**TRANSPORTATION POOLED FUND PROGRAM**

**QUARTERLY PROGRESS REPORT**

Lead Agency (FHWA or State DOT): \_\_\_\_IOWA DOT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**INSTRUCTIONS:**

*Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.*

|  |  |
| --- | --- |
| **Transportation Pooled Fund Program Project #***TPF-5(100)* | **Transportation Pooled Fund Program - Report Period:**□ Quarter 1 (January 1 – March 31) Quarter 2 (April 1 – June 30)X Quarter 3 (July 1 – September 30)□ Quarter 4 (October 4 – December 31) |
| **Project Title:****Deicer Scaling Resistance of Concrete Mixtures Containing Slag Cement** |
| **Project Manager: Phone: E-mail:**Peter Taylor 294-9333 ptaylor@iastate.edu |
| **Project Investigator: Phone: E-mail:**Peter Taylor 294-9333 ptaylor@iastate.edu |
| **Lead Agency Project ID:**RT 0000 | **Other Project ID (i.e., contract #):**Addendum 374 | **Project Start Date:**4/15/10 |
| **Original Project End Date:** 10/14/11 | **Current Project End Date:****7/25/12 (requested)** | **Number of Extensions:** |

Project schedule status:

□ On schedule □ On revised schedule □ Ahead of schedule x Behind schedule

Overall Project Statistics:

|  |  |  |
| --- | --- | --- |
|  **Total Project Budget** |  **Total Cost to Date for Project** |  **Total Percentage of Work** **Completed** |
| $74,888 | 0.00 | 15% |
|  |  |  |

***Quarterly*** Project Statistics:

|  |  |  |
| --- | --- | --- |
|  **Total Project Expenses** **This Quarter** |  **Total Amount of Funds**  **Expended This Quarter** | **Percentage of Work Completed** **This Quarter** |
| 0 | 0 | 5% |

**Project Description:**

Field surveys of portland cement concrete pavements and bridge decks containing slag cement (*13*) have already been conducted. This was done to evaluate whether the addition of slag cement to the concrete mixtures increased the surface scaling caused by the routine application of deicer salt. From this study it appeared that construction-related issues played a bigger role in the observed scaling performance than did the amount of slag in the concrete mixture. The work also indicated that the test method C672 may be more severe than most environments.

The aim of this project is therefore to recommend a test method that is more representative of field performance for concrete in a salt scaling environment.

**Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**

The following 14 Concrete Mixes have been cast:

1. 100% low alkali (LA) cement mix 0.42wc, 6-7% air entrained using Vinsol Admixture
2. 80% LA, 20% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
3. 65% LA, 35% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
4. 50% LA, 50% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
5. 100% high alkali (LA) cement mix 0.42wc, 6-7% air entrained using Vinsol Admixture
6. 80% HA, 20% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
7. 65% HA, 35% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
8. 50% HA, 50% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
9. 80% LA, 20% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
10. 65% LA, 35% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
11. 50% LA, 50% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
12. 80% HA, 20% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
13. 65% HA, 35% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
14. 50% HA, 50% slag grade 100 mix 0.42wc, 6-7% air entrained using Vinsol Admixture

For each mix, 6 slabs have been cast for deicer scaling under the ASTM C672, modified BNQ and VaDOT accelerated curing regimes (2 slab specimens for each test).

Test being conducted on the mixes above include:

* + 7, 14, 28 days, and 28 VaDOT accelerated curing (7days moist, then 21days moist at 38°C) and 56 day compression strength tests (2 cylinders cast for each testing period)
	+ 14, 28, 28 accelerated, 56 day RCPT testing (2 samples per testing period)
	+ Samples have been prepped and scanned for Air Void analysis for all mixes mentioned above. Results are being processed and will be reported as soon as they are available.
	+ Freeze/Thaw cycling has been completed for 5 mixes and cycling has commenced on slabs from 8 more mixes (currently 5 -15 cycles have been completed depending on cast date of each mix).
	+ A slab has been instrumented with thermocouples to determine the temperature cycles experienced in the solution, just below the concrete surface and in the center of the slab. Results are pending as test is in progress.
	+ 2 slabs have been insulated to determine the effect s of one dimensional freezing. Results are pending as these tests is in progress

**Anticipated work next quarter:**

* + 2 additional mixes still to be cast. Identical tests will be performed in these as listed above.
	+ Extra mixes may be cast to determine the effects of a Micro Air entrainer vs the Vinsol air entrainer provided there is enough freezer space.

**Significant Results:**

Interim Scaling Results: For the 5 mixes that have completed 50 cycles of freezing and thawing, the trend is for the BNQ test to result in lower scaling mass losses than in the ASTM C672 test. The major difference being that salt water is ponded on the surface of the BNQ slabs for 7 days prior to initiating freezing cycles. From interim results, use of the VaDOT accelerated curing regime (7 days at 73 oF followed by 21 days at 100 oF) prior to starting freezing cycles appear to be resulting in less scaling for the 50% slag mixes but increased scaling for the 100% Portland cement mixes..

**Circumstance affecting project or budget (Describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope, and fiscal constraints set forth in the agreement, along with recommended solutions to those problems).**

 Extension to 7/25/12 has been requested – this will match the ending date of the PFS and the federal cooperative agreement funding.