IDENTIFY THE RISK FACTORS THAT CONTRIBUTE TO FATALITIES AND SERIOUS INJURIES AND IMPLEMENT EVIDENCE-BASED RISK ELIMINATION AND MITIGATION STRATEGIES

Quarterly Progress Report
For the period ending November 30, 2018

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Submitted to:
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1 Background and Introduction

Construction activities related to bridge replacement and rehabilitation are significant contributors to safety hazards. The safety hazards attributed to construction work zones are alarming and accordingly, safety is a major focus of 2018-2022 US DOT Strategic plan. One of the most important advantages of ABC is to improve the safety, which is achieved by reducing onsite construction activities and thereby reducing accidents, injuries to workers and public. No good documentation is available yet for this major ABC advantage. This collaborative project with FIU and ISU aims at filling such gap. The overall objective of this project is to provide quantitative data supporting the fact that ABC does improve safety relative to conventional construction. The output of this project can provide future evidence and justification that can be used by state DOTs to further implement ABC and consider ABC for new construction.

2 Problem Statement

Construction activities related to bridge replacement and rehabilitation are important contributors to traffic jams and reduced mobility and, most importantly, to safety hazards. The safety is a major focus of 2018-2022 US DOT Strategic plan. The safety hazards attributed to construction work zones are alarming. “There were 87,606 crashes in work zones in 2010. There were 37,476 injuries in work zones in 2010. This equates to one work zone injury every 14 minutes (over 102 per day), or about four people injured every hour. In 2010, there were 514 fatal motor vehicle crashes in work zones, resulting in 576 fatalities. These 576 fatalities equate to one work zone fatality every 15 hours” (http://www.ops.fhwa.dot.gov/). One of the most important advantages of ABC is to improve the safety, which is achieved by reducing onsite construction activities and thereby reducing accidents, injuries to workers and public. However, up until now there has been no good documentation of this ABC advantage. This project will provide quantitative data supporting the fact that ABC does improve safety.

3 Research Approach and Methods

Onsite construction time required for a bridge replacement can be reduced from a year or more using conventional construction, to a few weeks or less using ABC technologies. This significant reduction of time in the work zone translates to vastly improved safety for the traveling public and construction crews. A benefit/cost analysis for the reduced number of days of work zones due to the use of ABC requires 1) an estimate of the number of crashes avoided, and 2) the monetary value of each avoided crash, including a breakdown of fatalities and injuries for each. The U.S. DOT’s Value of Statistical Life (VSL) can be used to determine the monetary value of each avoided crash, as discussed on the U. S. DOT Office of Safety website. Also discussed is the use of the Maximum Abbreviated Injury Scale (MAIS) for fractional values to assess the benefit of preventing an injury crash.

In this project, the data described above can be compiled and interpreted through collaborative efforts between UNR, FIU, and ISU. A detailed research plan will be outlined. However, a

preliminary plan is for data that can be provided by FIU and processed and interpreted between UNR and ISU. The overall objective of this project is to provide quantitative data supporting the fact that ABC does improve safety relative to conventional construction. Literature search will include work of USDOT Office of Safety and recently completed ABC-UTC total costs research projects at FIU. The output of this project can provide future evidence and justification that can be used by state DOTs to further implement ABC and consider ABC for new construction.

4 Description of Research Project Tasks

Based on the identified problem statement above, proper data is not yet available and accordingly, the following research tasks are proposed and will be conducted to provide foundational work for future safety analysis. A summary of the proposed research tasks is as follows:

Task 1 – Conduct a thorough literature review to identify safety analysis procedures and results related to work zones in general, and specify any bridge-related analyses.

Task 2 – Collect and process traffic safety and crash data from AADT dataset for Nevada and narrow down the data for bridge construction projects if possible. Based on the collected data, analysis of the crash data will be conducted and tied to generic work zones versus bridge-related projects if possible.

Task 3 – Conduct analysis using the NDS database. This task is pending the availability of SHRP2 data pertaining to bridge construction projects. The PIs will contact the NDS database administrator at Virginia Tech to identify potential trip data that can be used to analyze behavior and crash risk in bridge-related construction projects.

Task 4 – Conduct preliminary analysis using data from Task 2 (and possibly Task 3) to quantify safety in work zones versus bridge sites as it relates to construction time, which can set the stage for quantifying lower safety risks for future ABC projects.

5 Expected Results and Specific Deliverables

- Final Report

6 Schedule

The expected timeline for each task is as follows:

Task 1: complete by Dec 2018 (in progress)

Task 2: complete by February 2019

Task 3: complete by April 2019

Task 4: complete by July 2019