TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): **Wisconsin 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(432)***	**Transportation Pooled Fund Program - Report Period:** ☐ Quarter 1 (January 1 – March 31) X Quarter 2 (April 1 – June 30) ☐ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 1 – December 31)	
Project Title: **Bridge Element Deterioration for Midwest States**		
Name of Project Manager(s): William Oliva, P.E., Wisconsin DOT (Lead Agency) Jonathan Groeger (Wood, performing organization)	**Phone Number:** 608-266-0075 301-210-5105 x19	**E-Mail** William.Oliva@dot.wi.gov Jonathan.Groeger@woodplc.com
Lead Agency Project ID: 0092-19-40	**Other Project ID (i.e., contract #):** N/A	**Project Start Date:** December 3, 2019
Original Project End Date: December 2, 2021	**Current Project End Date:** December 2, 2021	**Number of Extensions:** 0

Project schedule status:

X 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
$399,317.00	$119,405.00	30%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$47,112.91 / 12%	$47,112.91	30%

Project Description:

Scope

The objective of this pooled fund research is to have multiple Midwest DOTs pool resources and historic Midwest DOT bridge data related to element level deterioration, operation practices, maintenance activities and historic design/construction details. This data will provide the basis for research to determine bridge deterioration curves. A select number of deterioration curves will provide needed utility for the time-dependent deterioration of bridge elements to be used in making estimates of future conditions and work actions. This effort will pool data and through the analysis and research processes create results that will improve the accuracy of various bridge management and asset management applications that the member DOTs use (AASHTO BrM, Agile Assets, and others).

This study is sequenced into three tiers based on the priorities of the DOTs:

Tier 1 National Bridge Elements (NBE) & National Bridge Inventory (NBI) Components:

- Develop element level deterioration curves for Reinforced Concrete Deck.
- Develop element level deterioration curves for Reinforced Concrete Slab.
- Develop deterioration curves for NBI component items (i.e. bridge deck, superstructure, and substructure).
- Develop element level deterioration curves for Reinforced Concrete Deck after a major preservation activity such as mill and overlay with the rigid concrete wearing course.
- Develop predicted improvement in the condition of Reinforced Concrete Deck element after a major preservation activity such as mill and overlay.
- In addition to probabilistic deterioration curves, also develop select deterministic deterioration curves.

Tier 2 Bridge Management Elements (BME) & Remaining NBE Elements

- Develop element level deterioration curves for each type of wearing surface (bare concrete, sealed concrete, thin polymer overlay, Polyester Polymer Concrete (PPC) overlay, ridged concrete overlay, Polymer Modified Asphalt overlay, and asphalt overlay with membrane).
- Develop element level deterioration curves for Strip Seal Deck Joints and Modular Deck Joints.
- Determine defect level deterioration curves that describe defect development and progression (e.g., cracking and delamination).
- Develop deterioration curves for Paint system (protective steel) effectiveness.
- Develop defect level deterioration curves for Steel Girder corrosion, and correlate to Paint system effectiveness; specifically, how long from new paint to 75% and 50% effective and end of life.
- Develop element level deterioration curves for substructure elements in harsh environments (e.g., pier caps under expansion joints, pier columns in spray zone from snow plows, etc.).

Tier 3 Similar Agency Defined Elements (ADE) & Inspection Related

- Identify Agency Defined Elements (ADE) that would be of use for other Midwest DOTs to consider adopting.
- Determine what type of inspection information related to Nondestructive Evaluation (NDE) Midwest DOTs have and how it is used that translates into information on element level defects (Ground Penetrating Radar (GPR), Infrared Thermograph, or other).
- Provide a summary of policy, guidance, and practices that Midwest DOTs employ to relate NDE results to defect reporting (to describe delamination and deterioration) and how DOTs use NDE to make quantifiable inspection and actionable work actions for concrete bridge decks.

Expected Findings and Benefits

The project will deliver the following items:

- Literature review which will detail the current state of the practice for bridge deterioration modeling and will include the literature review, a survey, and targeted interviews.
- Data screening procedure. This will allow participating States to help understand the validity of their data and its pros and opportunities for improvement.
- A populated and documented open source database and analysis engine which the States can use to explore and model their data or data from other States in an easy to use interface.
- Tier 1 models.
- Tier 2 models.
- Ties 3 information.

Overall the main thrust of this project is to produce deterioration models to fuel the analysis of bridge performance for selected items.

The activities, tools, practices, policies or methods in partner States that would be impacted by the research findings include:

- Bridge management practices and policies
- Deterioration modeling of bridge components
- Deterioration modeling processes which can be applied to other element level bridge components
- Development of defensible system performance targets
- Development of bridge work plans
- Performance of risk analysis to determine which bridges are more at risk from a condition standpoint
- This project will provide participating States strengths and opportunities for improvement in their data collection policies, procedures, and methods

The primary benefit of this project to the participating States is the ability to plug the resultant models into their asset management systems and immediately begin to use the data to make better, data driven decisions. A secondary benefit of this project is the provision of the online database and analysis engine that will be designed for the participating States to run their own analysis at the NBI level or NBE level using their States data, a portion of the participating States data, national data or some other permutation. This will empower the participating States to explore the data and come up with deterioration models as new data are available or new analysis concepts are uncovered.

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

Task 1 – Project Management

A progress report was issued and the project was managed. We held monthly status calls with the participating States.

This task is 30% complete. No problems have been encountered to-date.

Task 2 – Literature Review

We completed the draft literature review. We presented the contents of the literature review at a monthly status call. The participating States had a one a month review period. We will revise this document based on the comments received.

This task is 95% complete. No problems have been encountered to-date.

Task 3 – Data Collection

We concluded the data collection phase of the project. This item is on the critical path and is very important to the success of the project. The data collection portion of the project included a request for nine data items and pieces of information from the twelve participating State Departments of Transportation (DOTs), the management and review of data and documents received from each State DOT, the retrieval and processing of additional bridge data from FHWA website (InfoBridge), and the formatting of the different databases into a consistent data format.

All participating State DOTs uploaded data and documentation to the cloud storage folder provided by the project team. Based on the initial findings from the review of the data and documents submitted by the States, the project team developed and issued a list of follow-up questions for each State DOT and interviews were conducted to solicit the information.

The project then compiled the information in a series of twelve databases. The contents of these databases were then reviewed by the State DOTs. An accompanying memo was developed as the key deliverables for this task. The States are currently performing a final review of the data and memorandum.

This task is 98% complete. No problems have been encountered to-date.

Task 4 – Develop Data Screening Procedure

The project team developed a data screening memorandum which was discussed with the States at the monthly call. The memorandum is under review by the States.

This task is 50% complete.

Task 5 – Develop Data Management Policy

The project team developed a draft data management framework presentation which was presented and discussed

with the States during the monthly call. This framework laid out the general contents of the data management framework. concept is under review by the States and will be discussed during the monthly meetings.

This task is 10% complete.

Task 6 – Develop Tier 1 Deterioration Curves

No work was conducted on this task during the reporting period. This task is 0% complete.

Task 7 – Develop Tier 2 Deterioration Curves

No work was conducted on this task during the reporting period. This task is 0% complete.

Task 8 – Develop Tier 3 Inputs

No work was conducted on this task during the reporting period. This task is 0% complete.

Task 9 – Final Project Deliverables

No work was conducted on this task during the reporting period. This task is 0% complete.

Anticipated Work Next Quarter:

Task 1 – Project Management

We will issue a progress report and invoice. We will continue the monthly status calls with the participating States on the third Friday of every month. Keeping all States informed of progress and discussing key technical issues is a critical step in the success of this project.

Task 2 – Literature Review

The literature review will be completed after a final review by the TPF TAC.

Task 3 – Data Collection

The data collection process will be completed after a final review by the TPF TAC.

Task 4 – Develop Data Screening Procedure

Once the screening procedure is agreed to and approved in writing we will implement it in the database we have developed for the project. This will be a critical output of the project.

Task 5 – Develop Data Management Policy

We will provide a draft data management policy to the TPF TAC.

We have tentatively scheduled the face-to-face meeting with the panel after Task 5 for September 2020 during the Midwest Bridge Preservation Partnership Meeting. Due to COVID, we may have a virtual meeting in its place.

Task 6 – Develop Tier 1 Deterioration Curves

Work is anticipated to begin on the Tier 1 deterioration curves after formal written approval is provided to proceed late in the next quarter.

Task 7 – Develop Tier 2 Deterioration Curves

No work is anticipated on this task during the reporting quarter.

Task 8 – Develop Tier 3 Inputs

No work is anticipated on this task during the reporting quarter.

Task 9 – Final Project Deliverables

No work is anticipated on this task during the reporting quarter.

Significant Results:

There have been no significant results except for the fact that we are very close to having a fully populated data analysis database. A significant and critical aspect of this project.

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).

None have been identified to-date.

Potential Implementation:

There are no potential implementation activities identified but multiple are expected by the time the project is completed.

ID	Duration	Task Name	Duration	Start	Finish
1					
2	0 days	**Task 0 - Notice to Proceed**	0 days	Tue 12/3/19	Tue 12/3/19
3					
4	**521 days**	**Task 1 - Project Management**	**521 days**	**Tue 12/3/19**	**Tue 11/30/21**
5	8 days	***1.1 Project Launch Meeting - Within this Timeframe (Face-to-Face Meeting)***	8 days	Tue 12/3/19	Thu 12/12/19
6	20 days	1.2 Develop Detailed Work Plan	20 days	Fri 12/13/19	Thu 1/9/20
7	10 days	Develop Draft Work Plan	10 days	Thu 12/12/19	Wed 12/25/...
8	0 days	***Deliverable: Draft Work Plan***	0 days	Wed 12/25/19	Wed 12/25/...
9	10 days	***Pooled Fund Members (PFM) Review (assume 2 week review)***	10 days	Thu 12/26/19	Wed 1/8/20
10	4 days	Finalize Work Plan	4 days	Thu 1/9/20	Tue 1/14/20
11	1 day	***Deliverable: Final Work Plan***	1 day	Wed 1/15/20	Wed 1/15/20
12	521 days	1.3 Develop Quarterly Progress Reports (and invoices)	521 days	Tue 12/3/19	Tue 11/30/21
13	521 days	***1.4 Coordination - Monthly Status Calls***	521 days	Tue 12/3/19	Tue 11/30/21
14	**45 days**	**Task 2 - Literature Review**	**45 days**	**Thu 1/16/20**	**Wed 3/18/20**
15	30 days	2.1 Conduct Literature Review/Survey/Targeted Interviews	30 days	Thu 1/16/20	Wed 2/26/20
16	30 days	2.2 Develop Draft Literature Review/Synthesis Document	30 days	Thu 1/16/20	Wed 2/26/20
17	0 days	***Deliverable: Draft Literature Review Document***	0 days	Wed 2/26/20	Wed 2/26/20
18	10 days	***PFM Review of Draft (assume 2 week review)***	10 days	Thu 2/27/20	Wed 3/11/20
19	5 days	Develop Final Literature Review Document	5 days	Thu 3/12/20	Wed 3/18/20
20	0 days	***Deliverable: Final Literature Review Document***	0 days	Wed 3/18/20	Wed 3/18/20
21	**85 days**	**Task 3 - Data Collection**	**85 days**	**Thu 3/19/20**	**Wed 7/15/20**
22	25 days	3.1 Develop Familiarity with Participating States Inspection and Coding Methods	25 days	Thu 3/19/20	Wed 4/22/20
23	25 days	3.2 Compare State Inspection and Coding Practices	25 days	Thu 3/19/20	Wed 4/22/20
24	20 days	3.3 Collect Data from DOTs	20 days	Thu 4/23/20	Wed 5/20/20
25	50 days	3.4 Determine Method to Collect Construction History Data	50 days	Thu 3/19/20	Wed 5/27/20
26	20 days	3.5 Collect State DOTs Construction/Preservation/Maintenance Practices	20 days	Thu 5/28/20	Wed 6/24/20
27	50 days	3.6 Evaluate National NBI/NBE Data	50 days	Thu 3/19/20	Wed 5/27/20
28	20 days	***3.7 Deliverable: Memorandum Data Collection Processes and Outcomes***	20 days	Thu 5/28/20	Wed 6/24/20
29	10 days	***PFM Review of Draft (assume 2 week review)***	10 days	Thu 6/25/20	Wed 7/8/20
30	5 days	Develop Final Memo	5 days	Thu 7/9/20	Wed 7/15/20
31	0 days	***Deliverable: Final Data Collection Processes and Outcomes Memo***	0 days	Wed 7/15/20	Wed 7/15/20
32	**29 days**	**Task 4 - Develop Data Screening Procedure**	**29 days**	**Thu 7/16/20**	**Tue 8/25/20**
33	15 days	4.1 Develop Data Screening Method	15 days	Thu 7/16/20	Wed 8/5/20
34	0 days	***4.2 Deliverable: Draft Screening Method***	0 days	Wed 8/5/20	Wed 8/5/20
35	10 days	***PFM Review (assume 2 week review)***	10 days	Thu 8/6/20	Wed 8/19/20
36	4 days	Finalize Screening Method	4 days	Thu 8/20/20	Tue 8/25/20
37	0 days	***Deliverable: Final Screening Method***	0 days	Tue 8/25/20	Tue 8/25/20
38	**45 days**	**Task 5 - Develop Data Management Policy**	**45 days**	**Wed 8/26/20**	**Tue 10/27/20**
39	30 days	5.1 Develop Data Management Policy	30 days	Wed 8/26/20	Tue 10/6/20
40	0 days	***5.2 Deliverable: Draft Management Policy***	0 days	Tue 10/6/20	Tue 10/6/20
41	10 days	***PFM Review (assume 2 week review)***	10 days	Wed 10/7/20	Tue 10/20/20
42	1 day	***Meeting to Discuss Data Management Policy and Approach for Tier 1***	1 day	Wed 10/21/20	Wed 10/21/...
43	4 days	Finalize Data Management Policy	4 days	Thu 10/22/20	Tue 10/27/20
44	0 days	***Deliverable: Final Data Management Policy***	0 days	Tue 10/27/20	Tue 10/27/20
45	**65 days**	**Task 6 - Develop Tier 1 Deterioration Curves**	**65 days**	**Wed 10/28/20**	**Tue 1/26/21**
57	**75 days**	**Task 7 - Develop Tier 2 Deterioration Curves**	**75 days**	**Wed 1/27/21**	**Tue 5/11/21**
70	**95 days**	**Task 8 - Develop Tier 3 Inputs**	**95 days**	**Wed 5/12/21**	**Tue 9/21/21**
80	**54 days**	**Task 9 - Final Project Deliverables**	**54 days**	**Wed 9/22/21**	**Mon 12/6/21**

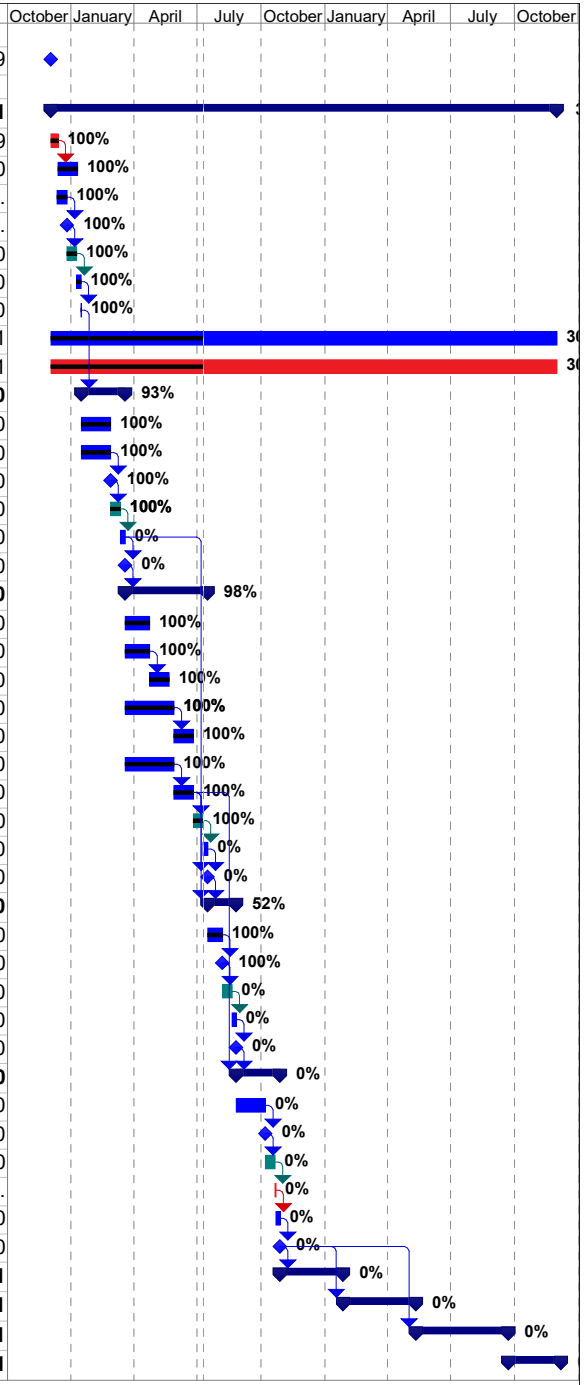

Figure 1. Project schedule.