

**PERFORMANCE OF EXISTING ABC PROJECTS – INSPECTION CASE STUDIES.**

**Quarterly Progress Report  
For the period ending November 30, 2020**

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**ACCELERATED BRIDGE CONSTRUCTION  
UNIVERSITY TRANSPORTATION CENTER**

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

# 1. Background and Introduction

ABC methods have been used on many projects, and have been shown to save time on site. That aspect of the approach is beyond question. However, the subsequent life expectancy of ABC bridges has received less study, and some uncertainty remains over their ability to resist the ravages of time, typically seen in the form of physical damage (due to studded tires, snow-plow hits, thermal expansion, etc.) and chemical damage, for example due to corrosion. Frequent closures for repair counteract the original benefits of ABC.

## 2. Problem Statement

Studies are needed to catalog the performance of ABC bridges in practice, and thereby to allow feedback to designers so that they can ensure not only the short-term benefits of rapid construction, but also the long-term benefits of durable bridges.

## 3. Objectives and Research Approach

The objective is to select two bridges in Washington State and to document their performance over time under service loads, particularly with respect to their ABC features. That performance will then be presented in the common format agreed among Center participants, to facilitate comparison of the effectiveness of different ABC techniques.

## 4. Description of Research Project Tasks

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

### **Task 1 – Agree a Common Reporting format**

Discuss with center personnel and partner university representatives to agree on a common format for reporting findings. This, alongside the inspection criteria to be developed by ISU, will guide the characteristics to be monitored and evaluated.

*Description of work performed up to this period.* We have contacted ISU for inspection criteria and have contributed to a web-based discussion of criteria. We await guidelines from the Center with respect to a common format.

### **Task 2 – Review WA State ABC bridges**

The known bridges in Washington State that were constructed using ABC techniques will be reviewed, and two of them will be selected for study. The researchers are already familiar with two bridges associated with I-5 that might prove instructive. The I-5 Ravenna undercrossing in Seattle was constructed using a very time and cost-effective approach in which prestressed concrete piles were driven but left projecting sufficiently far above grade that they acted as columns as well. This allowed for extensive time savings during on-site construction. The bridge was constructed in the 1960s, so provides a unique window into the long-term durability of an iconic ABC structure. The second likely candidate is the Skagit River Replacement Bridge that carries I-5 over the Skagit River, some 50 miles north of Seattle. It was installed in 2014 using a lateral slide under a design-build contract. I-5 is a critical West Coast corridor from Canada to

Mexico, so closure time was a high priority. Furthermore, the bridge used lightweight concrete deck bulb tees (in order not to exceed the weight capacity of the original piers) connected by a conventional concrete pour strip. It thus has many features of critical interest.

*Description of work performed up to this period.* A number of bridges are under review, including the Ravenna undercrossing (precast columns), the Skagit River Bridge (lateral slide), the Grand Mounds Overcrossing (PBES), 405 exit ramp (lateral slide), 520 approach span (precast columns), Boeing Renton facility water crossing, and others. Some of these are relatively modern, and so have had little opportunity to deteriorate. It may be more profitable to consider other, older bridges using precast technology, but that were built before the term ABC came into vogue. We will consult the center on the issue. We have already inspected two of the bridges (Ravenna and 520), and have visited the Skagit River bridge and held discussions with the contractor who did the replacement.

### **Task 3- Selection of Candidate Bridges**

Two bridges will be selected, in collaboration with the WSDOT. While the two bridges mentioned in Task 2 have attractive characteristics, we will nonetheless work with WSDOT to review the full range of candidate bridges.

*Description of work performed up to this period.* Final selection has not yet been made.

### **Task 4 – Collection of data.**

This will include construction records, subsequent maintenance records, discussions with DOT Bridge Preservation personnel, and a site visit to each bridge to permit inspection and photographs (if such features as are not already documented by the DOT). The data collection will be conducted in collaboration with the other partner universities, after pooling knowledge about the most appropriate data to seek and methods for acquiring it. Collaboration at this stage will help to generate a consistent presentation when the data from the different institutions is subsequently

*Description of work performed up to this period.* As stated in Task 2, we have already made several site visits and inspections.

### **Task 5 – Review Data**

Review the data, and discussions with DOT personnel as needed, to resolve any uncertain features.

*Description of work performed up to this period.* None yet.

### **Task 6 - Preparation of the report to the ABC-UTC Center.**

*Description of work performed up to this period.* None yet.

## 5. Expected Results and Specific Deliverables

The research will result in records of data on the serviceability of two ABC bridges. When these records are combined with those from the partner universities, they will form a valuable database that potential owners and engineers can use to predict the long-term performance of ABC projects that they are planning. Such information is presently transmitted largely on an ad-hoc basis through personal contacts. A co-ordinate database, replete with photographic and numerical records, will greatly facilitate the successful implementation of ABC.

## 6. Schedule

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

Task	Description	Year	2020					2021							
			Mo.	S	O	N	D	J	F	M	A	M	J	J	A
1	Agree common reporting format			■	■	■	■								
2	Review WA State ABC bridges			■	■	■	■	■							
3	Selection of candidate bridges							■							
4	Collection of data			■	■	■	■	■	■	■	■				
5	Review data										■	■	■		
6	Final report												■	■	■
	Task proposed		■												
	Task in progress		■												
	Task complete		■												

## 7. References