	I	-	-
<b>Task 5:</b> Sample Aggregates			2/15/2010	3/15/2010	C	-	-	-
<b>Task 6:</b> Binder Selection and Sampling			6/15/2010	7/31/2010	C	-	-	-
<b>Task 7:</b> Stockpile Aggregate Gradation and Gravity Testing			3/16/2010	5/15/2010	C	-	-	-
<b>Task 8:</b> ATLAS Test Section Planning			12/1/2010	5/30/2011	-	I	-	-
<b>Task 9:</b> Permeability Testing of I-57 F-G and Control Pavement			6/1/2010	9/15/2010	C	-	-	-
<b>Task 10:</b> Sample F-G Project (I-57, D-5)			8/1/2010	9/15/2010	C	-	-	-
<b>Principal Investigator:</b>								
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<b>Co-Investigator:</b>								
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<b>Description of Research:</b>								
This study will involve a comprehensive literature review, a survey of key practitioners, a review of related agency specifications, lab testing, and accelerated pavement testing. Lab testing will include Bailey mix design, gyratory compaction and volumetric analysis of compacted mixture specimens of a wide range of F-G mixtures, mechanical testing of promising mix designs, construction of test pavements and full-scale accelerated pavement testing using the UIUC ATLAS device.								
<b>Keywords:</b> fine-graded, HMA, asphalt, mixture, flexible, pavement, overlay								
<b>Technical Review Panel:</b>								
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Meeting Dates / Minutes Available?
1/26/2010 / Yes
2/19/2010 / Yes
9/2/2010 / No
12/13/2010 / No

**End User(s) and Result(s) Expected:**

This study will produce comprehensive laboratory and accelerated pavement data, which will lead to recommendations for the development of a F-G HMA specification for IDOT. Recommendations for new aggregate gradations to support the design of F-G mixtures will also be provided, if deemed necessary.

**Progress to Date:**

A comprehensive review of national literature related to fine graded mixtures was completed by the UIUC team in the Fall of 2009. Murphy Pavement Technology completed their initial project tasks, including literature review, solicitation and review of fine-graded mixture specifications, and phone interviews with key asphalt mixture designers. Two comprehensive meetings have now been held with the Technical Review Panel (December 2009 and February 2010), which have focused on discussing and finalizing decisions on target mixtures to be used in both field and accelerated pavement studies. In addition, aggregate types and sources have been sampled from locally available options, and large stockpile samples were obtained, tested, and fractionated in very large quantities to promote consistency in the fractionated materials. The design of the eight study mixtures (three fine-graded binder mixes, three fine-graded surface mixes, and two control coarse-graded mixes) is well underway. Extra care is being taken to produce mixtures with very similar VMA levels in order to fairly compare between the fine graded mixtures and the course graded control sections. Mechanical testing (creep, strength, Hamburg, T-283, etc.) of the design is underway and will continue in parallel with the completion of mix design in the next quarter.

Last Updated: 2/18/2011  
 Approved By TRP Chair: 10/28/2009



<b>Project Title:</b> Fatigue Testing of Brass Breakaway Couplings			<b>Last Edited:</b> 2/8/2011					
			<b>Function Code:</b> R27-80					
			<b>Project Number:</b> R27-80					
<b>QPR Author Name:</b> Grzegorz Banas			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-5019	<b>% Project Completed:</b> 95				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Determination of Stress Concentration Factor			9/1/2009	10/25/2009	C	-	-	-
<b>Task 2:</b> Variable Load HHistory			7/1/2009	8/31/2009	C	-	-	-
<b>Task 3:</b> Design and fabrication of steel loading plate			9/1/2009	9/14/2009	C	-	-	-
<b>Task 4:</b> Design and fabrication of fatigue grips			9/5/2009	10/21/2009	C	-	-	-
<b>Task 5:</b> Reduction of Square/Diamond/Individual Load Data			10/1/2009	11/1/2009	C	-	-	-
<b>Task 6:</b> Report of Square/Diamond/Individual Loading			11/1/2009	12/1/2009	C	-	-	-
<b>Task 7:</b> Monotonic Testing of CDA 360 Alloy			10/15/2009	11/5/2009	C	-	-	-
<b>Task 8:</b> Fatigue Testing of Notched Brass Couplings			11/5/2009	1/1/2010	C	-	-	-
<b>Task 9:</b> Report of Fatigue Testing of Original Design			11/5/2009	12/31/2010	I	I	-	-
<b>Task 10:</b> Bending and Fatigue Testing of New Notch Designs			3/8/2010	6/15/2010	C	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Grzegorz Banas			<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-5019			UIUC-CEE					
<b>Email:</b> gbanas@illinois.edu			Civil Engrg 1120C Ncel 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Co-Investigator:</b>								
<b>Name:</b> Fred Lawrence			<b>Organization / Address</b>					
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<b>Description of Research:</b>								
<p>A concrete base will be attached to the strong wall located in NSEL in order to determine the stress concentration factor at the bottom of the notch on the machined brass couplers. The notched brass couplers will be placed in a 50 kip servohydraulic testing frame to be loaded to given stress levels to determine fatigue life. The fracture surface of each coupler will be examined using low magnification (10x) microscopy in order to develop a correlation between fatigue zone and brittle fracture zone as a function of stress level and fatigue life.</p>								
<b>Keywords:</b> brass, couplers, notched, light pole, CDA 360								
<b>Technical Review Panel:</b>								
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**Meeting Dates / Minutes Available?**

9/1/2009 / Yes

4/1/2010 / Yes

**End User(s) and Result(s) Expected:**

Numerical data and an S-N diagram will be produced to aid in the use of the machined brass couplers in field situations.

**Progress to Date:**

A steel plate has been fabricated to hold the concrete base to the strong wall. The plate was attached to the strong wall using steel bars. The concrete base was then attached to the steel plate using 3/4 in. rods threaded into the steel plate. The machined brass couplers had strain gauges mounted to the bottom of the notch as well as the nominal section. The couplers were attached in both diamond and square configurations, and a steel loading tube attached to the exposed threaded studs of the couplers by stainless steel bolts. A servohydraulic actuator was placed underneath the loading tube and pressure applied by a roller placed on top of the actuator. The actuator applied force under load control up to 5000 lbs. at a constant loading rate of 1000 lb./min. After analysis of data recorded from the strain gauges and actuator, it was determined that an eccentricity was present in both the diamond and square arrangements. Measurement by use of a plumb bob revealed an eccentricity of 3/16 in. The loading tube was removed and steel rods machined for use in fatigue testing were attached to couplers individually. The actuator was placed under each coupler individually and loaded to a strain value of less 0.002% elongation in order to prevent yielding of the couplers. Analysis of individually loaded coupler data produced a stress concentration factor of 5.7.

Monotonic tests of hexagonal CDA 360 brass were performed to verify the stress-strain relation and determine yield and ultimate stresses. An Instron 2 inch extensometer was attached to each specimen, and tested in an MTS 50 kip testing frame at a controlled 0.1 inch/minute by an Instron 8500 Plus controller. A yield stress of 38 ksi, and an ultimate stress of 57.5 ksi were determined by averaging results from three specimens.

Fatigue testing began November 05, 2009. To date seven specimens of the original notch design have been tested in fatigue with lives ranging from 10<sup>6</sup> to 10<sup>7</sup> cycles. The original notch design has been abandoned due to impact testing in Nebraska.

Two additional notch designs have been submitted to us, with 4 couplings of each design for bending and fatigue studies. These designs have been scrapped by IDOT, and testing on these couplings suspended.

A fourth coupling design was prepared and tested in fatigue. 6 couplings of the new design were tested with fatigue lives ranging from 10,000 to 200,000 cycles.

A set of 4 of the Transpo couplings as well as 4 of the brass couplings of the most recent design were subjected to 1000 hours in a salt-spray bath, and then tested in fatigue. The testing is nearly complete with 3 couplings left to test.

The TRP is reviewing the draft final report.

Last Updated: 2/8/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Field Performance Evaluations of IL Aggregates for Subgrade Replacement & Subbase - Phase II			<b>Last Edited:</b> 1/18/2011					
			<b>Function Code:</b> R27-81					
			<b>Project Number:</b> R27-81					
<b>QPR Author Name:</b> Erol Tutumluer			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-8637	<b>% Project Completed:</b> 70				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Mechanistic Evaluation of Pavement Layer Response during Construction			1/1/2010	6/30/2010	C	-	-	-
<b>Task 2:</b> Construction of Test Sections for Field Validation			6/30/2010	12/31/2010	I	C	-	-
<b>Task 3:</b> Field Test Study and Proposed Field Test Section Configuration			9/1/2010	6/30/2011	-	I	-	-
<b>Task 4:</b> Establishing Field Validated Thickness Correlations with Aggregate Properties			1/1/2011	6/30/2011	-	-	-	-
<b>Task 5:</b> Final Report and Implementation			7/1/2011	12/31/2011	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Erol Tutumluer			<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-8637			UIUC-CEE					
<b>Email:</b> tutumlue@illinois.edu			CEE 205 N. Mathews Ave. Urbana, IL 61801					
<b>Description of Research:</b>								
<p>Important practical findings of the laboratory study and the developed aggregate thickness correction factors based on laboratory test results are to be validated in this Phase II field testing effort, which is the scope of the R27-81 ICT project work plan. Using the University of Illinois full-scale testing equipment ATLaS, field performances of the laboratory studied Illinois aggregates will be adequately evaluated for subgrade replacement and subbase in the Phase II research project ICT R27-81. The aggregate thickness tentative correction factors presented and the recommendations made based on the findings from the Phase I laboratory study will be validated and finalized in the Phase II field study to ultimately economize the use of aggregate in the State of Illinois by either reducing thickness or avoiding failures due to poor quality aggregate cover performances.</p>								
<b>Keywords:</b> Illinois aggregates, field, performance, subgrade, subbase								
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<b>Meeting Dates / Minutes Available?</b>								
12/1/2009 / Yes								
5/6/2010 / Yes								
<b>End User(s) and Result(s) Expected:</b>								

With successful completion of this research, great savings will be realized in IDOT construction projects through proper aggregate selection/utilization according to aggregate properties and their validated field performances. The ultimate benefit will be achieved for making more economical use of the aggregates in the State of Illinois by either reducing treatment thickness or avoiding aggregate failures.

**Progress to Date:**

Task 1, mechanistic evaluation of pavement layer response during construction, is complete. In doing the mechanistic evaluation, the adequacy of the laboratory characterized aggregate materials were evaluated for field construction. The summary of findings from Task 1 include, the subgrade stress ratio (SSR) shows a clear dependence on the aggregate material quality, the acceptable SSR value selected the aggregate thickness requirement can change significantly, and the aggregate layer thicknesses in construction platforms need to be optimized to ensure adequate performance, at the same time avoiding excessive overdesign.

Task 2 research activities related to field test section design and construction were completed as of October 15, 2010. There were totally 6 test cells each having 3 different aggregate thickness test sections constructed.

Task 3 research activities included trafficking to failure of the constructed field test sections. Until mid December 2010, 5 out of the 6 test cells were trafficked to failure. Test cell #3 is still to be tested in early Spring 2011 after winter is over.

Last Updated: 1/18/2011  
Approved By TRP Chair: 7/15/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Strength of Bridge Wood Pilings Retrofits for Moment Resistance			<b>Last Edited:</b> 2/16/2011					
			<b>Function Code:</b> R27-82					
			<b>Project Number:</b> R27-82					
<b>QPR Author Name:</b> Bassem Andrawes			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-244-4178	<b>% Project Completed:</b> 50				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Analytical Investigation of as-built and retrofitted bridges			8/16/2009	5/15/2011	I	I	-	-
<b>Task 2:</b> Experimental testing of typical wood species			2/16/2010	2/15/2011	I	I	-	-
<b>Task 3:</b> Experimental testing of retrofitted wood species			2/16/2011	11/15/2011	-	-	-	-
<b>Task 4:</b> Final report			8/16/2011	2/15/2012	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Bassem Andrawes			<b>Organization / Address</b>					
<b>Telephone:</b> 217-244-4178			UIUC-CEE 3122 Newmark Lab Civil & Envir Eng 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Email:</b> andrawes@illinois.edu								
<b>Description of Research:</b>								
The research plan comprises four main tasks: (1) Analytical Investigation of as-built and retrofitted bridges. (2) Experimental testing of typical wood species. (3) Experimental testing of retrofitted wood species. (4) Documenting and summarizing the findings in the final report. It is anticipated that three brief progress reports will be submitted after each of the project's critical phases.								
<b>Keywords:</b> Wood pilings, Bridges, Bridge rating, Finite element								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
8/26/2009 / Yes								
11/30/2009 / Yes								
3/11/2010 / Yes								
6/17/2010 / Yes								
10/6/2010 / Yes								
<b>End User(s) and Result(s) Expected:</b>								

The outcomes of this project will be in the form of: (1) Recommended methodology for evaluating the capacity of bridges with wood piles under unsymmetrical loading (bridge rating). (2) Recommended retrofitting method and design for bridge wood pilings. The recommended method will provide balance between the cost and the effectiveness in restoring the compression-flexural capacity of damaged wood pilings.

**Progress to Date:**

The modified load rating procedure for bridge timber piles has been finalized per the TRP latest comments. The first draft of a timber piles rating guideline document using the new procedure has been developed and shared with IDOT. The FE-based parametric study on bridges with timber piles has been completed using the modified rating method and the results have been shared with the TRP members.

Last Updated: 2/16/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Good Movement Study in IL: Applications to Freight Transportation & Logistics		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-83					
		<b>Project Number:</b> R27-83					
<b>QPR Author Name:</b> Kouros Mohammadian		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011		
<b>Telephone:</b> 312-996-9840	<b>% Project Completed:</b> 40				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Task 1: Survey Tool Development and Implementation of Training Program		1/1/2010	7/1/2010	I	C	-	-
<b>Task 2:</b> Task 2. Participant Recruitment		6/1/2010	2/28/2011	I	I	-	-
<b>Task 3:</b> Task 3. Survey Implementation		8/1/2010	3/30/2011	I	I	-	-
<b>Task 4:</b> Task 4. Data Cleaning and Analysis		3/1/2011	8/15/2011	-	-	-	-
<b>Task 5:</b> Task 5: Dissemination of Findings		6/1/2011	8/30/2011	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Kouros Mohammadian		<b>Organization / Address</b>					
		UIC					
<b>Telephone:</b> 312-996-9840		Department of Civil and Materials Engineering University of Illinois at Chicago 842 West Taylor Street Chicago, IL 60607-7023					
<b>Email:</b> kouros@uic.edu							
<b>Description of Research:</b>							
The study will conduct a survey of firms and businesses that provide shipping services in the region with the goal of understanding their underlying decision making process that can be used to better replicate their behavior in the freight movement and distribution chain. These results can help IDOT, CMAP, cities, and other agencies to improve freight and passenger movement more efficiency and better maintain State owned transportation infrastructure.							
<b>Keywords:</b> Goods movement, freight, survey							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
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<b>Meeting Dates / Minutes Available?</b>							
2/26/2010 / Yes							
<b>End User(s) and Result(s) Expected:</b>							
The research will provide a new and highly disaggregate freight dataset that is needed for modeling more realistic decision making processes for more efficient freight movement.							
<b>Progress to Date:</b>							
Task 1: Survey Tool Development and Implementation of Training Program							
Survey questionnaire was designed and reviewed by TRP. Survey protocol was also developed and submitted to the UIC's IRB committee (for survey ethics and research subjects protection purpose). The approval was obtained in late May 2010.							

After completion of Phase I of Participant Recruitment step, we also revisited the survey questionnaire and modified it.

#### Task 2. Participant Recruitment

Participant Recruitment-Phase I was started in June 2010. By the end of November 2010, over 12000 firms were contacted by phone and over 1500 emails were collected during the recruitment process.

Participant Recruitment-Phase II will start in February 2011. In this phase, recruitment emails will be forwarded to 100,000 firms their contact information is obtained from info USA. Currently, university is finalizing the purchasing process of the required data from Info USA.

#### Task 3. Survey Implementation

Survey materials were sent to individuals whose information are collected in the recruitment task (Phase I). As of December 31, we have received 71 completed questionnaires.

Those firms that will be contacted in Phase II will receive survey documents in February 2011 followed by two reminders. It is hoped that 500 firms can complete the survey in this phase.

#### Task 4. Data Cleaning and Analysis

Task has not started yet.

#### Task 5: Dissemination of Findings

A paper is submitted to TRB and accepted for presentation at the 2011 annual meeting.

Last Updated: 1/27/2011  
Approved By TRP Chair: 4/15/2010



<b>Project Title:</b> Develop Travel Reliability Inventory for Highway Networks			<b>Last Edited:</b> 1/20/2011					
			<b>Function Code:</b> R27-84					
			<b>Project Number:</b> R27-84					
<b>QPR Author Name:</b> Yu (Marco) Nie			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 847-467-0502	<b>% Project Completed:</b> 53				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Compile link-based inventory			6/1/2010	8/31/2010	I	C	-	-
<b>Task 2:</b> Develop GUI for link-based inventory			8/1/2010	10/30/2010	I	C	-	-
<b>Task 3:</b> Software development			10/1/2010	4/30/2011	-	I	-	-
<b>Task 4:</b> Identify critical Origin-Destination Pairs			12/1/2010	2/28/2011	-	I	-	-
<b>Task 5:</b> Construct aggregated indexes			1/1/2011	5/30/2011	-	-	-	-
<b>Task 6:</b> Prepare the final report			4/1/2011	6/1/2011	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Yu (Marco) Nie			<b>Organization / Address</b>					
<b>Telephone:</b> 847-467-0502			Northwestern University Northwestern University Civil & Environmental Engineering 2145 Sheridan Road, A328 Evanston, IL 60208-3109					
<b>Email:</b> y-nie@northwestern.edu								
<b>Co-Investigator:</b>								
<b>Name:</b> Peter Nelson			<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-3259			UIC					
<b>Email:</b> nelson@uic.edu								
<b>Co-Investigator:</b>								
<b>Name:</b> John Dillenburg			<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-5598			UIC					
<b>Email:</b> dillenbu@uic.edu								
<b>Description of Research:</b>								
develop necessary procedures and computer tools to document the random travel time patterns of highway networks. For the purpose of demonstration, a prototype travel reliability inventory will be created for the Chicago Metropolitan Area. The primary reason to focus on this area is data availability: IDOT has continuously funded the Gary-Chicago-Milwaukee (GCM) Traveler Information System, which has over the years accumulated a huge amount of traffic data that cover major roads in the Chicago area.								
<b>Keywords:</b> travel, reliability, highway, inventor, software tool								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
<b>End User(s) and Result(s) Expected:</b>								

Developing a software tool to analyze and visualize traffic data and generate travel reliability inventories.

**Progress to Date:**

06/01/2010 - 06/30/2010

The UIC team has reconfigured the traffic database used for the Northwestern team since June. The new loop detector and IPASS data from 2008 - 2010 were added. Accordingly, Northwestern team has started to download and store these data into its own MYSQL database. The development of link-based reliability inventory also started in June and will continue into July and August.

07/1/2010 - 09/30/2010

The new traffic detector and IPASS data (10/2008 - 09/2010) have been downloaded and the database are currently being updated approximately once a week with the latest traffic data.

The travel time distributions on all links covered by detector and IPASS data have been created and stored in the same database, from which the link-based reliability information will be derived. (Task 1)

We have also started to develop the graphical user interface to visualize the link-based reliability information. (Task 2).

10/1/2010 - 12/31/2010

We have made significant progress in the development of the graphical user interface. A prototype software tool named TRIC (it stands for Travel Reliability Inventor for Chicago), developed using MFC, has been created. The test and refinement of this tool will continue in the next quarter.

We also extracted a strategic sub-network from the original CMAP network which is predominantly comprised of freeways and toll roads for which loop detector and IPASS data are available. We have also begun to examine various methods to organize the reliability information for different O-D pairs in this strategic sub-network. We expect to finalize the methods and begin to archive travel reliability data in the next quarter.

Last Updated: 1/20/2011



<b>Project Title:</b> An Expert Systems Approach to Highway Construction Scheduling			<b>Last Edited:</b> 1/10/2011					
			<b>Function Code:</b> R27-86					
			<b>Project Number:</b> R27-86					
<b>QPR Author Name:</b> Dianne Slattery			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 417-836-5292	<b>% Project Completed:</b> 50				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Meet with TRP			7/1/2011	6/30/2011	I	I	-	-
<b>Task 2:</b> Interview Key Subject Matter Experts			7/1/2010	1/31/2011	I	I	-	-
<b>Task 3:</b> Analyze Weather Data			8/1/2010	9/30/2010	I	C	-	-
<b>Task 4:</b> Develop Planning Software			8/1/2010	5/31/2011	I	I	-	-
<b>Task 5:</b> Develop Visualization Software			8/1/2010	5/31/2011	I	I	-	-
<b>Task 6:</b> Beta Test Software			4/1/2011	6/30/2011	-	-	-	-
<b>Task 7:</b> Final Report			5/1/2011	6/30/2011	-	-	-	-
<b>Principal Investigator:</b>								
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<b>Description of Research:</b>								
<b>Keywords:</b> highway scheduling, construction planning, weather delays, decision tool								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>		
7/1/2010 / Yes		
<p><b>End User(s) and Result(s) Expected:</b></p> <p>The development of a software tool to assist highway designers in the preparation of project schedules will help preserve the institutional knowledge held by veteran IDOT resident engineers and infuse new knowledge currently held by construction professionals. The tool will assist IDOT in selecting the most probable duration of a project, and a better understanding of the critical decision points that impact project completion. A weather risk visualization tool will</p>		
<p><b>Progress to Date:</b></p> <p>During the quarter beginning October 1, we have completed analysis of rainfall and temperature data statewide, conducted interviews with 6 contractors and 1 consultant, and scheduled additional interviews with IDOT resident engineers. We have begun searching the ICORS databases of completed projects as a potential source of data to update productivity rates on common controlling items for a variety of project types. Software development continued and is evolving into an interactive scheduling tool that will integrate the drawings, specifications, and dialogue to lead designers through the scheduling process.</p>		

Last Updated: 1/10/2011  
 Approved By TRP Chair: 11/15/2010



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Implementing Pavement Management Systems for Local Agencies			<b>Last Edited:</b> 1/11/2011					
			<b>Function Code:</b> R27-87					
			<b>Project Number:</b> R27-87					
<b>QPR Author Name:</b> Angela Wolters			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-398-3977	<b>% Project Completed:</b> 50				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Project Kick-off Meeting			5/15/2010	5/31/2010	C	-	-	-
<b>Task 2:</b> Literature Review			6/1/2010	9/30/2010	I	C	-	-
<b>Task 3:</b> Select Agencies			7/1/2010	9/1/2010	I	C	-	-
<b>Task 4:</b> Interviews With Agencies			10/1/2010	1/31/2011	I	C	-	-
<b>Task 5:</b> Interviews with IDOT			11/1/2010	1/31/2011	I	I	-	-
<b>Task 6:</b> Mid-Project Meeting			2/1/2011	2/27/2011	-	-	-	-
<b>Task 7:</b> Synthesis and Implementation Guide			2/1/2011	10/31/2011	-	-	-	-
<b>Task 8:</b> Close-out Meeting			9/1/2011	9/30/2010	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Angela Wolters			<b>Organization / Address</b>					
<b>Telephone:</b> 217-398-3977			APTech					
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<b>Description of Research:</b>								
<p>During this project, the research team is conducting a literature review to identify innovative approaches being taken to pavement management, with an emphasis on local agency implementations. The team is contacting several pavement management software vendors to obtain detailed information about their software to support the development of the guidelines. An online survey is being developed and distributed to municipal and county engineers around the state; the responses to these surveys are being used to identify which agencies will be highlighted as case study examples. APTech will also be conducting interviews with selected local agencies and IDOT staff to gain information for the development of the guidelines. Finally a synthesis of pavement management practice will be developed. The synthesis will provide an overview of the various processes selected agencies underwent in implementing their respective systems.</p>								
<b>Keywords:</b> pavement management, local agency								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>
5/20/2010 / Yes
9/2/2010 / Yes

**End User(s) and Result(s) Expected:**

The research team anticipates that the research results will provide a document that will guide local agencies in two areas: 1) selecting a pavement management system that is suitable for their requirements, and 2) successfully implementing that pavement management system so that its full benefits can be realized. The document will feature illustrative case study examples of in-state local agencies that have successfully implemented pavement management systems and overcome various obstacles. In short, the results of this research will provide the information necessary for agencies to select the right type of system to match their needs and to successfully implement it at the local level.

**Progress to Date:**

Seven agencies were selected as case studies and interviews with those agencies occurred in October and November. An interview was also held with State representatives to discuss the information IDOT has available to share with the local agencies.

The literature search summary and draft summaries of the project meetings were completed by Bradley University. Details from each will be included in the implementation guide.

A mid-project meeting will be held in February to discuss the project progress.

Last Updated: 1/11/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Bridge Decks: Mitigation of Cracking & Increased Durability		<b>Last Edited:</b> 1/20/2011					
		<b>Function Code:</b> R27-88					
		<b>Project Number:</b> R27-88					
<b>QPR Author Name:</b> Paramita Mondal		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-3069	<b>% Project Completed:</b> 11			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Stage 1: Literature review; In-depth study, experimental tests on shrinkage of concrete mixes		5/15/2010	6/15/2012	I	I	-	-
<b>Task 2:</b> Stage 2: Structural testing and modeling to assess influence of structural characteristics		1/16/2011	12/15/2012	-	-	-	-
<b>Task 3:</b> Stage 3: Develop design and construction recommendations		7/16/2011	5/15/2013	-	-	-	-
<b>Task 4:</b> Report and paper writing		5/16/2011	5/15/2013	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Paramita Mondal		<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-3069		UIUC-CEE					
<b>Email:</b> pmondal@illinois.edu		2114 Newmark Civil Engineering Laboratory 205 N. Mathews Ave. Urbana IL 61801-2352					
<b>Co-Investigator:</b>							
<b>Name:</b> Douglas Foutch		<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-6359		UIUC - CEE					
<b>Email:</b> dfoutch@illinois.edu							
<b>Co-Investigator:</b>							
<b>Name:</b> Riyadh Hindi		<b>Organization / Address</b>					
<b>Telephone:</b> 314-977-8547		Saint Louis University					
<b>Email:</b> rhindi@slu.edu							
<b>Description of Research:</b>							
<p>The first stage will focus on HPC mix designs and measurement of shrinkage. Effects of cement type (type K, type G), SRAs and fly ash will be evaluated. Silica fume will be considered to confirm its negative impact. Fibers will be considered if time permits. The second stage will focus on exploring influence of superstructure on deck cracking. A laboratory model will be built to study the restraint and shrinkage. A FEM model will be developed and validated using the experimental results, and parametric study will be carried out. The third stage will aim to develop design and construction recommendations.</p>							
<b>Keywords:</b> bridge, cracking, durability, mitigation							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>		
5/25/2010 / Yes		
8/31/2010 / Yes		
12/2/2010 / Yes		
<b>End User(s) and Result(s) Expected:</b>		
<p>The result of this research is that IDOT and the State of Illinois should see bridge decks that are less likely to crack prematurely and thus that are more durable. Decks that are more durable require less frequent replacement and also help the supporting main beams to last longer. The savings to the taxpayers of Illinois could be quite significant over a long period of time.</p>		
<b>Progress to Date:</b>		
<p>A thorough literature review is being conducted and is being summarized as deliverable # 2 to study the approaches adapted by DOTs of nearby states (where weather and locally available raw materials are similar) to mitigate the deck cracking issue. The research team performed initial mortar bar shrinkage test using 8 different cements supplied by IDOT. However, river sand was used for this first set of testing. After discussion with IDOT, it was decided to repeat the test for 12 cements using Ottawa sand and following ASTM 596. The exact testing protocol is developed through discussion with TRP and also through suggestions made by the IDOT staff while visiting UIUC lab. The mortar bars specimen preparation is complete and now stored in control environment. Measurements are taken at regular intervals. Two different sets of specimen are made, one with different water to cement ratio but same flow as required by the code, the other with constant water to cement ratio. The test is expected to be done by mid November</p> <p>Thorough literature review on effects of mix design and concrete constituents on shrinkage and cracking of concrete was done and submitted to the TRP as deliverable 2. A plan for next phase of materials testing (no of specimens, variables for parametric study) was decided through discussion with TRP and presented in deliverable 2. Mortar bar test following ASTM C596 was finished using 12 different cements and through discussion with TRP, it was decided to use continental cement for future experiments. Test setup and special mold was developed for measuring length change of concrete with expansive cements. Initial mix design for shrinkage test of concrete following ASTM C157 with or without SRA has been developed. A letter to SRA companies asking to supply admixtures and dosage has been prepared. UIUC procured sand and aggregates, which will be used throughout this project. Samples of both were send to IDOT for testing and testing data has been received from IDOT. UIUC is in the process of starting trial mixing to finalize the mix design with currently available admixtures in the lab while waiting to receive the actual supply from the companies.</p>		

Last Updated: 1/20/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Illinois Highway Safety Manual Workshop		<b>Last Edited:</b> 2/16/2011						
		<b>Function Code:</b> R27-89						
		<b>Project Number:</b> R27-89						
<b>QPR Author Name:</b> Yanfeng Ouyang		<b>Estimated Dates</b>			<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-9858	<b>% Project Completed:</b> 90				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>	
<b>Task 1:</b> Pre-conference Phase		8/16/2010	11/15/2010	I	C	-	-	
<b>Task 2:</b> Conference Phase		11/1/2010	11/20/2010	-	C	-	-	
<b>Task 3:</b> Post-conference Phase		11/21/2010	3/15/2011	-	I	-	-	
<b>Principal Investigator:</b>								
<b>Name:</b> Yanfeng Ouyang		<b>Organization / Address</b>						
<b>Telephone:</b> 217-333-9858		UIUC-CEE						
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<b>Co-Investigator:</b>								
<b>Name:</b> Santanu Chakraborty		<b>Organization / Address</b>						
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<b>Description of Research:</b>								
<p>The proposed Illinois HSM Lead State Peer to Peer Workshop will be held in Schaumburg, IL at the IDOT District 1 office. The tasks include the following: (1) identify 10 to 13 state highway agencies that are taking a lead role in implementing the HSM and are willing to share their experiences with other states; (2) convene an initial peer-exchange meeting involving 10 IDOT Central Office representatives, 3 representatives from each of the IDOT districts and selected states and other experts familiar with HSM development and implementation; and (3) identify best practices and challenges to implementation and prepare a final report documenting the findings.</p> <p>The University of Illinois at Urbana-Champaign (UIUC) will coordinate and assist in facilitating this HSM Workshop. UIUC will be responsible for establishing and maintaining a web site for the Workshop, coordinating transportation and lodging, and payment of all conference related expenses (unless defined in this proposal letter). UIUC will also be responsible for preparation of the proceedings, video-taping and voice recording of the entire workshop, supporting the IT and other presentation needs, and preparing the final report after the event. IDOT's Bureau of Safety Engineering will oversee the Workshop and assist with the meeting arrangements.</p>								
<b>Keywords:</b> Highway Safety Manual (HSM); Peer exchange; Lead state								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
<b>End User(s) and Result(s) Expected:</b>								
<p>This project will advance the effort by IDOT and other state DOTs required to implement the HSM, at both the central office and the local districts. FHWA are developing implementation plans and the IL workshop will support the national effort. Our project will allow IDOT to have direct input into FHWA's efforts.</p> <p>The recommended research is urgent and has a high payoff potential. The recommended research will help to ensure that highway agencies reap the benefits from effective implementation of the HSM. These benefits potentially include a more effective safety management process and consideration of safety as a quantitative factor in project development decision making. The lead states initiative will be of direct benefit to the states that participate. The development of an HSM user guide, which could also be published and distributed AASHTO, will make the experiences</p>								

of the lead states available to all highway agencies and the highway safety community at large.

**Progress to Date:**

The HSM Lead State Peer to Peer Workshop was successfully held on Nov 17-18, 2010. A total of over one hundred participants attended the event, representing 13 lead states and the private sector. As of January 4, 2011, a draft of the final report was prepared and is currently under review and revision. We anticipate completing the project in time by March 15, 2011.

Last Updated: 2/16/2011



<b>Project Title:</b> Investigation of Contributing Factors of Wrong-Way Driving on Freeways			<b>Last Edited:</b> 1/27/2011				
			<b>Function Code:</b> R27-90				
			<b>Project Number:</b> R27-90				
<b>QPR Author Name:</b> Huaguo Zhou		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 618-650-2815	<b>% Project Completed:</b> 25			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Task 1 Kick-off meeting and literature review		7/1/2010	12/31/2010	I	C	-	-
<b>Task 2:</b> Data Collection		8/1/2010	3/31/2011	I	I	-	-
<b>Task 3:</b> Data Analysis		1/3/2011	6/30/2011	-	-	-	-
<b>Task 4:</b> Identify the contributing factors		5/1/2011	9/30/2011	-	-	-	-
<b>Task 5:</b> Development of potential countermeasures		8/1/2011	12/30/2011	-	-	-	-
<b>Task 6:</b> Field Review, final report and presentation		1/1/2012	6/30/2012	-	-	-	-
<b>Principal Investigator:</b> <b>Name:</b> Huaguo Zhou <b>Telephone:</b> 618-650-2815 <b>Email:</b> hzhou@siue.edu <b>Organization / Address:</b> SIUE Southern Illinois University-Edwardsville Department of Civil Engineering Engineering Campus Box 1800 Building Room 2056 Edwardsville, IL 62026-1800							
<b>Co-Investigator:</b> <b>Name:</b> Ryan Fries <b>Telephone:</b> 618-650-5026 <b>Email:</b> rfries@siue.edu <b>Organization / Address:</b> SIUE							
<b>Co-Investigator:</b> <b>Name:</b> Brent Vaughn <b>Telephone:</b> 618-650-3533 <b>Email:</b> bvaughn@siue.edu <b>Organization / Address:</b> SIUE							
<b>Description of Research:</b> A brief review of data from the IDOT Safety Datamart reveals that there were 40 fatal and A-injury crashes related to the wrong-way driving errors on freeways for the most recent five years of reporting (2004 through 2008 inclusive). To reduce wrong-way driving related crashes, this research project includes six main tasks: literature review, data collection, data analysis, identifying contributing factors, developing countermeasures, and identifying at-risk locations.							
<b>Keywords:</b> Traffic Safety, Freeways, Wrong-Way Driving							
<b>Technical Review Panel:</b>							
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Meeting Dates / Minutes Available?
7/20/2010 / Yes
9/10/2010 / Yes
1/7/2011 / Yes

**End User(s) and Result(s) Expected:**

The research results will answer three basic questions: (1) What is the state of practices on safety, design, and operational issues related to wrong-way driving on freeways? (2) What is the wrong-way crash history, pattern, and severity in Illinois? And (3) What are the significant contributing factors affecting severe and less severe wrong-way crashes?

**Progress to Date:**

During the second quarter of the project, the SIUE research team worked on the tasks 1-3.

1. SIUE research team had completed literature review and developed an information CD, including a list of literature related to the research area. A technical presentation on literature review will be given at the second quarterly meeting on January 7, 2011.
2. Five year crash data were collected from IDOT. The wrong-way driving incident data were collected from ISP.
3. The web-based survey was developed.
4. A preliminary statistical analysis was conducted based on the crash data collected.

Last Updated: 1/27/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Evaluating of Traffic Flow Monitoring Technologies: Cicero-Midway Smart Corridor Case Study		<b>Last Edited:</b> 1/31/2011					
		<b>Function Code:</b> R27-91					
		<b>Project Number:</b> R27-91					
<b>QPR Author Name:</b> Jakob Eriksson		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 312-996-0481	<b>% Project Completed:</b> 90			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Identify data sources, experimental design		1/1/2010	12/31/2010	I	C	-	-
<b>Task 2:</b> Set up and test data-collection		4/1/2010	12/31/2010	I	C	-	-
<b>Task 3:</b> Data collection		7/1/2010	12/31/2010	I	C	-	-
<b>Task 4:</b> Data analysis, final report		10/1/2010	12/31/2010	-	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Jakob Eriksson		<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-0481		UIC University of Illinois at Chicago Dept. Computer Science Room 1120 SEO (M/C 152) Chicago, IL 60607					
<b>Email:</b> jakob@uic.edu							
<b>Description of Research:</b>							
Collection of probe-vehicle and sensor data in the region of interest, cleaning and map-matching of said data. Evaluation of accuracy of multiple technologies either through direct comparison with ground truth (probe vehicles) when data is available, or through simulation where direct measurement data is unavailable.							
<b>Keywords:</b> traffic flow, Cicero-Midway, corridor, arterial streets							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Jeff Gallas (Chair)		708-524-2145		jeff.galas@illinois.gov			
Abraham Emmanuel				Abraham Emmanuel			
David Zavattono				David Zavattono			
<b>Meeting Dates / Minutes Available?</b>							
2/10/2010 / No							
4/29/2010 / No							
5/4/2010 / No							
5/14/2010 / No							
<b>End User(s) and Result(s) Expected:</b>							
Accurate, real-time traffic flow and travel time information can be an important factor to support active management and operations on the arterial and expressway facilities serving traffic between and along the Cicero-Midway Smart Corridor and the I-55 corridor. Active management strategies based on the real-time performance of the integrated corridor will include traffic signal operations, VMS messaging, ramp metering, incident management and response. These strategies will improve corridor performance, improve air quality, reduce fuel consumption, and enhance traveller service and comfort.							
<b>Progress to Date:</b>							
In the spring, everything seemed to be on track, though it became clear that we would not be able to directly collect data from all the sensors							

discussed in the proposal. It also turned out that none of the available sensors were placed in the same stretch of road, which would make comparison difficult. In meetings with a local airport shuttle service, offers were made of providing the ground-truth GPS traces that the project could not do without. As spring turned into summer, we (I, as well as David and Emmanuel), were told that the GPS traces were delayed due to technical difficulties at the company. During summer, my students and I developed in-house solutions for collecting and analyzing GPS and sensor data, awaiting the GPS traces. We also attempted to use city vehicle GPS data, but this did not pan out.

Eventually, October arrived, and it became increasingly clear that we would not receive the ground-truth data. Without knowing the ground truth, one cannot determine which sensor estimate is the most accurate, and hence a comparative evaluation is not possible. While we could collect several traces by driving ourselves, this small number of traces is sufficient to produce anything statistically significant - an accurate comparison should be based on hundreds or thousands of traces distributed across many days, and all hours of the day that are of interest. Mounting such an extensive driving campaign was outside the scope of the project.

Fortunately, as most of the technologies up for evaluation were not available to us, we had endeavored to re-create several of them in my lab, to deploy in the field, or simulate based on GPS traces as appropriate. As part of this multifaceted effort, my students and I created a device which estimates traffic flow based on WiFi signals from passing cars. To our knowledge, this has not been demonstrated before.

We deployed 6 of these WiFi monitoring devices along Cicero for a few hours in December, and the results were overwhelmingly positive: in 90 minutes (just before noon) our devices observed between 300 and 400 vehicles, each transmitting a unique WiFi signal. What's more, each prototype device cost only \$70, and would (in a long-term deployment), not require their own backhaul link, further reducing cost (see the proposal). This is a very promising development, which I intend to pursue vigorously, possibly even with an eye toward possible commercialization "down the road".

Many of our other efforts seem to have been in vain, due to circumstances out of our control (lack of data). However, we were able to re-use much of the work put into data trace analysis in another project which has greatly benefited the UIC community. The UIC Shuttle Tracker (available at <http://bus.uic.edu>), was developed from scratch by my group. It provides the real-time location of our shuttle buses, as well as the "route" of each bus (this is automatically determined), and the estimated arrival times at each bus stop. This project was partially supported by the National Science Foundation, and UIC Facilities. However, much of the technology developed for data collection, cleaning, analysis and extrapolation under the auspices of the ICT project, could be retrofitted to serve the shuttle tracker project, which has been a great success on campus.

To summarize, the project resulted in two great unexpected outcomes: greatly facilitated the UIC shuttle tracker, and produced an initial design for a WiFi based traffic flow monitoring system. Unfortunately, it also failed to meet some goals set out in the proposal, though this was due to external factors (data unavailability) out of our control.

We have applied for a new project to further refine and develop the WiFi traffic flow collection system into a production-worthy design. This project will result in a permanent deployment on Cicero, to complement the existing bus tracker-based system. Assuming it produces good results, it will also result in a low-cost reusable traffic flow monitoring system which can be deployed at large scale in and around Chicago and other cities.

Finally, to wrap up the current project, we plan to perform a comparison of the following existing data sources on Cicero avenue: the bus tracker-based system by OEMC, a temporary WiFi collection deployment, probe-vehicle based data provided by TomTom, and probe-vehicle based data provided by Inrix. The final report will include this comparison, and a description of the WiFi system in its current state.

Last Updated: 1/31/2011



<b>Project Title:</b> Transportation Conformity Particulate Matter Hot-Spot Air Quality Modeling		<b>Last Edited:</b> 2/16/2011					
		<b>Function Code:</b> R27-93					
		<b>Project Number:</b> R27-93					
<b>QPR Author Name:</b> Jane Lin		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 312-996-3068	<b>% Project Completed:</b> 15			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Generate "Illinois specific" PM2.5 and PM10 emission factors using MOVES2010		11/1/2010	2/28/2011	-	I	-	-
<b>Task 2:</b> Perform quantitative PM2.5 and PM10 hot-spot analyses in Nonattainment and Maintenance Areas		3/1/2011	6/30/2011	-	-	-	-
<b>Task 3:</b> Assist in developing, defending and securing approval of Illinois-specific thresholds		11/1/2010	9/30/2011	-	I	-	-
<b>Task 4:</b> Develop a graphical user interface computer program for PM hot-spot modeling and analyses		6/1/2011	9/30/2011	-	-	-	-
<b>Task 5:</b> Produce a final ICT project report		9/1/2011	11/30/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Jane Lin		<b>Organization / Address</b>					
<b>Telephone:</b> 312-996-3068		UIC					
<b>Email:</b> janelin@uic.edu		2095 ERF MC 246 842 W. Taylor Chicago IL 60607-7023					
<b>Description of Research:</b>							
<p>n light of the new development in PM hot-spot regulations and IDOT's NEPA documentation requirements, this research project will (1) quantify motor vehicle-generated PM2.5 and PM10 in Illinois' nonattainment and maintenance areas (located in IDOT Districts 1, 3 and 8), (2) develop "Illinois" specific thresholds for these areas, and (3) secure USDOT and USEPA approval for IDOT to use these thresholds to determine if a project is a project of air quality concern. This information will be documented in IDOT NEPA documents or Project Reports.</p>							
<b>Keywords:</b> PM hot-spot, quantitative analyses, project of air quality concern, Illinois specific thresholds, MOVES, dispersion models,							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
11/3/2010 / Yes							
12/8/2010 / Yes							
1/14/2011 / Yes							
2/10/2011 / No							

**End User(s) and Result(s) Expected:**

Provide IDOT staff, a set of traffic related threshold values approved by interagency consultation groups and a GUI tool to automate the work.

**Progress to Date:**

The project started on Nov 1, 2010 and the kick-off meeting was held on Nov 3, 2010 through a conference call. Participants included the TRP members, the PI Jane Lin and an assigned note taker from IDOT. At that meeting, Walt first gave an overview and the intended deliveries of the project. Jane then explained step-by-step the research approach. Various research questions were discussed during the meeting. At the end of the meeting, it was also decided a monthly conference call/project meeting would be held.

On November 18, 2010 Walt and Jane briefed on the project, the objectives and approach, at the Chicago Metropolitan Agency for Planning; Representatives from both FHWA and EPA were present. TRP members Matt Fuller and Mike Rogers were also at the meeting.

On December 1 (and a follow-up one on December 8), 2010 the second project meeting/conference call was held. At those meetings, a number of items were discussed in length, including (1) the preliminary design of emission factor lookup tables (or database), (2) background concentrations and annual 24-hour particulate matter (PM) hotspot analyses, (3) thresholds and criteria for determining what projects are of air quality concern, and (4) comparisons between MOBILE6.2 and MOVES. It was concluded at the meeting that the panel would revisit the issue of background concentrations at a later time because it required input from Illinois EPA and better understanding from the EPA's PM hotspot guidance.

By the end of December, the research team has started Task 1, i.e., Generate "Illinois specific" PM2.5 and PM10 emission factors using MOVES2010. It's estimated a total of 2000 model runs. Some preliminary results have been generated. It's expected the complete emission factor lookup table will be created by end of February 2011.

Last Updated: 2/16/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Field Evaluation of Smart Sensor Vehicle Detectors at Intersections & RR Crossings		<b>Last Edited:</b> 2/7/2011					
		<b>Function Code:</b> R27-95					
		<b>Project Number:</b> R27-95					
<b>QPR Author Name:</b> Ray Benekohal		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-244-6288	<b>% Project Completed:</b> 10			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature review		9/15/2010	2/15/2011	I	I	-	-
<b>Task 2:</b> Testing criteria and methods		11/15/2010	5/15/2010	I	I	-	-
<b>Task 3:</b> Obtain the equipment		1/15/2011	6/15/2011	I	I	-	-
<b>Task 4:</b> Install the detectors and prepare them for testing		3/15/2011	10/15/2011	I	I	-	-
<b>Task 5:</b> Data collect and analysis		5/15/2011	7/15/2012	-	-	-	-
<b>Task 6:</b> Report project findings		3/15/2012	8/15/2012	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Ray Benekohal		<b>Organization / Address</b>					
<b>Telephone:</b> 217-244-6288		UIUC-CEE					
<b>Email:</b> rbenekoh@illinois.edu		Civil & Environmental Eng Civil & Environmental Eng Civil Engineering 1213 Newmark Lab 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Description of Research:</b>							
The detection performance of two smart sensors (Wavetronix and one other company) will be studied to determine the potential errors on such measure of effectiveness as missed calls, false calls, stuck on calls and dropped calls. The potential errors will then be verified by human observers. The sensors will be installed at an existing test bed in Rantoul that has been used for evaluation of other sensors. The RR site is in Chicago area.							
<b>Keywords:</b> smart vehicle sensors, intersection detectors, microwave vehicle sensors, signalized intersections							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
9/14/2010 / Yes							
11/4/201 / Yes							
<b>End User(s) and Result(s) Expected:</b>							
It would provide an evaluation of the smart vehicle sensors at RR crossing and regular intersections. IDOT and ICC staff can utilize the knowlwdge to decide the sensor utilization. A more accurate and reliable detection system can reduce train-vehicle crashes at railroad crossings, and would improve traffic signal operation at intersections.							

**Progress to Date:**

Arrangements were made with Wavetronix company representative/distributor to make a presentation on the sensors capability. Field testing site was visited and installation requirements were determined. Literature review is being conducted to determine the second technology to be tested. A smart vehicle sensor company MS SEDCO was invited to make presentation on their system capabilities. That was selected as the second that will provide detection device for evaluation. Request for additional funds to purchase the Wavetronix device is made to IDOT.

Last Updated: 2/7/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Evaluation of Flashing Yellow Arrows (FYA) for Protected/Permissive Left Turn (PPLT) Control			<b>Last Edited:</b> 1/26/2011					
			<b>Function Code:</b> R27-97					
			<b>Project Number:</b> R27-97					
<b>QPR Author Name:</b> Kerrie Schattler			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 309-677-2779	<b>% Project Completed:</b> 8				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Project Kick-off Meeting			11/1/2010	11/30/2010	I	C	-	-
<b>Task 2:</b> Literature Review			12/1/2010	5/30/2011	I	I	-	-
<b>Task 3:</b> Conduct a Survey of Driver Understanding of FYA			11/1/2010	3/30/2012	I	I	-	-
<b>Task 4:</b> Identify Candidate Control Sites and Finalize Experimental Plans			12/1/2010	3/30/2011	I	I	-	-
<b>Task 5:</b> Collect and Analyze Operational Data			4/1/2011	8/30/2012	-	-	-	-
<b>Task 6:</b> Collect and Analyze Traffic Crash Data			2/1/2011	8/30/2012	-	-	-	-
<b>Task 7:</b> Quarterly and Mid-Project Meeting			11/1/2010	10/30/2012	I	I	-	-
<b>Task 8:</b> Conduct Statistical Analyses			9/1/2011	8/30/2012	-	-	-	-
<b>Task 9:</b> Prepare a Final Report			7/1/2012	11/30/2012	-	-	-	-
<b>Task 10:</b> Final Project Meeting			10/1/2012	10/30/2012	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Kerrie Schattler			<b>Organization / Address</b>					
<b>Telephone:</b> 309-677-2779			Bradley University Department of Civil Engineering and Construction 1501 West Bradley Ave. Peoria, IL 61625					
<b>Email:</b> kschantler@bradley.edu								
<b>Description of Research:</b>								
<p>This research seeks to quantify the safety and operational benefits from upgrading the left turn signal control for the permissive state from solid circular green indication to a flashing yellow arrow indication at intersections in the Peoria area. The safety and operational benefits will be assessed using a before-and-after study of traffic crashes, injuries, and traffic conflicts. Differences in the safety and operational measures will be tested for significance using appropriate inferential statistics. As a part of this research a literature review and a driver comprehension survey will also be conducted. The results and findings will be documented in a final report.</p>								
<b>Keywords:</b> Flashing Yellow Arrows, intersection safety, left turn control, permissive phase								
<b>Technical Review Panel:</b>								
<b>Members</b>			<b>Telephone</b>			<b>Email Address</b>		
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Meeting Dates / Minutes Available?
11/3/2010 / Yes
<b>End User(s) and Result(s) Expected:</b>
The results of this study, if proven effective in reducing traffic crashes and injuries, will be extremely helpful to IDOT in terms of improving intersection safety and promoting the use of FYA for PPLT control as policy. These efforts may assist in the adoption of FYA as an area-wide policy throughout the state thereby improving intersection safety for Illinois motorists.
<b>Progress to Date:</b>
<p><b>Task 1. Project Kick-off Meeting</b> The project kick-off meeting was held on Wednesday, November 3, 2010 at the IDOT offices in Peoria. Topics discussed included:</p> <ul style="list-style-type: none"> <li>• Implementation plan</li> <li>• Proposed work plan</li> <li>• Project deliverables</li> <li>• Time schedule</li> <li>• Budget</li> <li>• Feedback on scope of work</li> <li>• Data needs such as traffic crash data, traffic volume data, signal timing plans, etc.</li> </ul> <p>The kick-off meeting was attended by Mr. Randy Laninga, TRP chair, members of the TRP, Bradley University graduate research assistants and Dr. Kerrie Schattler, PI of project. The proposed work plan and budget was approved by the TRP. Minutes of the meeting were recorded.</p> <p><b>Task 2. Literature Review</b> Internet queries have been conducted using the Transportation Research Board (TRB) and TRIS search engines to obtain relevant journal papers pertaining to permissive left turn signal control. The research team is currently in the process of assembling an exhaustive bibliography and list of references. Many journal papers have been obtained and are being reviewed and summarized by the research team.</p> <p><b>Task 3. Survey of Driver Understanding of FYA</b> The draft questionnaire survey for assessment of driver understanding of flashing yellow arrow permissive left turn indication has been prepared and was sent to Mr. Laninga on 12/28/2010 for distribution to the TRP for review and comment.</p> <p>The survey was developed using Survey Monkey. A sample copy of the survey is viewable at <a href="http://www.surveymonkey.com/s/J6DKZG2">www.surveymonkey.com/s/J6DKZG2</a>. The survey will be distributed via email using available distribution lists once it is finalized and approved by the TRP.</p> <p><b>Task 4. Identify Candidate Control Sites and Finalize Experimental Plans</b> The characteristics of all 105 test intersections have been investigated and documented. A comprehensive database has been created to provide details of the geometric features, traffic volumes (ADT), laneage, signal configuration, and other notable features of all test intersections in the Peoria area. Draft hand sketches of the intersections were produced as well. The research team is currently in the process of categorizing the test intersections into groups based on common features and characteristics.</p> <p>Intersection locations in the Bloomington/Normal area are currently being investigated for use as control sites in the experimental plan for this research. The criteria for their selection and inclusion in the study is that the control intersections be as similar to the respective test intersection(s) as possible, with the exception of the treatment or flashing yellow arrows (i.e they will operate with circular green indications for the permissive state of the left turn control). The research team is currently in the process of creating a database of intersections locations in Bloomington/Normal for use as candidate control sites.</p> <p><b>Task 5. Collect and Analyze Operational and Traffic Conflict Data</b> Operational data for the "before" period was collected prior to the project start date. Data was collected at a sample of 20 approaches during the AM, Midday, or PM peak period totaling over 80 hours of data (with four hours of video data per approach). Data was captured on video and was manually collected in the field. Approaches were selected based on availability of a safe and clear vantage point for the camera and left turn volumes.</p> <p><b>Task 6. Collect and Analyze Traffic Crash Data</b> The research team is currently coordinating with IDOT to gain access to the traffic crash data and reports.</p>








Last Updated: 1/26/2011

Approved By TRP Chair: 1/31/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Evaluation of Concrete Cylinder Match Curing & Evaluation of 4" X 8" Cylinders		<b>Last Edited:</b> 2/9/2011					
		<b>Function Code:</b> R27-98					
		<b>Project Number:</b> R27-98					
<b>QPR Author Name:</b> John Popovics		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-244-0843	<b>% Project Completed:</b> 18			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Review of Literature and Visit to Precast Production Facilities to Assess Current State of Practice		9/1/2010	11/30/2010	I	C	-	-
<b>Task 2:</b> Meeting with the TRP Members to Finalize Remaining Work Plan		11/1/2010	12/31/2010	I	C	-	-
<b>Task 3:</b> Purchase, assembly and verification of match curing technology and establishment of concrete composition and sample curing condition		1/1/2011	3/31/2011	-	-	-	-
<b>Task 4:</b> Effect and influence of match cure system temperature control precision on results		4/1/2011	7/31/2011	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> John Popovics		<b>Organization / Address</b>					
<b>Telephone:</b> 217-244-0843		UIUC-CEE Civil & Environmental Eng Civil & Environmental Eng Civil & Envir Eng 2129d Newmark Lab 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Email:</b> johnpop@illinois.edu							
<b>Description of Research:</b>							
This research will help determine which match curing technology is most effective for the pre-stress industry and the Department, and if approval to use 4-inch x 8-inch cylinders should be given.							
<b>Keywords:</b> match cure, air chamber, water bath, insulated cyinder molds							
<b>Technical Review Panel:</b>							
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<b>Meeting Dates / Minutes Available?</b>							
11/9/2010 / Yes							
<b>End User(s) and Result(s) Expected:</b>							

The overall anticipated outcome of this research effort is more accurate determination of strength at various ages for precast pre-stressed products, and in a timely manner to reduce production costs.

The following specific outcomes are expected: to determine which match cure technology best represents the properties on in-place concrete; to determine if compressive strength obtained from cylinder and chamber match curing processes are statistically equivalent; to determine if strengths obtained from 4 x 8-inch cylinders are statistically equivalent to those obtained by 6 x 12-inch cylinders, and if not equivalent to determine if a reliable correlation between the two can be established.

**Progress to Date:**

Tasks 1 and 2 have been completed.

Last Updated: 2/9/2011



<b>Project Title:</b> Best Practices for Implementation of Tack Coat TRP Recommendations			<b>Last Edited:</b> 1/10/2011					
			<b>Function Code:</b> R27-100					
			<b>Project Number:</b> R27-100					
<b>QPR Author Name:</b> Imad Al-Qadi			<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-893-0705 x222	<b>% Project Completed:</b> 15				<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>			<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Literature Review			9/16/2010	1/31/2011	I	I	-	-
<b>Task 2:</b> Laboratory Testing			11/1/2010	10/31/2011	I	I	-	-
<b>Task 3:</b> Equipment Identification/Modification			11/1/2010	4/30/2012	I	I	-	-
<b>Task 4:</b> Field Study			5/1/2011	1/31/2013	-	-	-	-
<b>Task 5:</b> Guideline Development			5/1/2012	1/31/2013	-	-	-	-
<b>Principal Investigator:</b>								
<b>Name:</b> Imad Al-Qadi				<b>Organization / Address</b>				
<b>Telephone:</b> 217-893-0705 x222				ICT - UIUC CEE				
<b>Email:</b> alqadi@illinois.edu				1611 Titan Drive Rantoul, IL 61866				
<b>Description of Research:</b>								
<p>The project includes laboratory tests on HMA-HMA specimens, as well as field validation. The optimum tack coat application rates, which maximize the shear strengths of HMA-HMA interfaces will be determined. Testing specimens will be prepared using various HMA (surface mix and binder mix) and various tack coat materials (including straight asphalt, rapid-set emulsion, and a trackless tack coat). The effect of the surface texture of the underlying HMA (milled and original) will also be evaluated. Using those findings, the appropriate field application equipment will be evaluated and modified if necessary and validated through field study that will consider the performance and cost effectiveness of tack coat application. The modification will consider attaching tack coat sprayers to the paver.</p>								
<b>Keywords:</b> Tack Coat, Interface bonding, HMA-HMA, paver, trackless tack coat, shear strength, bond strength.								
<b>Technical Review Panel:</b>								
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<b>Meeting Dates / Minutes Available?</b>								
8/30/2010 / Yes								
10/11/2010 / Yes								

**End User(s) and Result(s) Expected:**

The expected outcomes include tack coat material selection, optimum application rate for tack coat applied to various existing pavement surfaces in a HMA-HMA interface, pavement surface milling and verifying surface cleaning methods, tack coat application equipment and procedure, recommendation on equipment modification (paver) if necessary, and in-place tack coat application rate measurement.

**Progress to Date:**

## TASK 1 Literature Review:

The required information related to tack coat at HMA-HMA interface were collected. These information define a variety of tack coat materials, the procedure and equipment currently used to apply tack coat, and different laboratory testing methods to examine interface bonding. These information were processed and the Literature Review is being written and reviewed. This task is 90% complete, however the Literature Review will be updated whenever new information is found.

## TASK 2 Laboratory Testing:

The materials required for testing have been collected, aggregates, emulsion, asphalt and core samples. The asphalt mix preparation process will start this week.

## TASK 3 Equipment Identification/Modification

The identification and comparison of available pavers with attached tack coat sprayers are done, and the recommendations are being written and reviewed. The modifications will be discussed later.

## TASK 4 Field Study

This task hasn't been started yet.

## TASK 5 Guideline Development

This task hasn't been started yet.

Last Updated: 1/10/2011



<b>Project Title:</b> Profile Equipment Verification 2009 (Special Project)		<b>Last Edited:</b> 2/16/2011					
		<b>Function Code:</b> R27-SP13					
		<b>Project Number:</b> R27-SP13					
<b>QPR Author Name:</b> Imad L. Al-Qadi		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-893-0705 x 222	<b>% Project Completed:</b> 99.9			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> PEV Testing		4/1/2009	4/30/2009	-	-	-	-
<b>Task 2:</b> Data analysis		9/1/2009	12/31/2009	-	-	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Imad L. Al-Qadi				<b>Organization / Address</b>			
<b>Telephone:</b> 217-893-0705 x 222				UIUC-CEE			
<b>Email:</b> alqadi@illinois.edu				205 N. Mathews Ave. Urbana, IL 61801			
<b>Co-Investigator:</b>							
<b>Name:</b> Jim Meister				<b>Organization / Address</b>			
<b>Telephone:</b> 217-893-0705 x 232				ICT			
<b>Email:</b> jfmeiste@illinois.edu							
<b>Description of Research:</b>							
<p>IDOT Standard Specifications require each new pavement (PCC or HMA) be tested for profile ride quality acceptance using a California profilograph with a 0.20-inch blanking band. This method for measurement allows high frequency low amplitude roughness to go undetected during the testing; however, this roughness is still bothersome to the traveling public.</p> <p>This project would include conducting the 2009 PEV Program and performing a data analysis to evaluate the profile devices and their measurement capabilities.</p>							
<b>Keywords:</b> testing, profile, equipment							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
LaDonna Rowden (Chair)		217-782-7208		Ladonna.Rowden@illinois.gov			
<b>Meeting Dates / Minutes Available?</b>							
<b>End User(s) and Result(s) Expected:</b>							
Implementation of a program to guarantee the accuracy of pavement smoothness ratings for state of Illinois work.							
<b>Progress to Date:</b>							
<p>The TRP Chair has reviewed the draft final report and has identified what has been completed in the report and what hasn't. The PI is in the process of addressing those comments.</p> <p>The PI is making the final changes to the draft report.</p> <p>ICT is making final edits to the report.</p>							



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Snowplow Simulator Training Study (Special Project)		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-SP15					
		<b>Project Number:</b> R27-SP15					
<b>QPR Author Name:</b> Thomas O'Rourke, PhD, MPH		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-840-7036	<b>% Project Completed:</b> 100			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Simulator Training		10/1/2009	12/1/2009	C	-	-	-
<b>Task 2:</b> Develop questionnaires		1/1/2010	6/30/2010	C	-	-	-
<b>Task 3:</b> Final report		6/1/2010	9/30/2010	I	C	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Thomas O'Rourke, PhD, MPH				<b>Organization / Address</b>			
<b>Telephone:</b> 217-840-7036				UIUC Community Health			
<b>Email:</b> torourke@illinois.edu				129 Huff Hall, Mail Code 588 1206 S. Fourth St. Champaign, IL 61820			
<b>Description of Research:</b>							
This research would evaluate simulator training of IDOT snowplow operators to improve IDOT snow & ice removal operations. The research would focus on the effectiveness and cost efficiency of simulation training. The researcher would observe and evaluate the class training material and class.							
<b>Keywords:</b> Snowplow, simulator							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Dave Johnson (Chair)		217-782-2984		David.B.Johnson@illinois.gov			
<b>Meeting Dates / Minutes Available?</b>							
5/10/2010 / No							
<b>End User(s) and Result(s) Expected:</b>							
If practically effective and cost effective, the simulator training could enhance safety, reduce traffic accidents and property damage, and increase driver efficiency through decreased maintenance costs and a reduction in fuel consumption. The evaluation has the potential to provide significant cost savings to IDOT and the State of Illinois.							
<b>Progress to Date:</b>							
Simulator training questionnaires were sent out. The draft final report is being worked on to include project objectives and cost-benefit.							
The PI is making final edits to the report to include TRP Chair comments.							
The TRP approved the final report on 11/2 (subject to minor corrections). ICT is making final edits to the report.							
The final report is posted on the ICT website (publications page).							

Last Updated: 1/27/2011



<b>Project Title:</b> Evaluation of Horizontal Directional Drilling (HDD) (Special Project)		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-SP16					
		<b>Project Number:</b> R27-SP16					
<b>QPR Author Name:</b> Youssef Hashash		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-333-6986	<b>% Project Completed:</b> 95			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Observe field installation using HDD		7/16/2009	7/31/2009	C	-	-	-
<b>Task 2:</b> Data collection		7/16/2009	12/31/2009	C	-	-	-
<b>Task 3:</b> A report to IDOT on findings and recommendations		1/31/2010	8/31/2010	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Youssef Hashash		<b>Organization / Address</b>					
<b>Telephone:</b> 217-333-6986		UIUC-CEE					
<b>Email:</b> hashash@illinois.edu		2230c Newmark Lab 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Description of Research:</b>							
Paper research to develop general information, comparison study to Jack and Bore method, view a directional drill for a larger size pipe to get the feel of the process and evaluate for possible conflict of interest, and establish preparatory information to continue in Phase II.							
<b>Keywords:</b> HDD, horizontal, vertical, directional, drilling, Jack, Bore							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Terri Petersen (Chair)		217-342-8317		Theresa.Petersen@illinois.gov			
<b>Meeting Dates / Minutes Available?</b>							
<b>End User(s) and Result(s) Expected:</b>							
Consideration should be given to the overall safety, aesthetic quality, costs and difficulty of construction and maintenance of both the utility facility and the highway. Recommendations will be made on cost comparisons of directional drilling compared to Jack and Bore, horizontal and vertical location requirements and clearances, industry codes and other government regulations or provisions, preservation and restoration of highway facilities, appurtenances, natural features, vegetation and limitation on the utilities activities in right of way, protection of traffic during and after installation including Traffic control, Access control, open pits, material storage and vehicle parking, timing of projects, length of time to construct, direct and indirect environmental and economic effects including loss of productive agricultural land or impairment of that land, and liabilities associated with future relocations.							
<b>Progress to Date:</b>							
The TRP Chair is reviewing the draft final report. ICT is making final edits to the report.							

Last Updated: 1/27/2011



Research Quarterly Progress Report  
Ending DECEMBER 2010

<b>Project Title:</b> Warm Mix Asphalt Study (Special Project)		<b>Last Edited:</b> 1/27/2011					
		<b>Function Code:</b> R27-SP17					
		<b>Project Number:</b> R27-SP17					
<b>QPR Author Name:</b> Imad Al-Qadi		<b>Estimated Dates</b>		<b>Fiscal Year:</b> 2011			
<b>Telephone:</b> 217-893-0705 x 222	<b>% Project Completed:</b> 99			<b>JUL</b>	<b>OCT</b>	<b>JAN</b>	<b>APR</b>
<b>Task Title</b>		<b>Start</b>	<b>Complete</b>	<b>SEP</b>	<b>DEC</b>	<b>MAR</b>	<b>JUN</b>
<b>Task 1:</b> Laboratory test		7/16/2009	6/30/2010	C	-	-	-
<b>Task 2:</b> Priliminary report		9/1/2009	1/31/2010	C	-	-	-
<b>Task 3:</b> Final report		1/1/2010	7/31/2010	I	I	-	-
<b>Principal Investigator:</b>							
<b>Name:</b> Imad Al-Qadi		<b>Organization / Address</b>					
<b>Telephone:</b> 217-893-0705 x 222		UIUC-CEE					
<b>Email:</b> alqadi@illinois.edu		2230c Newmark Lab 205 N Mathews M/C 250 Urbana, IL 61801					
<b>Description of Research:</b>							
The Illinois Department of Transportation (IDOT) has an immediate need for laboratory testing to evaluate the performance characteristics of new asphalt mixtures. The new mixtures include warm mix asphalt, stone-matrix asphalt (SMA) with recycled asphalt shingles (RAS) and asphalt mixtures containing alternate friction aggregates (Diabase, Rhyolite, Quartzite and Granite).							
<b>Keywords:</b> asphalt, mixtures, warm, testing							
<b>Technical Review Panel:</b>							
<b>Members</b>		<b>Telephone</b>		<b>Email Address</b>			
Tom Zehr (Chair)		217-782-9607		thomas.zehr@illinois.edu			
<b>Meeting Dates / Minutes Available?</b>							
<b>End User(s) and Result(s) Expected:</b>							
The primary end result of this project is to evaluate the new asphalt mixtures and provide a method for comparison between the mixtures. IDOT will be able to compare the results of the laboratory performance testing and use this information when making decisions to implement these new mixtures on future projects.							
<b>Progress to Date:</b>							
Hamburg Wheel testing has been performed on all of the samples provided by IDOT to date. Currently samples are being prepared for complex modulus testing.							
Testing is being completed and the draft final report is in process.							
The draft final report has been sent to the TRP Chair.							
The TRP Chair is reviewing the final report.							

Last Updated: 1/27/2011