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

**Quarterly Progress Report**
**For the period ending August 31, 2019**

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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 are 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 will involve 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 each partner institution, which addresses differences in materials, designs, construction, and maintenance 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.

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 are 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 will be identified in collaboration with the ABC-UTC leadership and the REPF outreach coordinator. New outreach activities in REPF are generally developed by SEED scholars. The ABC-UTC Associate Director will work 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 propose to organize a Summer Camp this coming summer. We intended to organize a summer camp this year (2018), but we did not have enough lead time. This time we plan to allocate enough lead time and work with the GCoE staff to ensure success. We will work closely with the ABC-UTC leadership to develop specific elements of the program and participation. The center operation includes attending of annual progress review meeting, submitting progress reports, and responding to requests for information in a timely manner. Organizing periodic workshops and seminars are part of workforce development. A portion of the budget will be used for these activities as well.

# 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 designs, constructions, and maintenance. Therefore, this element of the proposed project is considered important to achieving overall objectives of Year 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 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 (25% done)

*Proposed task description:*

Three ABC bridges will be identified in collaboration with the Oklahoma Department of Transportation and the ABC-UTC leadership at the FIU. 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 the state of Oklahoma that meet the ABC criteria for this project. These consist of the following:

A. Slide-In Bridge Construction (SIBC) –Bridge over Cottonwood creek on state highway 51, just west of SH-48. Installed in 2013. Appendix A shows the general plan and elevation. It is a three span slide-in that replaces a six span bridge.
B. Prefabricated Bridge Elements and Systems (PBES) – Bridge over Keystone Lake Spillway. Installed in 2014. Prefabricated panels transversely with Post Tensioning Longitudinally

A third ABC bridge in Oklahoma, a slide-in rail road bridge built in 2018 at the Broadway Extension and NW 50$^{th}$ street in Oklahoma City was determined to be a poor candidate. It is a massive corten (weathering) steel truss bridge that has a design lifespan that suggests there will be very little degradation since it was built.

We have contacted engineers in both Kansas and Texas to help select the third candidate bridge.

Initial visits to both the Slide-In Bridge Construction (SIBC) –Bridge over Cottonwood creek on state highway 51 and the Prefabricated Bridge Elements and Systems (PBES) – Bridge over Keystone Lake Spillway, have been performed by the PI. A further visit coordinated with the local Division Engineer of ODOT is planned for the next quarter.

**Task 2 – Outreach through REPF, Summer Camp, Seminars and Center Operation (35% done).**

*Proposed task description:*

Two outreach activities are 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. The center operation includes attending of annual progress review meeting, submitting progress reports, and responding to requests for information in a timely manner. Organizing periodic workshops and seminars are part of workforce development. Funds are allocated for these activities in Year 2. The workforce development activities will be pursued in collaboration with the Southern Plains Transportation Center (SPTC).

*Description of work performed up to this period:*

ABC-UTC and Southern Plains Transportation co-hosted the 2019 Summer Symposium. This one-day event was held on Thursday, August 8 at the National Cowboy and Western Heritage Museum in Oklahoma City. About 100 people from the government agencies, academic community, and private sector attended. The afternoon session (see attached program) was dedicated to concrete materials. One of the presentations, "Ultra-High Performance Concrete for Bridge Retrofit" was specifically related to ABC-UTC. Some of the posters presented at the Poster Session (e.g., "Accelerated Bridge Construction Using Large-Block GRS Abutments," "Performance Monitoring of GRS Bridges in Oklahoma," and "Use of Sensor-Enabled Geosynthetics (SEG) for Performance Monitoring of GRS Bridge Abutments and MSE Walls") were also closely related to ABC-UTC topics.

We have recently recruited a SEED scholar, Wesley Harris, to design some hands-on activities for K-12 students visiting Rawl Engineering Practice Facility at Gallogly College of Engineering at the University of Oklahoma. The goal is to design the activity during this fall semester and use it for outreach in spring semester next year.

**Task 3- Prepare Final Report (35% done)**

*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. An anonymous survey of the summer camp may be conducted, and an overview of response summarized.

# 6. Schedule

Progress of tasks in this project is shown in the table below.

| Item | % Completed |
|---|---|
| Percentage of Completion of this project to Date | 30% |

| Research Task | 2019 | | | | | | | | | | | | 2020 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A |
| Task 1a – identify ABC structures | | | | | | | | | | | | | | | | | | | | |
| Task 1b – Assess ABC structures | | | | | | | | | | | | | | | | | | | | |
| Task 2 – Outreach through REPF Summer Camp, workshops / seminars and center operation | | | | | | | | | | | | | | | | | | | | |
| Task 7- Prepare Final Report | | | | | | | | | | | | | | | | | | | | |
| | | Work Performed | | | | | | | Work to be Performed | | | | | | | | | | | |

# Appendix A