Federal Contract # DTFH61-17D00001 – Task Order #2

LONG-TERM BRIDGE PERFORMANCE PROGRAM

PROGRESS REPORT NO. 9

Report Period: June 1, 2018 – June 30, 2018

Prepared For:

Federal Highway Administration

Prepared By:

RUTGERS
Center for Advanced Infrastructure and Transportation

A. Account of work performed in this period

1. Coordination and Meetings Between the Contractor and FHWA LTBP Team

The Rutgers team had meeting with FHWA on 6/20th at TFHRC. The minutes of the meeting was submitted to the FHWA personnel present at the meeting.

Staff Engineer: 78.75 hours

2. Develop LTBP Program bridge performance strategic research matrix

A proof of concept for the proposed strategic research tool was implemented and presented to FHWA in the month of June as part of Task 2.3. Subtasks and their percent completion are as follows:

Task 2.3.1 – Develop/finalize pipeline for automated data retrieval and storage (80% Complete):

A working pipeline for data retrieval from the TRID database has been developed. During the June 20th meeting with FHWA, an additional data source (National Transportation Library) was suggested. While this task is nearly complete for TRID, it is anticipated that additional work for this task will include updating the data pipeline to retrieve data from the National Transportation library, if necessary.

Task 2.3.2 – Create the SRM database schema to store research project data (80% Complete):

This task is nearly complete. It is anticipated that any additional work on this task will include the refinement of database schema for additional data sources (e.g. NTL) if necessary.

Task 2.3.3 – Populate SRM database using data retrieval/storage pipeline (80% Complete):

This task is nearly complete. The SRM database has been created and populated with data from TRID. Additional work on this task will only be required if it is decided that other data sources should be included (e.g. NTL).

Task 2.3.4a – Identify all known current and planned research efforts related to bridge performance research topic areas (Ongoing, 20% Complete):

Work on this task began in June with the development of the proof of concept SRM application that was presented to FHWA on June 20th, 2018. It is anticipated that this task will progress concurrently with the development of the proposed SRM application.

Task 2.3.4b – Create frontend interface to visualize and explore the data collected and stored in the SRM database (20% Complete):

A proof of concept web interface was developed and presented to FHWA on June 20th. With positive feedback and approval from FHWA to continue implementing the proposed SRM framework, the interface is being developed concurrently with Task 2.3.4a.

PI: 41 hours

Co-PI: 6 hours

Project Engineer: 41.88 hours

Staff Engineer: 157.5

Technician: 29.55

Project Support: 17 hours

3. Conduct training for all field personnel on LTBP Protocols

Efforts in June were focused on (1) updating the existing training material to be consistent with the current LTBP Protocol standards and (2) expanding the existing protocols training material to compliment the planned data collection activities for 2018. The original training material consists of two days of presentations. The original training was conducted in October of 2014 when many of the protocols were still in draft form. The first day was held in two sessions and the second day held in three sessions. Bridge documentation, planning and logistics, data storage & meta data collection and site preparation are discussed in the morning session of the first day and material sampling is discussed in the afternoon session of the first day. The second day contains three sessions. Visual inspection is covered in the morning session, and visual inspection and non-destructive evaluation is covered in the afternoon sessions. Professional quality video was taken during the presentations and is available for distribution.

The following tasks were visited/revisited in June:

- Reviewed LTBP data collection protocols relevant for current data collection plan
- Reviewed current training material and coursework. This involved critical review of two full days of training material inclusive of written documents, PowerPoint slides, and previously recorded lectures.
- Held meetings with team members to plan revision and expansion current draft of protocol training
- Began planning and drafting expansion of protocols training coursework to include a hands-on "workshop" portion. The hands-on portion of the coursework is meant to compliment and reinforce the lecture material. Additionally, it aims to present many of the same problems commonly encountered in the fiend in hopes to provide a robust and diverse training experience that is similar to the expected environment.
- Reviewed raw/native data sets of NDE technologies previously collected in the LTBP data collection activities in an effort to provide details regarding the documentation, storage, and reporting of collected data and meta data
- Drafted preliminary schedule and timeline of training

The team expects to finalize the protocols training in July.

Staff Engineer: 78.75 hours

Project Support: 2 hours

4. Development of data collection protocols and RABIT-CE operations manual

Nothing was done during this period.

5. Legacy Data Mining data extraction

The LDM group accomplished the following tasks for the month of June:

- All data extraction from bridge plans has been completed, the combined data extraction excel sheet is now ready for the first upload trial to InfoBridge (Task is 100% complete).
- Continued to perform quality control and quality assurance on all extracted data through organization and review of all data in order to improve data accuracy as well as clarity.
- Fields have been added for steel plate girder dimensions as well as moment of inertia for all girders. Preparations have been made to begin data collection for these fields.
- Continued to periodically work on creation of the BLOB (Binary Large Object) files from the collected bridge documentation for possible future implementation into Bridge Portal.
- Miscellaneous updates and fixes to the bridge structure numbers and other fields were made in order to have a smoother upload process of the extracted data to Bridge Portal server.

CO-PI: 6 hours

Project Engineer: 86.25 hours

Staff Engineer: 78.75 hours

Technician: 26 hours

Project Support: 17 hours

6. Organize, conduct, and participate in LTBP workshops and meetings

No work was performed for this task.

7. Publications, website, communications, and technical assistance

The Rutgers team prepared the electronic version of the monthly progress report and submitted it to FHWA. Moreover, the Rutgers team developed a MS Project file showing the

project milestone and submitted it to FHWA.

The Bridge Intelligence team worked on converting and uploading the XML and reports from OR and WA RABIT testing to Bridge portal per FHWA request. The detail is in the subcontract section.

Co-PI: 90.5

Project Support: 22 hours

B. Work to be accomplished during the next period

1. Coordination and Meetings Between the Contractor and FHWA LTBP Team

The Rutgers team will meet with reach out to FHWA to set up a meeting for the month of July.

2. Develop LTBP Program bridge performance strategic research matrix

In July, the Rutgers team will conduct a review of the National Transportation Library (NTL) and decide if it is necessary to include as a data source. If it is determined that NTL provides additional information not obtained from TRID, the Rutgers team will utilize the same process framework to develop a pipeline for data retrieval (Task 2.3.1), create the schema (Task 2.3.2), and populate the SRM database (Task 2.3.3) with data from NTL. Otherwise, work efforts in the month of July will focus on Task 2.3.4: (a) implementation and refinement of queries to the SRM database in order to begin to identify all known current and planned research efforts, and (b) implementing interface components (as needed) in order to satisfy the objectives of SRM task.

3. Conduct training for all field personnel on LTBP Protocols

The Rutgers team will wait to hear about possible needs for training the HDR team from FHWA.

4. Development of data collection protocols and RABIT-CE operations manual

The Rutgers team is still waiting for any possible comment from FHWA. Upon receiving any comment, the Rutgers team will work on providing answers.

5. Legacy Data Mining data extraction

For the month of July, the group will continue to work on all of the items mentioned before with more of a focus on reviewing the collected data and gathering data on the newly added fields related to girder details. The group's efforts will primarily be on performing efficient and accurate data collection of the new fields related to the important girder details that were discussed in the June progress meeting. Statistics will also be collected from previously extracted data to help better understand where any issues may lay. Analysis will continue to be done on the data collected to ensure it is of the highest quality and is being represented as accurately as possible on the Bridge Portal website.

6. Organize, conduct, and participate in LTBP workshops and meetings

No work is planned under this task for the next reporting period.

7. Publications, website, communications, and technical assistance

The Rutgers team will prepare the electronic version of the monthly progress report and will submit it to FHWA. Moreover, the Rutgers team will submit the updated MS Project file to FHWA.

The Rutgers team will work on the tasks related to Bridge Portal as they are requested by FHWA.

C. Problems/Recommended Solutions

The Rutgers team is still waiting to receive comments from the COR for the report submitted for task 4 (protocols). Due to not receiving the comments/feedback from the COR, there will be delays in the delivery of this task.

D. How the results of the work performed supports one or more of the FHWA, DOT and LTBP Goals

The following is a summary of how the work performed on the primary tasks of this task order contribute to meeting the FHWA, DOT, and LTBP program goals.

Task 2 - Develop LTBP Program bridge performance strategic research matrix

Fundamentally, the SRMs aim to link the LTBP program to the larger research community. By placing the LTBP efforts in this larger context, the program will be able to identify potential synergies and collaborative opportunities as well as any overlaps that may exist. This will both increase the cost effectiveness of the program as well as the program's impact on bridge engineering practice through clearly showing how the LTBP program contributes to the overall bridge performance research landscape.

Task 3 - Conduct training for all field personnel on LTBP Protocols

At the heart of the LTBP program's data collection effort is the requirement that data be obtained in a consistent and reliable manner across the breadth of the program. Variations in collection techniques or unreliable practices would pollute the data streams and greatly limit the ability of the program to meets its goal of improving our understanding of long-term bridge performance. Activities under this task aim to ensure that the data collection efforts of the LTBP program are executed by teams with the required expertise to obtain consistent and reliable data.

Task 4 - Development of data collection protocols and RABIT-CE operations manual

Similar to the training work being conducted under Task 3, this task is also involved in ensuring consistent and reliable data collection throughout the program. Specifically, this task will develop additional protocols and operations manuals that specify best-practice approaches for data collection.

Task 5 - Legacy Data Mining data extraction

In addition to ensuring consistent and reliable data collection efforts, the overarching goal of the program is also dependent upon the completeness of the data collection efforts. This task contributes to this through the collection of available legacy data. This data not only provides a means to ensure field data collection efforts are carried out efficiently (i.e. on bridges best suited to meeting the program's goals) but also provides context to the data to help explain observed trends and correlations (and thus further our understanding of long-term bridge performance).

E. Purchases and Rentals

Nothing was purchased during this period.

F. Travel Details for Reporting Period

None.

G. Current and Cumulative Expenditures (cost shown includes benefits and overhead)

Institution	Current Expenditures 6/1/2018 – 6/30/2018	Cumulative Expenditures 10/1/2017 – 6/30/2018
Rutgers, the State University of New Jersey	$ 62,895.25	$ 502,067.09
Bridge Intelligence LLC	$ 13,325.00	$ 62,146.39
Pennoni Associates	$ 0	$ 33,138.00
Infratek Solutions	$ 0	$ 25,244.00
New Jersey Institute of Technology	$ 7,357.71	$ 13,631.02

H. Subcontractor's Progress Report

BRIDGE INTELLIGENCE

Sub-recipient Name: Bridge Intelligence LLC
Subaward No: 00000286
Principal Investigator: Hooman Parvardeh

LTBP TSSC
Federal Contract # DTFH61-17-D00001

PROGRESS REPORT NO. 6
For the Period from 6/1/2018 through 6/30/2018

A. Accomplishments/Work Performed

The following is a complete account of all accomplishments and work performed on each task during this reporting period.

Task 1: (Coordination and Meetings between the Rutgers and FHWA LTBP Team)

Nothing was done during this period.

Number of hours during this period: 0 hours

This task is approximately 40% complete.

Task 2: (Develop LTBP Program Bridge Performance Strategic Research Matrix)

During this period Mr. Parvardeh worked with Mr. Romano on the prototype for the visualization of the SRM.

Number of hours during this period: 6 hours

This task is approximately 50% complete.

Task 3: (Conduct Training on Proper Use and Application of LTBP Field Assessment Protocols)

Nothing was done during this period.

Number of hours during this period: 0 hours

This task is approximately 16% complete.

Task 4: (Development and Refinement of Data Collection Protocols)

Nothing was done during this period.

Number of hours during this period: 0 hours

This task is approximately 80% complete.

Task 5: (Legacy Data Mining Data Extraction and Upload)

During this period, Mr. Parvardeh work with Mr. Shane to finalize the Excel file for the LDM data extraction. Mr. Parvardeh emailed this file to Dr. Zobel and Mr. Nehme.

Number of hours during this period: 6 hours

This task is approximately 80% complete.

Task 6: (Organize, Conduct, and Participate in LTBP Workshops and Meetings)

Nothing was done during this period.

Number of hours during this period: 0 hours

This task is approximately 10% complete.

Task 7: (Publication, Website, Communication, and Technical Assistance)

During this period, the Bridge Intelligence team performed the following tasks:

- Prepared and submitted monthly progress report for June including updated MS project
- Created XML documents for IE, USW, and ER for 6 bridges in WA and OR
- Created NDT reports from individual maps
- Backed up the Database on LTBP3 before uploading the new data files
- Uploaded NDT reports and XML documents into bridges in Bridge Portal
- Prepared the Database and the LTBP Data Folder for submittal to FHWA
- Submitted the updated Database and the LTBP Data Folder to FHWA
- Prepared all the GPR data from RABIT data collections
- Prepare all stitched image data from RABIT data collection
- Uploaded all GPR and stitched image data from RABIT data collection to Google Drive
- Provided the access link for all GPR and Stitched images from RABIT to FHWA
- Spent a considerable amount of time (26 hours) on updating the 2017 environmental data on the Bridge Portal

Number of hours during this period: 90.5 hours

This task is approximately 55% complete.

B. Work Anticipated During the Next Period

For the next period, the Bridge Intelligence team will work with the Rutgers team to satisfy the FHWA requirements.

C. Changes /Problems

None.

D. Participants & charged Level of Efforts

Personnel Name	**Role/Contribution**	**Total Hours**	**Billed Cost**
Hooman Parvardeh	Principal	102.5	$ 13,325

Below is a breakdown of level of effort per task:

Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Total
0 hr	6 hrs	0	0	6 hrs	0	90.5 hrs	102.5 hrs

E. Travel

None.

Sub-recipient Name: New Jersey Institute of Technology
Subaward No: 00000289
Principal Investigator: Matthew J. Bandelt

LTBP TSSC – Task Order 2
Federal Contract # DTFH61-17-D00001
For the Period from 6/1/2018 through 6/30/2018

A. Accomplishments/Work Performed

The following is a complete account of all accomplishments and work performed on each task during this reporting period.

Task 2: LTBP Program Strategic Research Matrices

During this period, the team at NJIT met with the Rutgers University research group to discuss the strategic research matrices. Specifically, NJIT reviewed mechanisms to establish relationships that could be quantified using the Transportation Research International Documentation (TRID) Database from the Transportation Research Board. NJIT examined the data fields from TRID and provided input for Rutgers University to consider moving forward. These activities will help FHWA establish strategic research initiatives that can be addressed in future research programs.

Number of hours during this period: 71.4

Task 3: Training Curriculum

No work was completed on this task during this period.

Number of hours during this period: 0 hours.

Task 4: Development and Refinement of Data Collection Protocols

No work was completed on this task during this period.

Number of hours during this period: 0 hours.

B. Work Anticipated During the Next Period

For the next period, the team at NJIT will continue to assist and work on directed documents as directed by Rutgers and FHWA.

C. Changes /Problems

None.

D. Participants & charged Level of Efforts

Personnel Name	Role/Contribution	Total Hours	Billed Cost
Aaron Strand	Technician	29.6	$69/hour
Matthew Bandelt	Project Engineer	20.9	$127/hour
Matthew Adams	Project Engineer	20.9	$127/hour

Task 2	Task 3	Task 4	Total
71.6	0	0	71.4 hrs

E. Travel

None.