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OREGON DEPARTMENT OF TRANSPORTATION

SPR Quarterly Progress Report

April 1, 2016 through June 30, 2016

Date June 7, 2016

TO: Technical Advisory Committee Members:
Larry Ilg, ODOT
Chris Harris, ODOT
Anthony Boesen, FHWA
Keven Heitschmidt, Albina
Troy Tindall, Blueline Trans

1. Project

Title: HMAC Layer Adhesion through Tack Coat
SPR # 782

2. Project Investigator

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3. Project Coordinator

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4. Key Dates

Project start date: December 9, 2014
Project completion date: August 31, 2016

5. **Project Status** (Completed by project investigator)

Task 1: Literature Review and Assessment of Tack Coat Procedures and Tack Coat Materials

Percent completed reported in last quarterly report: 100%
Percent completed after this quarter: 100%

Key Progress-To-Date
- Literature review was completed.
- Interim report for the literature review was sent to the TAC.

Specific Progress This Quarter
- Recent studies on tack coat research were investigated and literature review completed.

Problems
- None

Work Planned for Next Quarter
- -

Task 2: Identify Materials and Test Procedures

Percent completed reported in last quarterly report: 95%
Percent completed after this quarter: 100%

Task 2a: Evaluation of Tack Coat Set Time and Tracking – Lab testing
Task 2b: Three Dimensional Finite Element Model
Task 2c: Evaluation of Tack Coat Test Methods and Procedures

Key Progress-To-Date
- All tasks were completed. Draft report is under preparation.
- Developed a low-cost wireless tack coat field tester (similar to LTCQT stated in the work plan). A test procedure for the device is also developed.
- Developed a three-dimensional finite element model and determined the effect of structural characteristics on tack coat shear stresses.
- Lab shear tester is developed.
- A device for distillation is developed according to ASTM D 6997 and emulsion distillation process started.
- All field tests were completed.
- Completed emulsion distillation process and completed all binder experiments.
- A device for tracking measurement has been developed and tested during the field experiments (called as wheel tracking device).
- Field coring and lab shear testing has been completed.
- Completed emulsion distillation process and completed all binder experiments (softening point, DSR, penetrometer, rotational viscometer).

- 2nd set of cores were taken from field to evaluate the impact of traffic on bond strength. (photo given below)
- Field torque tester is developed. A test procedure is also developed for the torque tester. Field tests were conducted with the torque tester.

Specific Progress This Quarter
- Smart phone apps (IOS and Android) for tack coat set time were developed (see photo below).
- Data analysis and plots for all test results were completed.
- Lab torque tests were completed and torque tester fixtures were finalized. It was observed that torque test results are highly correlated with measured bond strengths (see plots below) and torque tester is a potential field test that can be used by ODOT to monitor in-situ bond strength.

Problems
- None

Work Planned for Next Quarter
- -

Task 3: Final Report and Deliverables

Percent completed reported in last quarterly report: 85%
Percent completed after this quarter: 95%

Key Progress-To-Date
- Draft literature review document was completed (Task 1).
- Interim reports for Tasks 2a and 2b are completed.
- Figures and tables summarizing the field test results are completed.

Specific Progress This Quarter
- Reports for all tasks are being finalized.

Problems
- None.

Work Planned for Next Quarter
- OSU plans to send the draft final report to TAC end of July-early August.

6. **Project Coordinator's Comments** (Completed by ODOT)

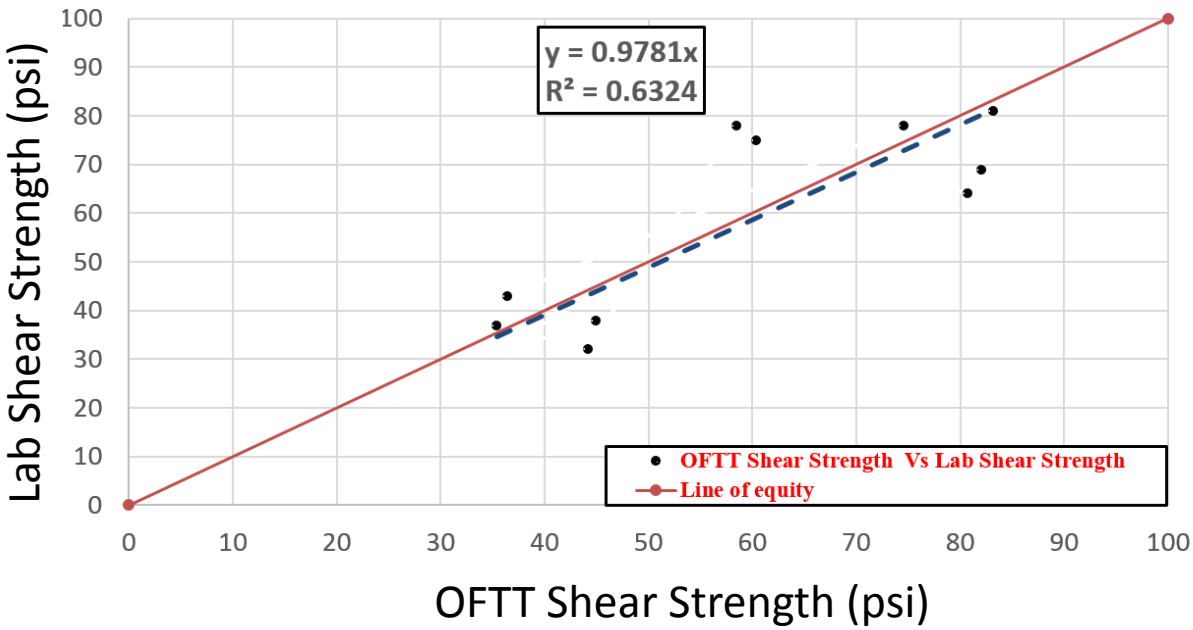
7. **Finances** (Completed by ODOT)

SPR Project Summary

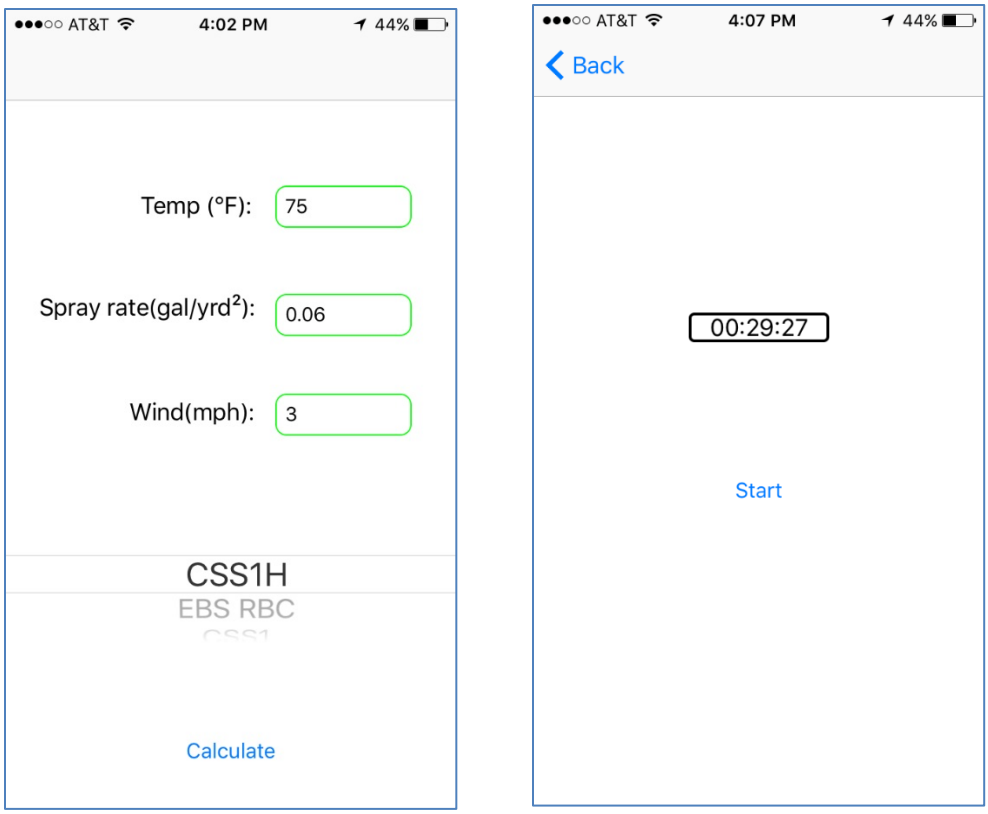
VENDOR	FY'15	FY'16	FY'17	FY'18	TOTALS
ORIGINAL BUDGET	$ 90,000	$ 50,000	$ -	$ -	$ 140,000
WORK PLAN BUDGET	$ 62,279	$ 77,721	$ -	$ -	$ 140,000
REVISED BUDGET	**$ 5,360**	**$ 115,500**	**$ 24,000**	**$ -**	**$ 144,860**
EXPENDITURES - VENDOR	$ 5,360	$ 85,488	$ -	$ -	$ 90,848
BALANCE	$ -	$ 30,012	$ 24,000	$ -	$ 54,012
ODOT	FY'15	FY'16	FY'17	FY'18	TOTALS
ORIGINAL BUDGET	$ 30,000	$ 70,000	$ 30,000	$ 10,000	$ 140,000
REVISED BUDGET	**$ 4,960**	**$ 8,500**	**$ 8,000**	**$ -**	**$ 21,460**
EXPENDITURES - ODOT	$ 4,960	$ 9,122	$ -	$ -	$ 14,082
BALANCE	$ -	$ (622)	$ 8,000	$ 10,000	$ 17,378
PROJECT	FY'15	FY'16	FY'17	FY'18	TOTALS
ORIGINAL BUDGET	$ 120,000	$ 120,000	$ 30,000	$ 10,000	$ 280,000
REVISED BUDGET	**$ 10,320**	**$ 124,000**	**$ 32,000**	**$ -**	**$ 166,320**
EXPENDITURES - PROJECT	$ 10,320	$ 94,610	$ -		$ 104,930
BALANCE	$ -	$ 29,390	$ 32,000	$ 10,000	$ 71,390

(a) (b) (c) (d)

Field torque tester (a) Coring before test (b) Platen gluing (c) Test set up before experiment (d) Broken core after test.



High correlation between Oregon field torque test and lab shear test results.



IOS app developed to calculate tack coat set time in the field. Screeshot above is showing the input screen and the output screen with the timer. The app sends a notification (with vibration) to the contractor saying “Tack coat is set!” when the timer reaches zero. OSU is working on registering both IOS and Android apps to have them available in app stores.