

**PROJECT MANAGEMENT PLANS TO SUPPORT SUCCESSFUL
DELIVERY OF ACCELERATED BRIDGE CONSTRUCTION PROJECTS**

**Quarterly Progress Report
For the period ending August 31, 2021**

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**ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER**

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1. Background and Introduction

There are about 600,000 bridges on public roads spread out across the US. Maintaining these assets represents a sizable investment of resources. The Accelerated Bridge Construction (ABC) approach is currently being utilized in some states for rapid construction of the bridges. However, not all DOTs are using the ABC approach. This can be linked to the hesitation of contractors to implement the ABC approach due to lack of training, incentives, and culture of respective DOTs to rely on traditional methods. Having a formal Project Management Plan (PMP) crafted specifically for the ABC projects will guide contractors during the life of the projects and encourage higher adoption of the approach. While there is guidance available to create PMPs for the major projects, in which they are required, the specifics of developing a PMP for an ABC project are not addressed in the guidance provided by the Federal Highway Administration or in the Strategic Highway Research Program 2 (SHRP 2) R10 report.

2. Problem Statement

Projects designated as major projects in the 23 U.S.C. 106(h) and funded by federal assistance are required to submit a Project Management Plan (PMP) to the Federal Highway Administration (FHWA). These major projects are dynamic in nature with high levels of uncertainty. Having a PMP provides guidance to the project managers to make decisions that keep the project moving smoothly. In general, the Strategic Highway Research Program 2 (SHRP 2) R10 provides a five-dimensional project management to handle the uncertainties of the complex projects. However, the R10 did not specifically address the implementation of PMP in ABC projects.

3. Objectives and Research Approach

The research team has adopted an exploratory approach to develop a framework for implementation of PMP in ABC projects (similar format as provided in SHRP2 R10). The framework will be categorized by different ABC tiers such as tier 1, tier 2, etc. The framework of the PMP will address items such as incentives/disincentives, public information plans, work zone control, off-site fabrication, etc.

4. Description of Research Project Objectives

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

Task 1 – Literature Review

Proposed Task Description: The objective of this task was to investigate the components of ABC projects through review of literature focusing on the following topics:

- Current practices in ABC projects
- Advantages and disadvantages of ABC
- Components of ABC to be included in the PMP

For this part of the project, the team developed an understanding of the ABC practices including the pros and cons of the method. The team then selected some ABC Projects to analyze and gather key information. The information below is an example of the findings which helped the team understand how the ABC projects are categorized.

1. Onsite construction time: The time from when a contractor alters the project site until all construction-related activity is removed. This includes but is not limited to the removal of traffic maintenance, materials, equipment, and personnel.

2. Mobility impact time: Any time the traffic flow of the transportation network is reduced due to onsite construction activities.

Tier 1: Traffic impacted for 1 day

Tier 2: Traffic impacted for 3 days

Tier 3: Traffic impacted for 2 weeks

Tier 4: Traffic impacted for 1 month

Tier 5: Traffic impacted for 3 months

Tier 6: Overall project schedule is significantly reduced by months to years

3. Overall Project Time: Overall project time starts with the beginning of planning/NEPA and concludes with the completion of construction.

4. Project Development Time: Project development time starts with planning, including NEPA and contract plan development time, and concludes on the date in which the project is advertised for construction.

Through review of about 60 ABC projects from the FIU ABC database, Method 2 was found to be most documented and was used to group the ABC projects for further analysis in the development of the ABC PMP Framework.

Task 2 – Collect and Analyze PMPs of Large Projects

Proposed Task Description: The objective of this task was to study the components of PMPs in general and specific to the ABC projects. The following were the specific action items listed for accomplishing this task:

- Locate and review PMPs of past projects including PMPs for ABC projects
- Study the information contained in PMPs. PMP information includes but is not limited to advantages, disadvantages, work zone controls etc.
- Identify SHRP 2 R10 5DPM recommendations for PMPs

- Find and compile information to be addressed by PMPs
- Analyze contents of collected PMPs
- Compare contents of PMPs from past projects to the Guide to Project Management R10 reports

Progress: In gathering data, the team set out to find any existing PMPs for past ABC projects. The team contacted several DOTs and inquired about the whereabouts of these PMPs. The list of DOTs contacted includes Vermont, Minnesota, and Iowa. Through conversation with these DOTs, it was discovered that PMPs were only required for “large projects”, that is, projects which are federally funded and cost upwards of 500 million dollars and most ABC projects did not meet that requirement. This meant there were no ABC PMPs on file for the team to use as a reference for the initial framework. As a result, the team decided to use the large project PMP examples posted by the Federal Highway Administration as a guideline for the components of a management plan and combine these components with the best practices for ABC projects, which were to be obtained through interviews with DOTs. The resulting document would be presented as the initial framework to be further refined through additional data gathering and feedbacks from industry experts.

The team reviewed related literature such as National Academies Press’s “Guide to Project Management Strategies for Complex Projects (2013)”, “Innovative Bridge Designs for Rapid Renewal: ABC Toolkit”, Federal Highway Administration’s “Project Management Plan Guidance for Major Projects”, “Project Management Plan Guidance Questions” and FHWA sample PMPs. The team analyzed the PMP guide and the sample PMPs to identify the major components needed to be addressed in a PMP and created a master list. The research done in Task 1 was used to add information to the master list which addressed the key components of ABC projects, making the master list tailored for ABC projects. The team identified the SHRP 2 R10 5DPM recommendations for PMPs and modified the master list accordingly.

The “Guide to Project Management Strategies for Complex Projects” suggests that for successful project delivery, there must be a balance between cost, schedule, technical, context, and finance. These pillars are referred to as the five-dimensional project management (5DPM) approach for complex projects. As mentioned in the guide, these five dimensions are meant to be the building blocks of a project management plan, elaborating on how their relationships with each other change based on the project needs and how the other dimensions work to support the overall successful delivery of any project. Although this portion of the SHRP 2 R10 is not specific to ABC projects, it still addresses the proactive management of projects, and is going to be the backbone of the initial framework. The “Innovative Bridge Designs for Rapid Renewal: ABC Toolkit” gave the team some insight and understanding about concepts involved in the design and delivery of ABC projects. This information provided the technical aspect of the 5DPM, tailoring it to the needs of ABC projects.

The cost dimension comprises factors that quantify the scope of work in terms of dollar amounts. For this dimension, the team focused on project estimates, project uncertainty, contingency, project-related costs, and project constraints. The schedule dimension involves the calendar-driven aspects of the project like time, schedule risk, prescribed milestones for each phase of the schedule. The technical dimension includes typical engineering and design requirements which should reference scope of work, design, construction, and constraints. The context dimension covers external influences that may have an impact on project progress like stakeholders, project-specific issues, local issues, environmental, legal, legislative and unexpected occurrences. The financing dimension involves understanding the impact of funding used to pay the project's cost like public funding, federal funding, and financial techniques to mitigate risk.

With the information gathered from the SHRP 2 R10, the team then leaned on the Project Management Plan Guidance, for direction what questions needed to be answered to develop the initial 5DPM into an actionable plan useful to project managers on ABC projects. To complement these questions, the team referenced the Project Management Plan Guidance for Major Projects, which provided an explanation to what each component of the large project PMPs. This enabled the group to have a better understanding of the type of information which was required by the FHWA for federally funded large project documentation. The team then applied the same guidelines to the creation of the initial framework. The next step was to compare the components of the initial framework to the sample PMPs from past projects to identify the overlaps and gaps.

Throughout the process, the team made connection with State DOTs who provided their expertise about the important aspects of ABC projects. The team incorporated the information gathered during these interactions into the initial framework. The following are the key findings from the interviews which were conducted so far.

Task 3 - Conduct Interviews for Evaluating the Framework

Proposed Task Description: The objective of this task was to evaluate the initial framework. DOT officials knowledgeable about the ABC projects were recruited and informed about the initial framework. Subsequent structured interviews have been conducted and still undergoing to evaluate the framework. The research team started to reach out to experts within their network and then used a snowball approach. Feedbacks from the interviews has been used to adjust the initial framework. This task is scheduled for completion in the second quarter, and below are the action items.

- Create an initial framework from the information collected from tasks 1 and 2
- Schedule and conduct interviews with officials and individuals knowledgeable o Project Management Plans
- Review the recommendations and make amendments to initial framework

Progress to Date: The topics were scrutinized, grouping like topics together into the categories set by the Project Management Plan Guidance for major projects and as seen in the sample PMPs posted by the FHWA. These categories were then used as a platform to tie in information from the literature review and expert feedbacks/recommendations.

The initial framework is divided into the following 13 components as listed below

1. Introduction
2. Project description and scope
3. Project goals objectives and metrics
4. ABC project delivery techniques
5. Project Organizational Management
6. Project Phases
7. Project Financial Plan
8. Project Schedule
9. Project Management Controls
10. Project Quality
11. Safety and Security
12. Traffic Management Plan
13. Project Communications

The next part of the report will go over the details about the components of the framework.

Introduction

This part of the project management plan provides background information about the ABC project implementation. This information may include summaries of project milestones, design, construction, traffic control and delay minimization during construction, the role of the project management plan for the project, the scope of work performed and the project roles and responsibility for the parties involved in the delivery of the project. These summaries are meant to give the Project owner or manager a quick rundown of what to expect as the details of the report build up in later parts of the PMP.

Project Description and Scope

This part of the PMP aims to answer the Who, What, Where, When, Why and How of the project. This section should provide project background and purpose, giving some information as to why the project sponsor is proposing the delivery of the project. The scope should focus on the technical range of work to be completed for the delivery of the ABC project, which includes the following topics:

- Site Information- need, traffic, design criteria, inspection report summary, hydraulics, utilities, right of way, environmental resources
- Maintenance of traffic throughout the project (to be later discussed)

- Safety plans- work zone safety during construction, worker safety during construction, Facility safety after construction
- Public information and communication about the implication of the project to the local community
- ABC project delivery techniques: what ABC technique has been selected for the project, e.g., prefabricated bridge elements and systems, slide-in bridge construction, geosynthetic reinforced soil-integrated bridge systems
- Incentives and disincentives for techniques used: benefits and limitations/constraints, (alternative discussion for contingency plan)
- Bridge design considerations based on ABC technique
- Project delivery and ABC technique Implementation: how the projects is going to be built, e.g. Design Bid Build, and how the ABC technique is going to be implemented within the project delivery method?
- Work zone control systems: traffic management, equipment, offsite fabrication

Project goals objectives and metrics

In this part of the report, the project team should discuss and define the long-term vision for the project. The team should also define strategies or implementation steps to attain the identified goals such as specific, measurables, short term actions that set the framework for establishing quantitative and qualitative metrics for the project. The project team should also, set targets that track how well the objectives are met.

Project Organizational Management

As described by the FHWA in their Project Management Plan Guidance for Major Projects, the project management team should be organized in such a way to achieve all the stated project objectives and goals from managerial, technical, oversight, and decision-making perspectives. This section of the project management plan should outline the organizational structure for the project and define the roles and responsibilities. The plan should explain how the project team members are expected to collaborate with each other throughout the course of the project implementation process. These points are represented in the bullets below.

- Project Organizational Chart for Project Management Team and Project Delivery Team
- Project Roles for both Project Management Team and Project Delivery Team
- Project Responsibility for Project Management Team and Project Delivery Team
- Team communication structures

Project Phases

If the project is done in phases, the description of all phases should be provided based on ABC technique.

Project Financial Plan

This part of the project will focus on the cost and financing of the project. As mentioned, the focus will be on Project estimates, project uncertainty, contingency, Project-related costs, and project constraints. This part will also look at understanding the impact of funding used to pay the project's cost like public funding, federal funding, and financial techniques to mitigate risk. The following key pieces of information will be identified.

- Project cost: How much money the project will need (Through cost estimation)
- Project funding: Where the money is coming from (owner involvement and budget plan)
- Project uncertainty sources and cost
- Cost of identified contingency
- Project constraint costs

Project Schedule

As defined by the 5DPM, the schedule dimension involves the calendar-driven aspects of the project like time, schedule risk, prescribed milestones for each phase of the schedule. The FWHA goes on to further explain that the schedule should discuss how the Project Sponsor will document, monitor, and control project schedule. The schedule should be a complete representation of the project's implementation and should include a realistic completion date. This subsection should document processes and tools used for tracking schedule, identifying scheduled deviations, and addressing schedule issues. Key information to consider here is as follows.

- Creation of a schedule that must be based on the ABC technique used for project delivery
- Realistic project end date (delivery date) based on project schedule, funds and other factors

Schedule risk

Prescribed milestones for each phase of the schedule

Project Management Controls

- Risk management controls (utilities, risk assessment and risk management for project and budget)
- Scope management controls
- Scheduling management -controls

Project Quality

As defined by the FHWA, this subsection should discuss how the project sponsor will document, monitor, and control project quality throughout the life of the project. It should document processes and tools used for tracking and analyzing project quality and identifying and addressing issues.

- Goals and objectives for quality
- Quality responsibility and control
- Quality standards to be used
- Quality assurance: design, construction and operation
- Owner verification processes

Safety and Security

Safety standards must address work zone safety during construction, worker safety during construction, facility safety after construction. These are the key points to consider.

- Establish safety policy for ABC technique
- Safety management for ABC technique
- Reporting avenues
- Safety criteria

Traffic Management Plan

- Goals and objectives for traffic around the site (e.g., what traffic tier goal and how that is going to be achieved)
- Roles and responsibilities
- Traffic design requirements and standard
- Operation and maintenance

Project Communications

The FHWA defines project communications as processes and procedures to ensure effective communications among project team members and with stakeholders. Stakeholders may include but are not limited to the following: the traveling public, political officials, media, interest groups, and businesses. This section should cover how informal and formal communications will be conducted and managed. This part of the framework also covers some aspects of the context dimension. Points to consider for this section.

- Project internal communication
- Project external communication

- Stakeholder involvement plan (provides a framework to guide the public participation process for all activities of the project)

Throughout the literature review process, the team made connection with State DOTs who provided their expertise about the important aspects of ABC projects. The team incorporated the information gathered during these interactions into the creation of the first draft of the initial framework. The following are the key finding from the interviews which were conducted

Vermont DOT

- The importance of the “How” of the project through scope reports
- Components of the Scope reports
- Importance of a Shareholder Involvement plan

Minnesota DOT

- Components of ABC scheduling
- ABC project quality control
- Importance and components of risk management plan

Iowa DOT

- Project phasing in ABC projects
- Project communications

The team is still in process of setting up interviews with the DOTs to get feedback and recommendations on how to improve the framework. The round of interviews is still being carried out and the iteration process is still under way.

Task 4: Prepare Final Report

Proposed Task Description: The team will draft a final report with the details of the study along with the benefits and challenges of the current management practices in ABC projects. The report will include the details of the finalized framework for the implementation of PMPs for ABC projects, and validation of the framework by experts. In addition to the final report, the team will produce a three-minute video. This task has not been started and will be completed after task 3. The action items for this task are as follows:

- Prepare final framework from Task 3 feedback
- Final Framework Submission
- Video submission

Progress to Date: The prerequisite for this task, Task 3, is still under progress. Once task 3 is complete, then Task 4 will begin.

5. Expected Results and Specific Deliverables

Quarterly reports are due.

Final report is due on Feb 28, 2022.

6. Schedule

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

Project	70 % Completed
Task 1 - Literature Review	90%
Task 2 - Interview DOT and Industry Personnel	90%
Task 3 - Develop Initial Framework	80%
Task 4 - Prepare Final Report	0%

AS OF 08.31.21													
RESEARCH TASK	2021											2022	
	M	A	M	J	J	A	S	O	N	D	J	F	
Task 1 - Literature Review	■	■	■	■	■								
Task 2 - Collect & Analyze PMPs of ABC project			■	■	■	■							
Task 3 - Compare collected PMPs to R10					■	■	■						
Task 4 - Interview DOT and Industry Personnel						■	■	■	■				
Task 5 - Develop Initial Framework							■	■	■	■			
Task 6 - Finalize the Framework and Develop Final Report											■	■	
	■	Planned Task											
	■	Task Accomplished											