



**SPR Quarterly Progress Report**  
January 1, 2008 through March 31, 2008

Date: April 21, 2008

TO: Technical Advisory Committee Members:  
Tim Rogers, FHWA  
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FROM: Steve Soltesz, Research Coordinator (ph: (503) 986-2851)

**1. Project**

Abrasion-Resistant Concrete Mix Designs for Bridge Decks  
SPR 622

**2. Key Dates**

Start Date for ODOT: October 2004  
Completion Date for ODOT: December 2009

**3. Principal Investigators**

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**4. Progress**

- Finalized the experiment design to include one control mix and four experimental mixes. After researching the potential advantages of “large” coarse gravel versus crushed rock, it was decided to pursue inclusion of crushed coarse rock instead of the larger gravel for the

experimental mixtures. Thus, the experimental mixtures include 3/4 in. crushed rock versus 3/4 in. gravel and silica fume plus slag versus silica fume plus Class F fly ash as supplementary cementitious materials.

- Performed compressive strength and flexural strength tests on the control mix specimens cast for mix design purposes to determine the maximum water-to-cement ratio to be used in the control mix.
- Selected two mix designs for the experimental mixes based on the Knife River mix design for pre-cast, pre-stressed bridge girders.
- Mixed and cast all control mix and experimental mix test specimens. Recorded temperature, slump, air content, and unit weight of the fresh concrete.
- Received and setup the sonometer for dynamic modulus testing.
- Fabricated specimen containers for freeze-thaw conditioning. Setup the environmental chamber to conduct freeze-thaw testing and initiated conditioning of the first few mixtures cast.
- Redesigned and fabricated studded pads for the abrasion tester.

## 5. **Problems**

- Several problems were encountered in setting up the environmental chamber used for the freeze-thaw conditioning with the principal problem being the unit having difficulty rapidly cooling and heating all 45 test specimens to the tight low and high temperature tolerances required by ASTM C 666. It was decided to reduce the thermal mass to fifteen specimens (one per mix) so that the temperature tolerances could be reliably achieved without ruining the environmental chamber.

## 6. **Work Planned for Next Quarter**

- Compressive strength tests at 28 days for all mixtures.
- Obtain and setup the chloride penetration test.
- Continuation of freeze-thaw conditioning and dynamic modulus testing.
- Recording, maintaining, and analyzing test results.

## 7. **Finances**

### SPR Project Summary

VENDOR	FY'04	FY05	FY06	FY07	FY08	FY'09	FY'10	TOTALS
ORIGINAL BUDGET	\$ 14,000	\$ 164,000	\$ 25,000	\$ 25,000	\$ 12,000	\$ -	\$ -	\$ 240,000
REVISED BUDGET	\$ -	\$ 21,810	\$ 33,019	\$ 312	\$ 70,601	\$ 99,087	\$ -	\$ 224,829
EXPENDITURES - VENDOR	\$ -	\$ 21,810	\$ 33,019	\$ 312	\$ 53,938			\$ 109,079
BALANCE	\$ -	\$ -	\$ -	\$ -	\$ 16,663	\$ 99,087	\$ -	\$ 115,750

ODOT	FY'04	FY05	FY06	FY07	FY08	FY'09	FY'10	TOTALS
ORIGINAL BUDGET	\$ 1,626	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ -	\$ -	\$ 21,626
REVISED BUDGET	\$ -	\$ 5,747	\$ 9,795	\$ 7,107	\$ 6,500	\$ 4,000	\$ 2,000	\$ 35,149
EXPENDITURES - ODOT	\$ -	\$ 5,747	\$ 9,795	\$ 7,107	\$ 5,192	\$ -		\$ 27,841
BALANCE	\$ -	\$ -	\$ -	\$ -	\$ 1,308	\$ 4,000		\$ 5,308

PROJECT	FY'04	FY05	FY06	FY07	FY08	FY'09	FY'10	TOTALS
ORIGINAL BUDGET	\$ 15,626	\$ 169,000	\$ 30,000	\$ 30,000	\$ 17,000	\$ -	\$ -	\$ 261,626
REVISED BUDGET	\$ -	\$ 27,557	\$ 42,814	\$ 7,419	\$ 77,101	\$ 103,087	\$ 2,000	\$ 259,978
EXPENDITURES - PROJECT	\$ -	\$ 27,557	\$ 42,814	\$ 7,419	\$ 59,130	\$ -	\$ -	\$ 136,920
BALANCE	\$ -	\$ -	\$ -	\$ -	\$ 17,971	\$ 103,087	\$ 2,000	\$ 123,058