

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Equivalency of Subgrade Reinforcement Methods Administrative Contact: Nina McLawhorn WisDOT Technical Contact: Error! Bookmark not defined. Approved by COR/Steering Committee: \$100,616.00 Project Investigator (agency & contact): Craig Benson: UW-Madison	Project ID: 0092-00-12 Sponsor: Approved Starting Date: Oct 1, 1999 Approved Ending Date: Aug 31, 2003

Description: The study will be conducted over 35 months, and will be completed in five (5) phases.

- Task 1: Literature Review
- Task 2: Laboratory Investigation
- Task 3: Analysis of Large-Scale Test Data
- Task 4: Field Demonstration and Mechanical Monitoring
- Task 5: Synthesis of Results, Recommendations, and Technology Transfer

Background:

This study will consist of three phases. Phase 1 will consist of a literature review of the existing research conducted in this area and a survey of the practices of other state transportation agencies. Phase 2 will involve instrumentation under both laboratory and field conditions to determine the load transfer characteristics and stability of each of the proposed eight systems. Phase 3 will include preparation of recommendations for revisions to the depths and dimensions of each of the proposed eight systems to achieve equivalency of response and reaction.

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$100,616.00	\$25,154.00	\$0.00	\$100,616.00	90 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)
All large-scale laboratory experiments have been completed on all industrial byproducts and geosynthetics reinforcement except only one test that involve fly ash stabilized soft subgrade. All data relating to industrial by products (except fly ash) have been analyzed, interpreted and written in a report, which is also the doctoral thesis of a student. This report is expected to be submitted for the TOC review in August, 2003. The geosynthetics tests have been analyzed and it is in the process of being written.

Field FWD data have been collected in May 2003. The interpretation of field data is an integral part of overall equivalency interpretations.

Work Next Quarter:

Complete fly ash experiment and thus complete all large-scale laboratory experiments. Continue with the analysis of geosynthetics reinforcement.

Circumstances affecting progress/budget:

None.

Gantt Chart:

All tasks are complete except analysis and interpretation of geosynthetics reinforcement and writing of the related report to this aspect.

Note: Gantt chart shown in State Fiscal Year Quarters

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Investigation of the DCP and SSG as Alternative Methods to Determine Subgrade Stability	Project ID: 0092-01-05
Administrative Contact: Nina McLawhorn	Sponsor:
WisDOT Technical Contact: Error! Bookmark not defined.	Approved Starting Date: May 1, 2001
Approved by COR/Steering Committee: \$58,075.00	Approved Ending Date: May 1, 2003
Project Investigator (agency & contact): Tuncer Edil: UW-Madison	

Description: This study will be conducted over 24 months, and will be completed in four (4) phases.

- Task 1: Literature Study
- Task 2: Laboratory Investigation and Data Analysis
- Task 3: Field Testing and Data Analysis
- Task 4: Final Report

Background:

Over the years WisDOT has used various methods to determine the stability of earth subgrades during construction. These have included proof rolling, moisture/density tests, visual inspection and observation of construction equipment. All of these methods have drawbacks and some are very subjective and may even indicate misleading degrees of stability. An accurate determination of subgrade stability is important during the construction process to insure the construction of economical and long lasting subgrades and pavement structures.

Several agencies have recently proposed/used two new methods to measure subgrade stability. These separate methods involve the use of two test devices: the dynamic cone penetrometer (DCP) and the soil stiffness gauge (SSG). To date, only limited research of these devices has occurred on WisDOT projects. In addition to these devices, there may be other methods that accurately determine subgrade stability. The focus of this research is to investigate the two identified devices to determine their applicability and limitations to use on Wisconsin soils and WisDOT construction projects. Additional work will involve a literature search to determine if other devices/methods offer enough potential for future investigation.

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$58,075.00	\$19,358.34	\$0.00	\$58,075.00	90 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

We have spent most of this quarter in statistical analysis of the field data collected over 2 seasons and seeking relationships. This work is over and we have a draft report. We are also writing a paper for the TRB meeting, which will elicit some review of our analysis.

Work Next Quarter:

We plan to complete and submit the final report.

Circumstances affecting progress/budget:

None.

Gantt Chart:

All tasks are 90% complete. The only remaining task is completion of the writing and editing of the final report.

Note: Gantt chart shown in State Fiscal Year Quarters

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Investigation of Testing Methods to Determine Long Term Durability of WI Aggregate Resources Including Natural Mat... Materials, Industrial By-Product	Project ID: 0092-02-03
Administrative Contact: Nina McLawhorn	Sponsor:
WisDOT Technical Contact: Bob Arndorfer	Approved Starting Date: Oct 29, 2002
Approved by COR/Steering Committee: \$202,084.00	Approved Ending Date: Sep 15, 2005
Project Investigator (agency & contact): Richard Weyers: Error! Bookmark not defined.	

Description: This study will be conducted over 30 months, and will be completed in five (5) phases.

Phase 1: Literature Search

Phase 2: Aggregate Durability Test Methods

Phase 3: Laboratory Investigation

Phase 4: Analysis of Test Results

Phase 5: Reports (Quarterly, Final, Implementation)

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$202,084.00	\$67,361.33	\$0.00	\$0.00	0 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

Work continued on the literature review. The electronic search is quite extensive and the review is in progress.

Work Next Quarter:

Complete the literature review.

Circumstances affecting progress/budget:

The principal investigator is on research leave and other research assignments until August 15,2003

Gantt Chart:

Note: Gantt chart shown in State Fiscal Year Quarters

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Development of Methodology to Include the Strength Contribution of Select Subgrade Materials in Pavement Structure	Project ID: 0092-03-12
Administrative Contact: Nina McLawhorn	Sponsor:
WisDOT Technical Contact: Bob Arndorfer	Approved Starting Date: Jul 25, 2002
Approved by COR/Steering Committee: \$120,034.00	Approved Ending Date: Oct 25, 2004
Project Investigator (agency & contact): Tuncer Edil: UW-Madison	

Description: The study will be conducted over 27 months, and will be completed in five (5) phases.

- Task 1: Review
- Task 2: Laboratory Investigation
- Task 3: Analysis of Large-Scale Test Data
- Task 4: Field Evaluation
- Task 5: Synthesis of Results, Recommendations, and Technology Transfer

Background:

This study will determine what impact the inclusion of select materials in a subgrade will have on the pavement design parameters of that subgrade. It will also provide specific determinations for the relative impacts of each of the eight defined select materials systems now used by WisDOT. The study will recommend a proposed methodology to include these impacts in the pavement design process. The results of the study will provide WisDOT with the basis to make an informed policy decision on the inclusion of select materials impacts in pavement design.

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$120,034.00	\$30,008.50	\$27,679.07	\$0.00	75 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)
The testing and analysis as related to the inclusion of working platforms constructed using industrial byproducts have been completed and written as a report. This report will be submitted in August 2003 for the TOC review.

Work Next Quarter:

The testing has been completed but analysis and writing of the report relating to geosynthetic-reinforced working platforms is still underway. We plan to continue working on this in next quarter.

Circumstances affecting progress/budget:

None

Gantt Chart:

Tasks 1-4 are essentially complete. Task 5 is 50% complete.

Note: Gantt chart shown in State Fiscal Year Quarters

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Determination of Influences on Support Strength of Crushed Aggregate Base Course Due to Gradational, Regional and Source Variations	Project ID: 0092-02-01
Administrative Contact: Nina McLawhorn	Sponsor:
WisDOT Technical Contact: Bob Arndorfer	Approved Starting Date: Sep 6, 2001
Approved by COR/Steering Committee: \$99,972.00	Approved Ending Date: Jul 6, 2003
Project Investigator (agency & contact): Richard Reusser: OMNNI	

Description: This study will be conducted over 22 months, and will be completed in four (4) phases.

Phase 1: Literature Research

Phase 2: Examination of Existing Aggregate Sources in Wisconsin

Phase 3: Sampling and Testing of Individual Sources

Phase 4: Data Analysis and Reporting

Background:

The State of Wisconsin uses approximately 10,000,000 tons of crushed aggregate base course (CABC) annually, primarily as a base course layer, in its highway improvement projects. CABC is produced from both sand and gravel deposits, typically deposited in glacial and fluvial environments, and stone quarries. It is intended not only as a pavement support layer, but also as a stable working platform during the construction of the surface layer.

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$99,972.00	\$33,324.00	\$536.35	\$87,018.79	87 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

Work this quarter consisted of preparing the necessary progress reports. We also applied for a time extension to the contract to extend the contract deadline from July 1, 2003 to January 31, 2004 to allow more time for data analysis and report preparation.

Work Next Quarter:

Because of other demands placed on us during the construction season, we do not anticipate performing much work on the project during the third quarter. The analysis and report preparation necessary to complete the project will be performed primarily during the fourth quarter of 2003.

Circumstances affecting progress/budget:

State of Wisconsin/Department of Transportation
RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: Jun 30, 2003

Program: SPR-0010(36) FFY99	Part: II Research and Development
Project Title: Determination of Typical Resilient Modulus Values for Selected Soils Representative of the Soils Distributions of Wisconsin	Project ID: 0092-03-11
Administrative Contact: Nina McLawhorn	Sponsor:
WisDOT Technical Contact: Bob Arndorfer	Approved Starting Date: Jan 31, 2003
Approved by COR/Steering Committee: \$103,049.00	Approved Ending Date: Jan 31, 2005
Project Investigator (agency & contact): Hani Titi: UW-Milwaukee	

Description: The study will be conducted over 24 months, and be completed in 5 phases:

Task 1: Literature Review on Resilient Modulus of Subgrade Soils

Task 2: Selection of a Wide Spectrum of Subgrade Soils that Comprise Core Soil Types in Wisconsin

Task 3: Evaluate the Effects of Soil Properties and Stress Levels on the Resilient Modulus of Wisconsin Sugrade Soils

Task 4: Analyses of Test Results and Development of Models to Predict Resilient Modulus

Task 5: Final Report

Total Study Budget	Current FFY Budget	Expenditures for Current Quarter	Total Expenditures to Date	Percent Complete
\$103,049.00	\$34,349.66	\$14,000.00	\$0.00	20 (%)

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Progress This Quarter:

(Includes project committee mtgs, work plan status, contract status, significant progress, etc.)

1. Project kickoff meeting in Truax Center in May 21, 2003
2. Conducted comprehensive literature search and collected papers and reports pertaining to resilient modulus testing
3. Prepared a preliminary draft on the literature material compiled
4. Identified soil types for the laboratory testing program
5. Manufactured special soil preparation setup for resilient modulus testing as required by AASHTO T 307. This consists of 2.8 and 4 inches in diameter molds, pistons, rings, and hydraulic pressure jack.
6. Obtained one soil type and conducted all required tests and established laboratory work plan
7. Obtained three soil types for the laboratory testing program
8. Conducted laboratory tests to characterize all soils collected. Tests include grain size analysis (sieve analysis and hydrometer analysis), specific gravity, density-water content relationship, etc.
9. Conducted resilient modulus tests on soil samples at the specified moisture content and density.

Work Next Quarter:

1. Obtain more soil samples
2. Continue laboratory testing program
3. Conduct preliminary analysis
4. Finalize literature review
5. Meet with the Project Oversight Team (POT) and make a presentation on the work progress

Circumstances affecting progress/budget:

Gantt Chart:

Note: Gantt chart shown in State Fiscal Year Quarters