

**MULTI-SPAN LATERAL SLIDE LABORATORY INVESTIGATION:  
PHASE 1**

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

Submitted by:  
PI- Katelyn Freeseaman, Justin Dahlberg, and Brent Phares  
Research Assistant- Cody Gastel

**Affiliation: Department of Civil, Construction and Environmental Engineering  
Iowa State University**



**ACCELERATED BRIDGE CONSTRUCTION  
UNIVERSITY TRANSPORTATION CENTER**

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

## **1. Background and Introduction**

While single span lateral slides have been adopted by many states and are a common ABC method for construction of bridges when short closure durations are needed, multi-span lateral slides are far less common. A multi-span lateral slide incorporates additional construction complexities that must be considered by the designer, agency and contractor.

## **2. Problem Statement**

Lateral slide-in bridge construction (sometimes referred to as slide-in bridge construction) has gained increasing attention as a viable Accelerated Bridge Construction (ABC) approach. With lateral slide construction, the majority of the bridge superstructure is constructed off alignment, typically parallel to the final position, and usually on a system of temporary works. The construction of this portion of the bridge is often completed while the original bridge is still open to traffic. In some instances, portions of the substructure are also constructed while the original bridge is still open to traffic – a technique designed to further reduce traffic impacts. Common techniques for accomplishing this include building substructure elements outside of the original bridge footprint as well as using innovative techniques to complete construction under the bridge with consideration of clearance limitations, stability of the underlying soil, and others. Once the construction of the superstructure is essentially complete, the original bridge is demolished and new substructure construction is completed. Then, usually over a relatively short period time (hours to a day commonly), the new bridge superstructure is slid laterally from the temporary worksite onto the in-place substructure.

While many DOTs have completed lateral slide construction of single span bridges and have common connection details already established, these details do not directly apply to multi-span slides. The addition of more spans creates a more complex system that will require connections (and other details) that were previously not needed in a single span slide. Further, the fact that the multi-span bridge will need to slide on abutments plus piers (as opposed to just abutments in a single span case) creates possible uplift and overturning scenarios.

## **3. Research Approach and Methods**

The objectives of this project will be achieved via these three tasks:

1. Literature Review
2. Analytical Investigation and Establish Testing Plan
3. Summary and Recommendations for Phase 2

## **4. Description of Research Project Tasks**

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

### **Task 1 – Literature Review**

To prepare the current proposal, the research team has conducted a preliminary review of relevant information. For Task 1 of this project, the research team will compile all related information available in journals, conference proceedings, technical reports, and online resources in a concise and comprehensive summary. Note that match funds for this project are coming from an existing Iowa DOT project, so some of this work will be completed in conjunction with that project.

*The literature review is currently underway. The following agencies have been identified as having using slide-in bridge construction for a multi-span bridge:*

- *Michigan*
- *Minnesota*
- *Missouri*
- *New York*
- *Oregon*
- *South Carolina*
- *Washington*

*These previous projects will serve as a starting point for further exploration.*

### **Task 2 – Analytical Investigation and Establish Testing Plan**

Following the presentation of information collected in Task 1, the research team will be prepared to begin a preliminary analytical investigation of the variables impacting the performance of multi-span bridges constructed using slide in construction. To complete this preliminary analytical investigation, the team will develop various finite element models of a case study bridge and then complete a parametric study of the influence of various structural details. When the results are combined with the results of Task 1, the research team will be in a position to determine the need for additional work and recommend the most appropriate additional investigations to be completed in Phase 2 of this work. Although it is too early to make predictions as to the need for additional work, it is the team's opinion that additional work could be in the form of either greater analytical and/or experimental evaluations or both. In either case, it is likely that the additional work could consist of full scale evaluations or the evaluations of individual connections on small scale components.

Based on the findings from Task 1, knowledge gaps with respect to the construction of a multi-span lateral slide bridge will be identified. These areas which would benefit from further investigation will be addressed via proposed laboratory testing. This task will result in multiple suggested laboratory testing plans that will be proposed for further work in Phase 2 of the project.

### **Task 3 – Summary and Recommendations for Phase 2**

The efforts associated with Tasks 1 and 2 will be summarized and areas for future work will be identified. This will mainly consist of proposed laboratory testing that would be beneficial for agencies looking to proceed with a multi-span lateral bridge slide.

## **5. Expected Results and Specific Deliverables**

A comprehensive literature review on the use of multi-span lateral slides for ABC construction will be compiled, along with proposed laboratory and/or analytical testing to investigate any knowledge gaps that are seen. This work will be beneficial for establishing the work to be proposed in Phase 2, which will directly benefit agencies by means of details and component performance during multi-span lateral slide construction projects.

## 6. Schedule

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

Item	% Completed
Task 1: Literature Review	50%
Task 2: Analytical Investigation and Establish Testing Plan	0%
Task 3: Summary and Recommendations for Phase 2	0%

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1: Literature Review												
Task 2: Analytical Investigation and Establish Testing Plan												
Task 3: Summary and Recommendations for Phase 2												