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

LONG-TERM BRIDGE PERFORMANCE PROGRAM

PROGRESS REPORT NO. 10

Report Period: July 1, 2018 – July 31, 2018

Prepared For:

Federal Highway Administration

Prepared By:

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: 41 hours

Co-PI: 1 hour

Project Support: 4 hours

2. Develop LTBP Program bridge performance strategic research matrix

In the month of July, work continued framework for the strategic research tool (Task 2.3) presented to and approved by FHWA on June 20th, 2018. Subtasks and their percent completion are as follows:

Task 2.3.1 – *Develop/finalize pipeline for automated data retrieval and storage*:

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. After a manual review of a few dozen query results, was found that NTL does not provide a sufficient amount of additional project or publications than what has already been obtained through TRID and therefore will not be included as an additional data source. However, it should be noted that the Rutgers team 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*:

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*:

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*:

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*:

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.

Project Engineer: 27.92 hours

Staff Engineer: 165.00 hours

Technician: 19.70 hours

Project Support: 14 hours

3. **Conduct training for all field personnel on LTBP Protocols**

Efforts in July were focused on finalizing the protocols training material with the intent to compliment the planned data collection activities for 2018. The following tasks were visited/revisited in July:

- 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
- Planned and drafted 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
- Changed title from "Data Collection Grid & Coordinate System" to "Onsite Pretest Activities: Site Preparation, Data collection Grid & Coordinate System" to include the full spectrum of onsite pretest activities
- Added slide titled "Referenced Protocols" which list an overview of each applicable FIELD-VISIT protocols for onsite pretest activities
- Added two "Site Preparation" slides which overview these activities
- Updated outline slide to reflect contents
- Updated protocol naming and numbering for:
    - Steel superstructure
        - Deterioration
        - Corrosion
        - Section loss

- - - Cracking, deflection, rotation, and impact damage
    - o Concrete
      - Superstructure
      - Substructure
      - Abrasion
      - Cracking
      - Spalls and delamination (deck, superstructure, and substructure)
      - Sulfate Attack
    - o Rocker bearings
    - o Elastomeric bearings
    - o Expansion Joints
    - o Drainage system on bridge decks and approach slabs
  - Updated data collection tables for elastomeric bearings,
  - Removed slides pertaining to (as they are not addressed in the published protocols):
    - o Concrete superstructure
      - Moisture and efflorescence
    - o Concrete substructure
      - Moisture and efflorescence
    - o Bearings
      - Pot bearings
    - o Condition assessment of asphalt overlay
  - Re-ordered and re-labeled chain dragging specific slides to incorporate within FLD-DC-VIC-003: Concrete Deck – *Spalls and Delamination* related material. These slides were placed before FLD-DC-VIC-004: Concrete Superstructure and Substructure – *Spalls and Delamination* slides and the background slides for FLD-DC-VIC-004 were placed before the FLD-DC-VIC-003 slides to give context.

Staff Engineer: 40 hours

Project Engineer: 41 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 July:

- 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

- 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 begun 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 (see appendix). Rolled steel girder shapes as well as specific PS concrete shapes are also being extracted from the bridge plans in order to provide more structural properties for these girders (see appendix).
- Calculations for the following bridge attributes have begun and are being added to the main excel data extraction sheet for the following fields:
    - Moment of inertia of noncomposite section
    - Moment of inertia of composite section (if applicable)
    - Stiffness of superstructure
- Miscellaneous updates and minor fixes to some of the bridge structure numbers and other fields were made which will allow for a smoother upload of extracted data to the InfoBridge server.

CO-PI: 5 hours

Project Engineer: 40 hours

Staff Engineer: 125 hours

Technician: 289 hours

Project Support: 21 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: 21 hours

Staff Engineer: 165 hours

Project Support: 21.5 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 August 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. Calculations will continue to be done for the moment of inertia of noncomposite/composite sections and stiffness, while load distribution factors for each of the bridges will begin to be calculated as well. Statistics will also continue to 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 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 7/1/2018 – 7/31/2018	Cumulative Expenditures 10/1/2017 – 7/31/2018
Rutgers, the State University of New Jersey	$ 89,655.50	$ 591,722.59
Bridge Intelligence LLC	$ 3,510.00	$ 65,656.39
Pennoni Associates	$ 0	$ 33,138.00
Infratek Solutions	$ 0	$ 25,244.00
New Jersey Institute of Technology	$ 4,905.14	$ 18,536.16

H. Subcontractor's Progress Report

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

LTBP TSSC
Federal Contract # DTFH61-17-D00001

PROGRESS REPORT NO. 7
For the Period from 7/1/2018 through 7/31/2018

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)

During this period, corresponded with two emails regarding communications with the FHWA team.

Number of hours during this period: 1 hours

This task is approximately 50% complete.

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

Nothing was done during this period.

Number of hours during this period: 0 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 perform QA/QC control on the data.

Number of hours during this period: 5 hours

This task is approximately 90% 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

- Worked on the XML version of the new RABIT as well as the old XML versions and provided answers to FHWA questions regarding these versions and future versions

Number of hours during this period: 21 hours

This task is approximately 65% 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	27	$ 3,510

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
1 hr	0	0	0	5 hrs	0	21 hrs	27 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 7/1/2018 through 7/31/2018

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, NJIT continued to review relationships for the Strategic Research Matrices. Further investigation was conducted on different input/output relationships to help identified research initiatives and directions. The keyword list was further updated to identify relationships surrounding vehicular loading, maintenance actions, environmental conditioning, and preservations techniques.

Number of hours during this period: 47.6

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	3.5	$69/hour
Matthew Bandelt	Project Engineer	14	$127/hour
Matthew Adams	Project Engineer	14	$127/hour
Mandeep Pokhrel	Technician	16	$69/hour

Task 2	Task 3	Task 4	Total
47.6	0	0	47.6 hrs

E. Travel
None.