

**PROJECT TITLE: PERFORMANCE OF EXISTING ABC PROJECTS,
OUTREACH, AND CENTER OPERATION**

**Quarterly Progress Report
For the period ending May 31, 2020**

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**ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER**

Submitted to:
ABC-UTC
Florida International University
Miami, FL

1. Background and Introduction

The concept of Accelerated Bridge Construction (ABC) using precast and prefabricated bridge elements is gaining popularity among transportation agencies primarily to minimize traffic delays and costs. Some other benefits associated with the ABC techniques are reduced on-site construction time, reduced impact on mobility, better work zone safety and improved quality. This project has two components. The first component involves performance evaluation of three existing ABC projects. These projects will be selected in cooperation with the Oklahoma Department of Transportation and the ABC-UTC leadership at the Florida International University. The second component involves outreach (summer camp) and center operation.

2. Problem Statement

The first component of this project involves performance assessment of two existing ABC structures. Unlike many UTCs, the ABC-UTC at Florida International University (FIU) develops projects with inputs from the stakeholders and leadership in professional organizations such as AASHTO and TRB. Some ABC-UTC projects are pursued by multiple partner institutions together, which address differences in materials, designs, construction, and maintenance and evaluation practices. Assessment of conditions of ABC projects is one such project where each partner institution is expected to evaluate at least two existing structures. Because the number of ABC projects in Oklahoma is limited, it is possible that one or both ABC projects evaluated in this study may be in a neighboring state. Both selection and assessment of conditions will be done in cooperation and collaboration with the Oklahoma Department of Transportation (ODOT) and the ABC-UTC leadership. Iowa State University was designated as the lead for this project.

The second component involves outreach and center operation. The Rawl Engineering Practice Facility (REPF) at the OU Gallogly College of Engineering is a unique facility for outreach. Thousands of potential engineering students (elementary through high school) are exposed to various engineering disciplines each year through this facility. Two specific activities were proposed: (a) develop a hands-on type activity in which potential engineering students will be exposed to accelerated bridge construction; (b) organize an ABC-oriented summer camp. For the first activity, the specifics were identified in consultation with the REPF outreach coordinator. New outreach activities in REPF are generally developed by SEED scholars. The ABC-UTC Associate Director worked closely with the REPF outreach coordinator to identify a SEED scholar for this purpose. OU Gallogly College of Engineering (GCoE) organizes several summer camps each year. In part (b), we proposed to organize a Summer Camp in 2019. For logistic issues, we could not organize the summer camp in 2019. Instead, we focused on organizing seminars and tech transfer events. This quarterly progress report summarizes the activities undertaken during the reporting period ending on May 31, 2020. Dr. Royce Floyd and Dr. Musharraf Zaman have developed ideas (UHPC-oriented) for a possible summer camp in 2020 and submitted to GCoE leadership for logistic support. Whether we can organize this summer camp this year would depend upon the COVID-19 situations. Organizing periodic workshops and seminars are part of workforce development effort of ABC-UTC. Consequently, a portion of the OU budget is used for these activities.

3. Research Approach and Methods

Assessing conditions of existing ABC structures is considered an important goal of the ABC-UTC. Assessment of conditions of existing ABC structures provides useful data for

improvements in design, construction, and maintenance. Therefore, this element of the proposed project is considered important to achieving the overall objectives of Cycle 2 projects.

In addition to research, outreach and workforce development are important elements of the success of a University Transportation Center. It is expected that the activities proposed in these areas will be of benefit to ABC-UTC. A cost-effective and efficient operation of the ABC-UTC at each partner institution is important to achieving the overall objectives of the ABC-UTC. The proposed budget reflects a balance between research and other components, in an overall sense.

4. Description of Research Project Tasks

The following is a description of tasks carried out to date.

Task 1 – Identify and Assess three ABC Bridges (Bridge Inspection: 100%; Final Report (50%))

Proposed task description:

Three ABC bridges will be identified in collaboration with the Oklahoma Department of Transportation and the ABC-UTC leadership at Iowa State University for this project. An assessment plan will be developed and executed. Priority will be given to ABC projects located in Oklahoma. The OU research team will work with the other partner institutions to make sure a uniform assessment plan is developed and executed.

Description of work performed up to this period:

We met with the Assistant Bridge Division Engineer, Walt Peters and identified two bridges in Oklahoma that meet the ABC criteria for this project. The following bridges were selected:

- A. Slide-In Bridge Construction (SIBC) – Bridge over Cottonwood creek on State Highway 51, just west of SH-48. Installed in 2013. It is a three-span slide-in that replaced a six-span bridge.
- B. Prefabricated Bridge Elements and Systems (PBES) – Bridge over Keystone Lake Spillway. Installed in 2014, this bridge includes prefabricated panels transversely with post tensioning longitudinally.

A third ABC bridge in Oklahoma, which is a slide-in railroad bridge built in 2018 at the Broadway Extension and NW 50th street in Oklahoma City, was discussed but considered a poor candidate. It is a massive corten (weathering) steel truss bridge that has a design lifespan of 100 years which suggested that there would be very little degradation since it was built.

The team contacted engineers in both Kansas and Texas to help select the third candidate bridge, but the idea of having an additional bridge was dropped subsequently because of budgetary and time constraints.

Inspection visits to both the Slide-In Bridge Construction (SIBC) – Bridge over Cottonwood creek on SH 51 and the Prefabricated Bridge Elements and Systems (PBES) – Bridge over Keystone Lake Spillway, were performed by the PI, Dr. Ramseyer. Figures 1 and 2 were taken

during the bridge inspections. Additional photographs taken during the inspection of the Slide-In Bridge Construction (SIBC) – Bridge over Cottonwood creek on SH 51 were included in the previous quarterly progress report submitted in February 2020. Photographs taken during the inspection of the Prefabricated Bridge Elements and Systems (PBES) – Bridge over Keystone Lake Spillway were also included in the quarterly progress report submitted in February 2020.

Dr. Ramseyer is preparing a report documenting the conditions of these bridges. In a recent conference call, held on May 6, all consortium members reviewed the scope of this collaborative project. While some consortium members (FIU, OU and Iowa State) have conducted inspections of selected ABC bridges, the other consortium members (UNR and UW) have not done their inspection yet. It was suggested that the inspection report from each partner include an overview of the most recent State DOT inspection report. Once a draft is prepared it will be submitted to the lead institution (Iowa State) for comments. The report will be revised accordingly. The compiled report will be submitted to FIU by Iowa State.



Figure 1 - Slide-In Bridge Construction (SIBC) –Selected Photographs of Bridge over Cottonwood creek on state highway 51, just west of SH-48.



Figure 2 - Prefabricated Bridge Elements and Systems (PBES) – Selected Photographs of Bridge over Keystone Lake Spillway.

**Task 2 – Outreach through REPF, Summer Camp, Seminars and Center Operation
(Activities: 85%; Final Report: 0%)**

Proposed task description:

As outlined before, two outreach activities were proposed: (a) develop a hands-on type activity in which potential engineering students will be exposed to bridge construction with accelerated bridge construction elements; (b) organize an ABC-oriented summer camp. The hands-on activities are designed by a SEED scholar, Wesley Harris, who is an undergraduate student in

Architectural Engineering. One of the activities involves constructing a truss bridge using wooden sticks offsite, placing it on support, and load testing. A prototype was built before the OU Norman campus was closed due to COVID-19 and access to the Rawl Engineering Practice Facility (REPF) was suspended. Once REPF opens the project will be activated and used as an outreach activity for students visiting REPF.

The 2019 summer camp could not be materialized due to lack of logistic support. Instead, we focused on organizing seminars and tech transfer events, including Oklahoma Transportation Research Day (OTRD) and Summer Symposium. The 2020 OTRD is scheduled for October 20. Several presentations on UHPC are planned for this event. Also, in collaboration with SPTC, the team is in the process of scheduling several webinars. Two of these webinars are expected to be offered in June and July. Also, Dr. Royce Floyd and Dr. Musharraf Zaman have developed ideas (UHPC-oriented) for a possible summer camp in 2020 and submitted it to the GCoE leadership for logistic support. Currently, it is on hold due to COVID-19. Whether we can organize this summer camp this year would depend upon OU's decision to open the campus to students. The center operation includes attending of annual progress review meeting, submitting progress reports, and responding to requests for information in a timely manner.

Description of work performed up to this period (over 90% done overall):

Task 3- Prepare Final Report (Progress: 0%)

Proposed task description:

A final report will be prepared based on the outcome of the project. The final report will be submitted to the ABC-UTC and other professionals for further review.

Description of work performed up to this period:

Not pursued during this reporting period.

5. Expected Results and Specific Deliverables

The deliverables of the first element constitute a short report documenting the conditions of the ABC structures evaluated, along with illustrative photographs/sketches. The outcomes of the outreach activities will be reported in progress reports. It will include such data as the number of potential engineering students exposed to ABC-UTC and number of students attending the summer camp, if held this summer. An anonymous survey of the summer camp may be conducted, and an overview of response summarized, if it is held this year. If the summer camp is not held because of COVID-19, emphasis will be placed on 2020 OTRD, seminars and tech transfer.

