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:** X Quarter 1 (January 1 – March 31) ☐ 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	$72,292.09	20%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$68,664.27 / 17%	$68,664.27	17%

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 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 rigid concrete wearing course.
- Develop predicted improvement in 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 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 of 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 formal kickoff meeting was conducted with the participating States. Because we had an introductory kickoff meeting and developed the work plan prior to the project initiating, during this call we primarily discussed needs for the data collecti portion of the project (task 3). A progress report was issued and the project was managed.

This task is 17% complete. No problems have been encountered to-date.

Task 2 – Literature Review

We have developed the initial literature review and are focusing our efforts on identifying interview candidates. This task is progressing behind schedule but the task is not on the critical path. We will wrap up this task during the next quarter as input to the analysis task which is not scheduled to begin until the last quarter of 2020.

This task is 75% complete. No problems have been encountered to-date.

Task 3 – Data Collection

Work conducted by the project team during the first quarter of 2020 includes 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 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.

Most 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 are in the process of scheduling one-on-one interviews, when applicable.

As excepted, most of the effort spent during the referenced period was on the activities involved in converting the different formats of the bridge inspection data submitted by each State into a consistent format. These different data formats included Oracle dump file (3 States), Microsoft SQL Server backup file (1 State), Microsoft Excel files (4 States), Microsoft Access file (1 State), and individual csv files (1 State). The remaining two participating States referred the project team to retrieve their bridge inspection data from the FHWA website. The bridge inspection data publicly available in the FHWA website from these and all other participating States was retrieved by the project team.

The initial step for converting the different bridge inspection data formats was to review and get familiar with information received. The number of data tables, fields in each table, field names and other data characteristics varied among States. For instance, some of the States' submitted databases having hundreds of data tables while other States

submitted the bridge inspection data in less than five tables. In addition, some of the databases received included a data dictionary while some did not.

The initial review of the data files submitted by States involved locating a set of data elements (e.g., element conditions) necessary for the purposes of this project. This review of data was also performed by the project team on the data retrieved from the FHWA website for each State. Each of the State bridge inspection data as well as the data retrieved from the FHWA website was stored in a consistent format.

We are wrapping up this task by performing one-on-one state interviews to gather the last pieces of data or to understand the data provided.

This task is 80% complete. We are well ahead of schedule with the task. No problems have been encountered to-date.

Task 4 – Develop Data Screening Procedure

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

Task 5 – Develop Data Management Policy

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

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.

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 initiate monthly status calls with the participating States on the third Friday of every month.

Task 2 – Literature Review

The literature and interviews will be completed and a draft synthesis delivered.

Task 3 – Data Collection

The data collection process will be completed. This is a high priority item and is very critical to the project. We will issue a memo discussing the outputs for the process for review by the participating States.

Task 4 – Develop Data Screening Procedure

This task will commence at the end of Q2 2020. We will develop a written screening method in consultation and collaboration with the TPF TAC. Once the screening procedure is agreed to and approved in writing we will implement it in the database we have developed for the project.

Task 5 – Develop Data Management Policy

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

Task 6 – Develop Tier 1 Deterioration Curves

No work is anticipated on this task during the reporting 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 to 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 da...**	**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**

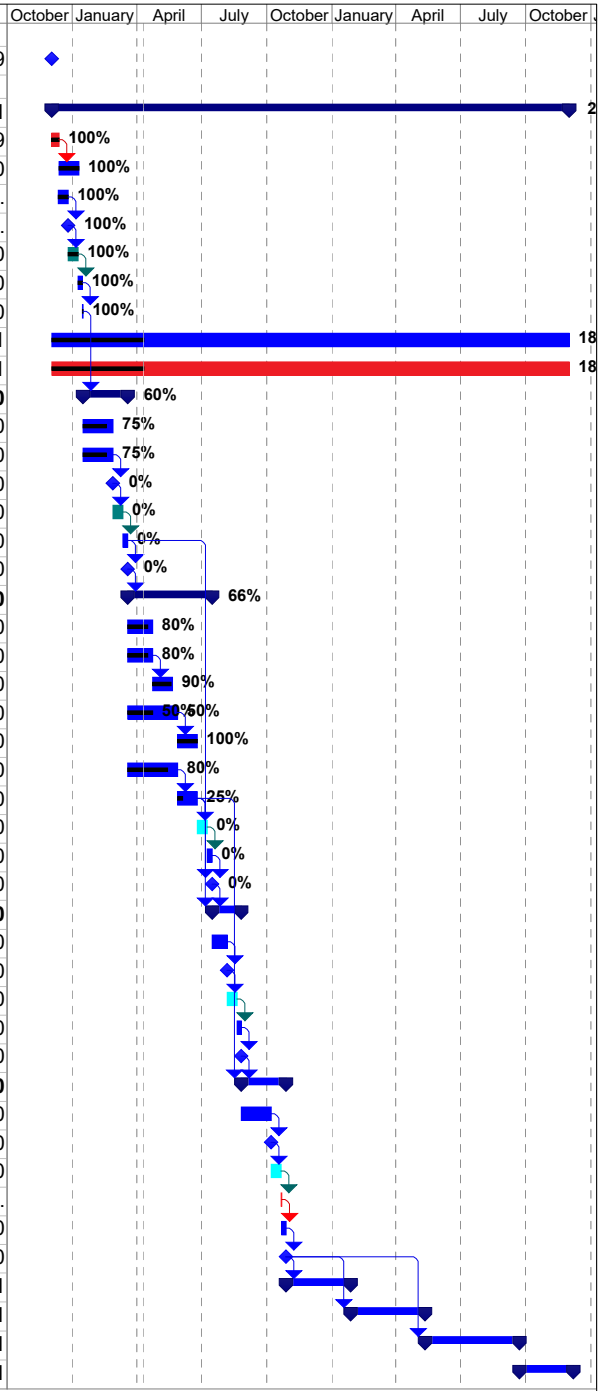

Figure 1. Project schedule.