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) ☐ Quarter 3 (July 1 – September 30) X Quarter 4 (October 4 – December 31)

Project Title: Deicer Scaling Resistance of Concrete Mixtures Containing Slag Cement		
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Lead Agency Project ID: RT 0336	**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**	**Number of Extensions:** Pooled fund project; interim funding

Project schedule status:

☐ On schedule X On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Total Percentage of Work Completed
$74,888	$0	25%

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
0	0	10%

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.):

All of the 16 Concrete Mixes have been cast with slumps ranging from 100-150mm.
The first 14 Concrete Mixes listed were done in previous quarters, with #15, & 16 this quarter.

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 (HA) 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
15. 65% HA, 35% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture
16. 50% HA, 50% slag grade 120 mix 0.42wc, 6-7% air entrained using Vinsol Admixture

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

Tests 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.
- 50 cycles of freeze/thaw cycling has been completed for 11 of the 16 mixes listed above (scaling mass loss results are shown in Table 1 in Appendix A). For Mix 16, an additional pair of slabs was cast to evaluate the effect of not using a geotextile in the bottom of the forms in the BNQ test.
- Additional mixes were cast and cycling has commenced on slabs from 2 more mixes to evaluate the impact of a 14 day drying period prior to initiating freezing cycles and after the VaDOT accelerated curing cycle
- A preliminary analysis of the current data is appended to this progress report (Appendix A).
- A second, double door vertical freezer was purchased to replace 2 smaller freezers that stopped functioning.

- Appendix A, Figures 1-3 show the initial results from the slab that was instrumented with thermocouples to determine the temperature cycles experienced in the solution, just below the concrete surface.

Anticipated work next quarter:

- Extra mixes may be cast to determine the effects of using Micro Air entrainer vs the Vinsol air entrainer in the 16 main test mixes.
- Scaling cycles will be completed for all 16 mixes.
- Iowa State University has received samples and will begin testing as well

Significant Results:
See Appendix A attached as pdf.

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).