

Mix Design and Analysis Track

Pooled Fund TAC Meeting

TTCC Spring 2010

Mixtures that are consistently
long-lasting, constructible,
and cost efficient

CP ROAD MAP
shaping the future of concrete pavement



The CP Road Map

1. **Mix Design and Analysis**
2. **Performance-Based Design Guide**
3. **Nondestructive Testing and Intelligent Construction Systems**
4. **Surface Characteristics**
5. Pavement Equipment Automation
6. Joint Design, Materials, and Construction
7. **Rehabilitation and Construction**
8. **Long-Life Concrete Pavements**
9. Accelerated and Long-Term Data Collection
10. Performance
11. Business Systems and Economics
12. Advanced Concrete Pavement Materials
13. **Concrete Pavement Sustainability**



MDA Track

- 5(179) – Permeability MI - Air void system
- 5(117) – Ternary Optimizing cement content
- NRMCA – Minimum Cement Content
- 5(205) – MDA (This project)
- FHWA Contract - MDA
- And others...

State	Concrete Research Project Title	Project Description	RESEARCH PROJECT CONTACT			Data started (or planned start)	Date completed (or planned completion)	Research sponsor(s)	Database(s) where project is listed (TRIS, etc.)	Link
			First	Last	Email					
MI	Quick Test for Durability	As the Minimum Department of Transportation (MDOT) moves to performance based specifications it is important to be able to determine the properties of placed concrete. One of the specifications requires that a certain "durability" be provided in the finished product. Current durability tests are time consuming to run. The objective of this project is to identify a more rapid test, or tests, that will determine the durability of concrete. The current test data and provide results over a month or more after a concrete roadway has been placed. Quick test(s) would allow contractors to make corrections to a mix in the field.	Janet	Dejeu		1/15/2001	4/16/2007	MDOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=21949
IN	Optimization of Mixture Proportions for Concrete Pavements		Jan	Deke	763-494-3013	1/1/2004	2/4/2010	IXDOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=25008
TX	Field Assessment of Concrete Exposed to External Sulfate Attack	Sulfate attack is a fairly complex process in that it can result in either physical attack or chemical attack on concrete, and the source of sulfate can either be internal to the concrete (e.g., DSE) or from external sources, such as groundwater, soils, and agricultural runoff. Texas is state with relatively high sulfate concentrations (in soil and groundwater) and has long been aware of the potential for sulfate attack. Specifications have been followed over the years that have helped to protect the state from significant external sulfate attack. However, one concern is that the current and upcoming specifications dealing with sulfate attack do not allow for the use of Class C fly ash due to concerns over its poor sulfate resistance (when used by itself without another supplementary cementing material (SCM)). Research by Dr. Michael Thomas has shown that silica fume can be used in small doses to enable the use of Class C fly ash in sulfate-rich environments. Similar research is needed on Texas Class C fly ash, especially those found in areas without an affordable Class F fly ash source. It is not available. Because of the complexity of sulfate attack, research teams with years of experience in dealing with sulfate attack has	Levin	Frank		9/1/2004	9/31/2009	TX DOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=9959
IA	Chloride Sealing Resistance of Concrete Pavements, Bridge Decks, and Other Structures Containing Slag Cement	This pooled field study will investigate the important variables that impact the sealing resistance of concrete containing slag cement. The project will consist of a field study and a laboratory study. The field study will collect and evaluate concrete samples extracted from pavement slabs. The laboratory study will investigate how specific variables influence the binder sealing resistance of concrete mixtures.				3/1/2003		IA DOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=10670
	Effect of Low Temperature on Ternary Concrete Mixtures	Currently, the Arkansas State Highway and Transportation Department (AHTD) is conducting research on the use of ternary concrete mixtures (mixtures containing both fly ash and slag cement). The research results are promising. Mixtures containing both materials at cement replacement rates of 20 percent (for each material) perform as well as mixtures containing only portland cement (even at early ages). However, the strength gains for ternary mixtures may be affected more by lower temperatures than portland cement only mixtures. While the ternary mixtures are performing well at temperatures of 70 F, they may not perform at temperatures less than 70 F.	Timothy	Bradley	timothy_bradley@ahd.state.ar.us	1/1/2003		FHWA	TRIS	http://trp.fhwa.gov/award/project.asp?aw=11132
IN	Investigation of Premature Distress Around Joints in RCC Pavements		Jan	Deke	763-494-3013	11/15/2003	9/30/2006	IXDOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=23000
IN	Optimizing Physical and Chemical Characteristics for Fly Ash in Concrete		Jan	Deke	763-494-3013	1/1/2006	7/31/2009	IXDOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=25110
IN	RCC Properties to Support W/C Determination for Durability		Jan	Deke	763-494-3013	1/1/2006	9/30/2009	IXDOT	TRIS	http://trp.fhwa.gov/award/project.asp?aw=25009



Pooled Fund 5(205)

- Participating States (8)
 - IA, KS, MI, MO, NY, OK, TX, WI
- Contract Status
 - Pooled fund contract signed with IA DOT
 - FHWA contract pending

Pooled Fund - Tasks

- Tests
 - Mix Proportions in fresh concrete -
Portable XRF Year 1
 - Set time – calorimetry and/or acoustic
methods Year 1
 - **Protocol for integral waterproofers ?**
- Models
 - What air do we really need Year 1-2
 - Mix proportioning Year 1
- Specifications
 - Guide specification Year 1-2

FHWA Contract - Tasks

- Models
 - What air do we really need Year 1-2
 - Mix proportioning Year 1
 - Standard data collection Year 2
- Specifications
 - Guide specification Year 1-2
 - Checksheets Year 2
- Communications
 - Tech briefs Year 2
 - Papers and presentations Year 2

Staffing

- Masters student Ms. Ezgi Yurdakul started work August 2009
- Sub-contracts waiting on FHWA funding
 - Gary Fick
 - Shiraz Tayabji
 - Tyler Ley