

**PERFORMANCE OF EXISTING ABC PROJECTS: INSPECTION
CASE STUDIES**

**Quarterly Progress Report
For the period ending September 3, 2019**

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1. PROJECT ABSTRACT

Several ABC projects have been completed or currently on going around the country. Some state DOTs have adopted ABC and completed several ABC projects (e.g. Iowa, New York, Utah) while other states are implementing or in the planning process for pilot ABC projects (e.g. Nevada). The goal of this project is to collaborate with all partner institutions in the ABC-UTC to inspect and check the performance of existing ABC projects and activities in the different regions of the country.

2. RESEARCH PLAN

2.1. STATEMENT OF PROBLEM

Over the past decade or two, several bridge replacement, retrofitting, or new construction projects have relied heavily on prefabricated elements for accelerated bridge construction. Some of the ABC projects used precast girders, bent caps, columns, or more commonly deck panels and used field connections using evolving advanced materials such as UHPC. Figure 1 shows an example for an ABC project recently completed in California through Caltrans for the widening of the San Mateo-Hayward Bridge.

Many of the ABC connections and details have been verified experimentally in several research laboratories around the country. However, the life-cycle performance of such connections or details especially when applied to real life projects has not been fully verified. Thus, field inspection of existing ABC projects can be beneficial in providing more insight and data on ABC projects performance and is the goal of this collaborative effort within the ABC-UTC.



Fig. 1 – San Mateo-Hayward Bridge Widening Project in California using prefabricated elements (courtesy of Caltrans ABC pilot program, Roberto Lacalle)

2.2. RESEARCH APPROACH AND OBJECTIVES

At UNR, the research team will coordinate with the ABC-UTC partner universities to acquire the performance evaluation and inspection framework that will be developed by ISU. PI Moustafa will work with Caltrans and possibly Nevada DOT to select ABC projects and case studies and

coordinate inspection efforts. Tentatively, two projects will be inspected in this project in the Fall 2019 or Spring 2020 timeline. The following tasks will be conducted.

Task 1 - Identify ABC projects in Nevada and California for inspection

The team at UNR has been in contact with Caltrans and Nevada DOT to identify potential ABC projects with some unique aspects that could complement other ABC projects inspected by the other ABC-UTC institutions. One potential project in Nevada is the recently completed I-15 / US 93 Garnet Interchange in Las Vegas, NV shown in Figure 2. The main challenge with this bridge is the high traffic loads on I-15 highway in Las Vegas, so inspection would not be possible without traffic control. Thus, this bridge is being considered as an option but will not be given priority unless the UNR team could align an inspection visit with the NDOT crew for the biannual inspection scheduled in late 2020.



Fig. 2 – I-15 / US 93 Garnet Interchange ABC bridge in Las Vegas, NV completed in Dec 2018

Two other options have been considered as well in California. One project is the Fort Goff Creek Bridge in Northern California which was completed in 2014 and got several ABC aspects such as: precast superstructure, precast abutments and wingwalls, and prefabricated rails. Some of the Fort Goff Creek project ABC aspects are shown in Figures 3 and 4. The other potential project is the Laurel Street Overcrossing in California which is more recent and completed in 2018. The ABC aspects of the Laurel Street bridge are very unique and include: precast girders, precast drop cap beam, precast columns, and grouted duct seismic column-to-cap beam connections filled with UHPC. Figures 5 and 6 show some of these aspects.



Fig. 3 – Precast abutment segments for Fort Goff Creek bridge in California (photos are courtesy of Dorie Mellon as adopted from Caltrans ABC-UTC seminar)



Fig. 4 – Wingwalss and abutment assembly (left) and deck precast segments (right) for Fort Goff Creek bridge in California (photos are courtesy of Dorie Mellon as adopted from Caltrans ABC-UTC seminar)



Fig. 5 – Precast columns and drop bent cap for Laurel Street Overcrossing project in California (photos are courtesy of Dorie Mellon as adopted from Caltrans ABC-UTC seminar)



Fig. 6 – Installing a precast girder for Laurel Street Overcrossing project in California (photos are courtesy of Dorie Mellon as adopted from Caltrans ABC-UTC seminar)

Task 2 – Finalize ABC project selection and coordinate visits schedule

In consulting with other ABC-UTC institutions and members of this center-wide activity, the ABC aspects that are preferred to be featured and inspected in Western United States by the UNR team will be identified. If such aspects exist in one or more of the previously identified bridges in Task 1, final coordination with state DOTs will proceed. Another key aspect of this task is to acquire the inspection protocol form ISU among other ABC-UTC institutions to define the main objectives and outcomes of the anticipated bridge site visits and inspections.

Task 3 – Conduct bridge inspection visits

This task is anticipated to take place late fall 2019 or early/mid spring 2020 where two bridges that will be selected based on Tasks 1 and 2 will be inspected by UNR team. At least the PI and one graduate student are planning to participate in the inspection trips to help document the inspection properly through pictures, filling forms, etc.

Task 4 – Document inspection through a project report

A final report describing the details of the inspection results and performance of ABC projects will be prepared and submitted to the ABC-UTC for review and comments.

3. TIME REQUIREMENTS

To allow for the completion of all the project tasks, the study will be conducted over a period of 12 months (4 quarters) following this schedule:

Task 1: June 2019 – August 2019 (completed)

Task 2: September 2019 – December 2019 (in progress)

Task 3: December 2019 – March 2020 (remaining)

Task 4: April 2019 – May 2019 (remaining)

Based on presented progress and schedule, the percentage of completion of this project is as follows:

Item	% Completed
Percentage of Completion of this project to Date	20