

TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT

Date: October 7, 2020

Lead Agency (FHWA or State DOT): Washington State 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(332)	Transportation Pooled Fund Program - Report Period: <input type="checkbox"/> Quarter 1 (January 1 – March 31) <input type="checkbox"/> Quarter 2 (April 1 – June 30) <input checked="" type="checkbox"/> Quarter 3 (July 1 – September 30) <input type="checkbox"/> Quarter 4 (October 1 – December 31)	
Project Title: LTPP Forensic Evaluations		
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Lead Agency Project ID: Y-12005	Other Project ID (i.e., contract #): Y-12005	Project Start Date: December 11, 2017
Original Project End Date: November 30, 2019	Current Project End Date: December 31, 2020	Number of Extensions: 1

Project schedule status:

- On schedule
 On revised schedule
 Ahead of schedule
 Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
Current contract = \$502,959.08 (Y-12005)	\$385,058.26	76.6%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$385,058.26 (11.8% spent this quarter)	\$63,515.36	94.7%

Project Description:

The objective of this project is to perform forensic evaluations on Long-Term Pavement Performance (LTPP) test sections as they go out of service, in general accordance with the guidelines provided in the Transportation Research Board's National Cooperative Highway Research Program (NCHRP) Report 747: "Guide for Conducting Forensic Investigations of Highway Pavements."

The forensic evaluations are to be performed on LTPP test sections, capturing data on exactly why the section performed as it did, and what ultimately led to its removal from the program. Consistent with the NCHRP Report 747 Guidelines, LTPP test sections considered for forensic evaluation will first undergo a desktop study to determine additional data needs, if any, to explain its performance. Follow-up investigations may entail trenching and coring, measuring lift deflection, and potential lab testing of field samples for materials characteristics.

The project is task order based and its scope consists of the four tasks detailed below. The task orders associated with each task have been executed and a summary of the progress to date for each task is also detailed below:

1. Project Management (Task Orders AA and AE)

All project management activities under this task are up to date and on schedule. Efforts are currently underway to extend the contract's period of performance from December 31, 2020 through June 30, 2021, and to obligate approximately \$88,000 in additional funding.

2. Test Section Selection (Task Orders AB and AF)

Well over 100 LTPP test sections have been identified for potential forensic evaluation. Nominations have been submitted and approved for 51 test sections in 19 States: Arizona, California, Colorado, Florida, Georgia, Indiana, Iowa, Kansas, Maine, Maryland, Mississippi, Montana, New Mexico, Ohio, Oklahoma, South Carolina, Texas, Utah, and Washington. During the reporting period in question, nominations were submitted and approved for two test sections – one in Maryland and one in Indiana. It is anticipated additional test section nominations will only be submitted if the project's period of performance is extended through June 30, 2021 to allow for completion of follow-up investigations that may be required.

Desktop studies and the associated technical memoranda documenting the studies have been completed for 49 of the 51 approved test sections. The studies and preparation of the associated memoranda have also been started for the remaining 2 test sections in Maryland and Indiana.

3. Forensic Evaluations (Task Orders AC and AG)

Follow-up forensic evaluations and the associated documentation have been completed, were not required, or could not be pursued for the test sections in Arizona, California, Colorado, Florida, Georgia, Kansas, Montana, Ohio, Oklahoma, South Carolina, Texas and Washington. In addition, follow-up investigations are ongoing for test sections in Iowa, Maine, Mississippi, New Mexico, and Utah. A determination for the need of follow-up investigations at the Maryland and Indiana test sections will be made after completion of the respective desktop studies.

4. Final Project Report (Task Order AD)

Activities associated with the preparation of the final report commenced during the reporting period in question. A detailed report outline was prepared and submitted to WSDOT for review and approval. Once approved, report writing activities commenced.

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

The following work activities were completed during the period of July 1 through September 30, 2020.

Project Management (Task Orders AA and AE)

- Continued working on those management activities necessary for the successful completion of the project including cost control, subcontractor control, preparation of progress reports and invoices, and participation in meeting/conference calls with WSDOT.
- As part of the above bullet item and working with WSDOT staff, completed and submitted the tenth quarterly progress report for the project covering the period of July 1 to September 30, 2020. Also, prepared and submitted invoices for the months of July, August, and September 2020.
- Prepared for and participated in routine internal project status meeting to review the work done and planned as well as to address issues that may be affecting the project.

- As needed, communicated with WSDOT staff via telephone or message to address issues related to the project and the associated task orders.
- Continued communication and coordination activities with the FHWA LTPP team and the LTPP Data Collection Contractor (DCC) team.
- Worked on proposal to explore possibility of extending the project's period of performance from December 31, 2020 to June 30, 2021 and to obligate approximately \$88,000 in funding that was left-over from unused travel and ODC funds.
- Worked on follow-up activities to the June 25, 2020 TPF-5(332) LTPP Forensic Evaluations TAC Project Status virtual meeting.

Test Section Selection (Task Orders AB and AF)

- Completed and submitted to WSDOT nominations for forensic investigations at the following two LTPP test sections:
 - Maryland test section 24_1634; nomination was submitted on September 22, 2020 and approval was given by WSDOT on September 22, 2020. The objectives are to investigate (1) reason(s) for high amounts of fatigue and NWP longitudinal cracking following the AC overlay of the test section; very little fatigue and NWP longitudinal cracking was observed prior to overlay, (2) reason(s) for very low IRI on the pavement section despite the presence of cracking throughout time, and (3) relationship between pavement deflection, pavement temperature, and subgrade moisture content using the SMP dataset, which will help extend the analysis conducted earlier on Montana LTPP Test Section 30_8129.
 - Indiana test section 18_1037; nomination as submitted on September 22, 2020 and approval was given by WSDOT on September 22, 2020. The objectives are to examine (1) the cause(s) of rutting depths observed, particularly prior to the first overlay in 1994, (2) the reason(s) for increased cracking following second overlay in 2003, and (3) the reason(s) for good pavement performance in terms of FWD deflections and IRI.
- Worked on the following forensic investigation desktop studies:
 - Completed Maine test section 23_1028 desktop study; technical memorandum was submitted to WSDOT on August 13, 2020 and approval to proceed with follow-up investigations was given by WSDOT on August 13, 2020. Memorandum was also submitted to the FHWA LTPP Team, the LTPP Data Collection Contractor and to the State DOT.
 - Completed Utah test sections 49_7082, 49_7085 and 49_7086 desktop study; technical memorandum was submitted to WSDOT on September 3, 2020. Memorandum was also submitted to the FHWA LTPP Team, the LTPP Data Collection Contractor, the State DOT and Mr. Larry Scofield (TAC member and concrete specialist). Follow-up investigations were recommended; in addition, based on input received from Mr. Scofield on September 22, 2020 concerning the construction events that took place at the three test sections, the decision was made to further pursue information on these construction events, which differ from what is presented in the LTPP database, via e-mail message with the Utah DOT on September 25, 2020. A response concerning the events was received via e-mail message from the Utah DOT on September 28, 2020, and the information is being used by the project team to clarify the construction events and their possible impact on the pavement performance. It is anticipated the desktop study technical memorandum will need to be modestly revised.
 - Completed Texas test section 48_1096 desktop study; technical memorandum was completed on July 31, 2020 and approval to proceed with follow-up investigations was given by WSDOT on August 10, 2020. Memorandum was also submitted to the FHWA LTPP Team and to the State DOT.
 - The project team reached out to the LTPP Data Collection Contractor regarding plans for the next six months to help identify additional candidate test sections.

Forensic Evaluations (Task Orders AC and AG)

- Worked with DOT staff and LTPP Data Collection Contractor staff to carry out follow-up forensic evaluations for the following test sections:
 - Completed follow-up investigations for the Texas test section 48_1111. Revised technical memorandum was submitted to WSDOT on June 30, 2020 and approved on July 1, 2020. Memorandum was also submitted to the FHWA LTPP Team and to the State DOT.
 - Completed follow-up investigations for the California test section 06_7451. Revised technical memorandum was submitted to WSDOT on September 16, 2020. Memorandum was also submitted to the FHWA LTPP Team and to the State DOT.
 - The Colorado SPS-2 follow-up investigations were completed during the previous period and an updated memorandum was submitted to WSDOT on June 30, 2020. However, a date issue was identified after submittal of the memorandum, so the issue was addressed, and a revised memorandum was submitted on July 9, 2020. Revised memorandum was also submitted to the FHWA LTPP Team and to the State DOT.

- Prepared for field follow-up activities at the Ohio test section 39_5003, only to find out the week before visiting the site that the test section had been milled and overlaid in 2019, but the information had not been provided to the LTPP program and hence it had not been entered into the LTPP database. As a result of the mill and overlay, the test section was automatically moved out-of-study and follow-up investigations were no longer appropriate. Accordingly, the investigations for this test section are now considered complete.
- Continued working with the respective State DOT and the LTPP Data Collection Contractor on follow-up investigations for the New Mexico SPS-8 project (2 test sections; completed on September 15, 2020) and Iowa test section 19_1044. The field data collection activities at both sites were completed during the month of September 2020.
- After several attempts, it is clear the Arizona DOT will not be able to support follow-up investigations at their SPS-2 project. Accordingly, the investigations for this test section are now considered complete.
- Prepared draft memorandum on use of NCHRP 01-34a method for the analysis of rutting on LTPP test sections. The objective of the study proposed in the memorandum is to determine how the NCHRP method may be implemented for use within pavement management. The study aims to identify the strengths and weaknesses of the NCHRP method by comparing the results of the method with desktop analyses of asphalt concrete pavement sections within the LTPP program. Specifically, the study will evaluate whether the NCHRP method provides logical results when considering different transverse profile collection methods (Dipstick data versus Laser Rut Measuring Sensors (LRMS) data), different climates (Freeze versus non-Freeze), and different LTPP study types (GPS-1, GPS-2, AC SPS-8, SPS-10). In doing so, this study aims to assess the usefulness of the NCHRP method as an effective tool for treatment identification and other pavement management practices. The memorandum will be submitted to WSDOT for consideration early in the coming reporting period.

Project Report (Task Order AD)

- A detailed outline of the final project report was submitted to WSDOT on August 18, 2020 and it was accepted by WSDOT on September 22, 2020.
- Began writing draft portions of report. To date, a draft of the Chapter 1 Introduction has been completed, selected tables of the Chapter 2 Test Sections Investigated have been completed (including timeline for all test section investigations), and draft write-ups of the South Carolina and Montana portions of the Chapter 3 Test Section Investigation Summaries were prepared.

Anticipated work next quarter:

The following work activities will be conducted throughout the period of October 1 through December 31, 2020. The activities assume the project's period of performance will be extended through June 30, 2021 and that additional funding will be obligated to the contract. If this does not happen, then all activities in the project need to be completed by December 31, 2020, which is the end of the upcoming period.

Project Management (Task Orders AA and AE)

Continue working on those management activities necessary for successful completion of project including cost control, subcontractor control preparation of progress report, preparation of invoices, and participation in meetings/conference calls with WSDOT and other TPF personnel.

Test Section Selection (Task Orders AB and AF)

- Continue to identify candidate LTPP test sections for forensic evaluation and, as appropriate, submit to WSDOT for review and approval consideration. Cut-off date for this activity is February 2021.
- Complete desktop study and associated technical memoranda for Maryland test section 24_1634, Indiana test section 18_1037, and other LTPP test sections approved by WSDOT.

Forensic Evaluations (Task Orders AC and AG)

- Continue to work on follow-up investigation activities for the following test sections:
 - Once data from the follow-up field investigations has been processed and entered into the LTPP database, prepare updated technical memoranda for the New Mexico SPS-8 project (2 test sections) and Iowa test section 19_1044.
 - As needed, pursue follow-up investigations for Mississippi test section 28_5025, Maine test section 23_1028, and Utah test sections 49_7081, 49_7085 and 49_7086. This includes potential field investigations, data analyses and memorandum preparation.
 - Submit proposed rutting analysis memorandum to WSDOT and, if approved, pursue study to determine how the NCHRP method can be implemented for use within pavement management.

Project Report (Task Order AD)

- Continue working on Chapter 2 Test Sections Investigated and Chapter 3 Test Section Investigation Summaries of the final project report.

Significant Results:

Technical memoranda for desktop studies addressing 49 LTPP test sections have been completed and similar memoranda for another two test sections are presently underway. These memoranda provide valuable information explaining the performance of the 51 test section pavements and, as appropriate, recommending follow-up investigations to better explain their performance. In addition, the technical memoranda that have been generated to date or are under preparation could potentially support the respective agencies with their M&R decision-making processes related to the test section(s) in question.

Follow-up forensic evaluation activities have been or are being carried out for the above referenced test sections, and as appropriate, the associated technical memoranda have been or are being updated to include the results from these evaluations. In turn, the resulting memoranda have been or will be submitted to the FHWA LTPP for inclusion into the LTPP AIMS for use by data analysts and other users.

It is also worthwhile to point out that several important findings have been made because of these forensic evaluations, which directly affect and will improve the LTPP database. For example, coring performed as part of the California test section 06_7451 follow-up investigations showed the thicknesses for some layers did not match what was in the LTPP database. Similarly, the Utah test sections 49_7082, 49_7085 and 49_7086 desktop study revealed there may be significant differences between the climatic data contained in the LTPP virtual weather station (VWS) tables of the LTPP database and those data contained in the MERRA tables. It is our understanding that the LTPP program will be removing the VWS tables, as the newer MERRA tables are considered of superior quality. Also, on these sections in Utah, some questions were raised regarding maintenance and rehabilitation activities that will result in updates to the LTPP database. Yet another example is what happened at the Ohio test sections 39_5003, where the LTPP database showed the test section as active, but the mill and overlay performed in 2019 automatically moved the test section to the out-of-study category, which prevented the planned follow-up activities.

Circumstance affecting project or budget. (Please 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).

No significant problems, challenges or issues have been encountered to date and none are anticipated. However, should Covid-19 impact the follow-up field investigations, it is the intention of the project team to shift effort towards the nomination of test sections and to desktop studies assuming a portion of the travel and ODC funds under Task Order AG can be transferred to Task Order AF. Alternatively, targeted studies could be pursued such as the earlier referenced study of rutting source for the asphalt concrete LTPP test sections considered in the pooled fund study to date could be pursued under Task Order AG without the need to transfer funds.

Potential Implementation:

Please see "Significant Results" write-up at the top of this page.