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

LONG-TERM BRIDGE PERFORMANCE PROGRAM

PROGRESS REPORT NO. 11

Report Period: Aug 1, 2018 – Aug 31, 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 a few correspondences with the FHWA team over the phone or by email.

PI: 24 hours

Co-PI: 1.5 hour

Project Support: 2 hours

2. Develop LTBP Program bridge performance strategic research matrix

In the month of August, work continued on the strategic research application (Task 2.3) presented to and approved by FHWA on June 20th, 2018. It is estimated that Task 2.3 is 65% complete at this time. Subtasks and their percent completion are as follows:

Task 2.3.1 – Develop/finalize pipeline for automated data retrieval and storage (90% Complete):

A working pipeline for data retrieval from the TRID database has been developed. In the month of July, the Rutgers team investigated an additional data source (National Transportation Library) per a suggestion from FHWA on the June 20th meeting. It was determined that NTL provided little additional information and therefore would not be included in the SRMs, however, it should be noted that development of a pipeline for data retrieval from NTL is feasible if it is decided this resource should be included in future versions of the SRM application.

Task 2.3.2 – Create the SRM database schema to store research project data (100% Complete):

At this time, this task is complete. It is anticipated that any additional work on this task will include the refinement of database schema for any additional data sources that may be requested.

Task 2.3.3 – Populate SRM database using data retrieval/storage pipeline (100% Complete):

At this time, this task is complete. It is anticipated that any additional work on this task will include the refinement of database schema for any additional data sources that may be requested.

Task 2.3.4a – Identify all known current and planned research efforts related to bridge performance research topic areas (Ongoing, 30% 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. 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 (50% Complete):

PI: 98 hours

Co-PI: 3.5 hour

Project Engineer: 13.96 hours

Staff Engineer: 172.50 hours

Technician: 19.70 hours

Project Support: 18 hours

3. Conduct training for all field personnel on LTBP Protocols

During this month, the Rutgers team corresponded with the FHWA and the HDR team and worked to make sure preparedness for a possible September training event.

Project Engineer: 85 hours

Project Support: 1 hour

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 August:

- All initial data extraction from bridge plans has been completed, the combined data extraction excel sheet is 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 collected data in order to improve data accuracy as well as clarity.
- Data collection has continued for all new fields relating to moment of inertia with the primary focus being on data extraction for steel plate girder dimensions from the bridge plans. Data extraction has also continued for rolled steel girder shapes as well as specific PS concrete shapes from the bridge plans in order to provide more structural properties for these girders.
- The group has continued working on calculations for the following bridge attributes. All excel formulas used for calculations made on the Plate Girder Calculations excel sheet will be added to the main excel data extraction sheet in order to facilitate more automated moment of inertia related attribute calculations on any future bridges added to our current list of LDM bridges for data extraction. The aforementioned fields are listed below:
    - Moment of inertia of noncomposite section

- Moment of inertia of composite section (if applicable)
- Stiffness of superstructure

Load distribution factor calculations for each bridge have begun and will continue to be worked on over the next month.

CO-PI: 3.5 hours

Project Engineer: 129 hours

Staff Engineer: 160 hours

Project Support: 10 hours

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

Dr. Frank Moon worked with the FHWA with regard to this task.

PI: 42 hours

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.

Additionally, during this month, Dr. Babanejad worked on enhancing the quality of the NDT data, which was collected throughout the LTBP program, the following details this effort.

Creating Analyzed Excel Files for NDT Test Results – During the month of July, Saeed completed the NDT results which were collected from the Mid-Atlantic cluster bridges during 2013, 2015, and 2017. However, the formatting of all individual tests (280 tests) were later revised to add more features to the Excel files. All formats have been changed to be constant for all test results. Over 90% of this task was completed by the end of August.

Reprocessing the Problematic Test Results – Some of the NDT test results were skeptical. This activity was started in July, however, it continued to August. Over 80% of this task was completed by the end of August. Due to the uncertainties associated with debugging the

problematic test results, the exact timeline for this task could not be set perfectly.

Co-PI: 11 hours

Staff Engineer: 215 hours

Project Support: 31 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

Work efforts in the month of September will continue for Task 2.3.4: (a) implementation and refinement of queries to the SRM database for searching and classifying all known current and planned research efforts (projects and publications), and (b) implementing interface components (as needed) in order to satisfy the objectives of SRM task. It is anticipated that an updated (from the prototype presented during the meeting on June 20th) SRM Web App will be available for testing and evaluation as well as utilization to satisfy Task 2.3.4a.

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 following month, the group will continue to work on all of the above items with a focus on gathering data on the newly added fields related to girder details, in particular steel plate girders. Calculations will continue to be done for the moment of inertia of noncomposite/composite sections and stiffness, as well as load distribution factors for each bridge. Statistics will also continue to be collected from previously extracted data as these new calculations are being performed in order to help better understand where any issues may lay. Analysis of all data collected will continue to be done in order to ensure it is of the highest quality and is being represented as accurately as possible on the InfoBridge 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 8/1/2018 – 8/31/2018	Cumulative Expenditures 10/1/2017 – 8/31/2018
Rutgers, the State University of New Jersey	$ 115,860.00	$ 707,582.59
Bridge Intelligence LLC	$ 2,535.00	$ 68,191.39
Pennoni Associates	$ 0	$ 33,138.00
Infratek Solutions	$ 0	$ 25,244.00
New Jersey Institute of Technology	$ 3,132.22	$ 21,668.38

H. Subcontractor's Progress Report