

Quarterly Project Report

Center for Transportation Studies

Project Title: TPF-5(149) Composite Pavements

Quarter: January 01 - March 31, 2009

CTS Project # : 2008036

Contract # : 89261

Work Order # : 90

Project Authorization Date : 10/1/2007

Project Expiration Date: 1/31/2011

Principal Investigator

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Funding Source(s):

State Pooled Funds

AL: Nelson Cruz

TL: Tim Clyne

Task Update:

1 Development of Information on Composite Pavements

The project team will assess the state of practice and knowledge for the design and construction of composite pavement systems. The literature review will include projects and studies within the U.S. and foreign countries. The review of the state of practice will focus on two main issues: summarizing design and construction guidelines and identifying test sections or field projects to determine performance histories. It will include the design and construction of AC overlays of old PCC pavements and new composite pavement systems. The team will start with a review of the procedures that have been used to design composite pavement systems. The design/analysis procedures for composite pavements will be reviewed to determine those that are believed to have application and those that are considered inappropriate for use on further subtask activities.

The other focus of the literature review will be to develop a database of pavement sections to be used for validation/verification of the design guidelines developed in this study. Although the main focus of this study will be new composite pavements, the literature review will cover asphalt overlays of old concrete pavements as well. Based on the literature review, the research team will identify where the design and construction guidelines can be improved.

Deliverables : A task report summarizing the literature review for new composite pavements and asphalt overlays of old concrete pavements.

Task Budget : \$43,898.00

Task Due Date : 1/31/2009 (Calculated)

Date Delivered : (Reported by PI)

Date Approved : (CTS received task approval)

Task Approved : No

Task % Complete : 95%

Progress: This task is 95% completed. The report will be submitted in the first half of April.

2 Perform Initial Life-Cycle Analysis

In this task a life cycle analysis will be performed, taking into account agency and user costs as well as environmental and sustainability aspects. This analysis will compare several hypothetical TICPs and overlays with conventional asphalt and concrete pavements to determine economically viable solutions and relative environmental costs. The research team will collect the most recent information on construction cost of individual design features for California, Washington and Minnesota conditions. After that, a life cycle analysis will be performed to determine under what conditions use of composite pavement may be viable. This life cycle analysis will include a life cycle cost analysis and an PaLATE (Pavement Life Cycle Assessment Tool for Environmental and Economic Effects).

The results of this task will be a thorough understanding and documentation of the absolute and relative costs of designing and

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constructing TICPs versus conventional pavements.

Deliverables : Letter-report containing detailed description of the analysis and a summary of the economically viable design solution and corresponding required design lives.

Task Budget : \$43,898.00

Task Due Date : 1/31/2009 (*Calculated*)

Date Delivered : (*Reported by PI*)

Date Approved : (*CTS received task approval*)

Task Approved : No

Task % Complete : 0%

Progress: This task has not been started yet due to problems with a subcontract with UC Davis. A request of contract modification will include a no cost time extension.

3 EICM Validation and Analysis

Although the construction of new composite pavements is relatively rare, over the past 35 years there exists a useful body of knowledge and experience for both AC/PCC and PCC/PCC materials, designs and construction. The MEPDG also provides useful prediction models, analysis methodologies, and a design procedure that, with further improvements and calibrations can be made to provide reasonable capabilities for new composite pavements.

In this task, the research team will conduct extensive validation of the EICM. An extensive sensitivity analysis will be conducted to ensure that the predicted temperature distributions are reasonable for a wide range of the input parameters that might be expected for composite pavements. The temperature distributions predicted with the EICM will be carefully evaluated. After that, the comparison of the predicted and measured temperatures distributions will be made. This will be followed by an extensive analytical investigation of the effect of various TICP designs on the reduction of PCC slab curling and joint movements due to presence of the HMA layer.

Deliverables : A letter-report summarizing validation of the EICM model and analytical investigation of the effect of various TICP designs on the reduction of PCC slab curling and joint movements.

Task Budget : \$70,237.00

Task Due Date : 1/31/2009 (*Calculated*)

Date Delivered : (*Reported by PI*)

Date Approved : (*CTS received task approval*)

Task Approved : No

Task % Complete : 70%

Progress: This task is 70% complete. A request for a no-cost time extension will be submitted in the first half of April.

Future Plans:

Problems Encountered/Actions Taken:

The contract award to the University of Minnesota (UMN) was executed in the 1st Quarter of 2008. However, the subcontracts with the University of California-Davis (UC Davis) and University of Washington are still in process. UC Davis wanted to modify some language in the contract which came mostly from the master agreement that UMN has with MnDOT. The negotiation ended without the desired results a decision was made to hire key members of the UC Davis team as consultants for this project. A draft of an amendment to the existing contract will be submitted in the first half of April. The draft will contain the request for a no-cost time extension for the first 3 tasks.

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