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16. Abstract The Accelerated Bridge Construction (ABC) process employs a variety of design, material, and management techniques to reduce the impacts of construction to the public, decreasing construction time and minimizing traffic disruptions. These projects require a great deal of planning and collaboration. To guide this, Project Management Plans (PMP) are developed that define the roles of the team members and the processes. These PMPs are critical tools and are required on major projects (over \$500 million) funded by the Federal Highway Administration (FHWA). It is critical that these PMPs are developed properly at the outset of the project so they are a useful guide throughout the project. The FHWA's SHRP 2 R10 report provides guidance for completion of the PMPs when required, there is no such guide for completing a PMP for an ABC project. The research team worked with subject matter experts to develop a template and guide for use by those developing PMPs specifically for ABC projects.			
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Project Management Plans to Support Delivery of Accelerated Bridge Construction Projects

Final Report

May 2022

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Accelerated Bridge Construction University Transportation Center



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CHAPTER 1: INTRODUCTION

1.1. Project Motivation

There are about 600,000 bridges on public roads spread out across the US. To ensure efficient movement of people and goods, there are new bridges that must be constructed in addition to the ongoing upkeep and maintenance of existing bridges. Maintaining these assets and constructing new ones represent 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. A formal Project Management Plan (PMP) crafted specifically for ABC projects will serve as a guide for contractors and other stakeholders during projects. It will support a systematic adoption of ABC techniques and help prevent the team from overlooking important aspects of the process. While there is guidance available to create PMPs for the major projects, as required by the Federal Highway Administration (FHWA), the specifics of developing a PMP for an ABC project (referred to as ABC-PMP in this document) are not addressed in the guidance provided by the FHWA or in the Strategic Highway Research Program 2 (SHRP 2) R10 report.

Projects designated as major projects in the 23 U.S.C. 106(h) and funded by federal assistance are required to submit a PMP to the FHWA. These major projects are dynamic in nature with high levels of uncertainty. Having a PMP provides guidance to the project team 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 does not specifically address the implementation of PMP in ABC projects. ABC projects being fast paced will greatly benefit from having a formal PMP.

1.2. Research, Objectives, and Tasks

The research team adopted an exploratory approach to develop a framework of PMP specific to ABC projects (modeled after the format as provided in SHRP2 R10). The framework of the PMP *for* ABC is divided into two main parts: one part being a list of questions to be answered in the creation of the PMP and the second part providing a checklist of items or things to consider for each ABC technique selected for the project.

The research objective was accomplished through the following research tasks.

Task # 1 Literature review: 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

Task # 2 Collect and analyze PMPs of large projects: 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.

Task # 3 Conduct interviews for evaluating the framework: 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 were conducted to evaluate the framework. The research team reached out to experts within their network and then used a snowball approach. Feedbacks from the interviews were used to adjust the initial framework. Below are the action items for this task.

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

Task # 4 – Final Report: A final report has been prepared meeting the RITA requirements for UTC funded projects. The content of the report will contain a detailed summary of the results from the preceding tasks and a recommendation for future phases of the project, if necessary.

1.3. Research Advisory Panel (RAP)

The project work and the interviews were done in collaboration with the Research Advisory Panel (RAP). The following individual participated in the RAP:

- Mr. Romeo R. Garcia
Former Bridge Construction Engineer
Structural Engineering Team
Office of Bridges and Structures
Office of Infrastructure

1.4. Report Overview

The research team has presented a brief review of the literature and summary of the existing PMPs reviewed for this project in Chapter 2. In the next chapter, the outline of the initial framework and the key findings from the two rounds of interviews with the subject matter experts have been presented. In Chapter 4, the modified framework with the template and guide to develop PMP for ABC type projects is presented.

CHAPTER 2. REVIEW OF LITERATURE & EXISTING PMP

2.1. Literature Review

The team reviewed existing 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 advantages and disadvantages of ABC practices. The team selected some ABC projects to analyze and gather key information. ABC projects can be categorized in more than one way. Below are a few methods of categorizing ABC projects based on current literature.

Method #1 - Based on onsite construction time: The time from when a contractor alters the project site until all construction-related activities are removed. This includes but is not limited to the removal of traffic maintenance, materials, equipment, and personnel.

Method #2 - Based on 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

Method #3 - Based on overall project time: Overall project time starts with the beginning of planning/NEPA and concludes with the completion of construction.

Method #4 - Based on 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.

2.2. Review of Existing PMPs

The team set out to find any existing PMPs for past ABC projects. The team contacted several DOTs and inquired about the details of these PMPs. The list of DOTs contacted includes Vermont, Minnesota, and Iowa. Through conversation with these DOTs, it was confirmed that PMPs were only required for “large projects”, that is, projects which are federally funded and cost upwards of \$500 million and most ABC projects did not meet that requirement. This meant there were no PMPs *for* ABC 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 FHWA as a guideline for the components of a management plan and combine these components with the best practices for ABC projects, which were obtained through interviews with DOTs. The resulting document has been presented as the initial framework to further refine through additional data gathering and feedback from 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 was 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 that was tailored 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 such as 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 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 connections 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.

CHAPTER 3. PROPOSED FRAMEWORK & EVALUATION

3.1. Initial Framework

The research team reviewed the sample PMPs posted by the FHWA. The topics included in the sample PMPs were scrutinized grouping similar topics together into the categories set by the Project Management Plan Guidance for major projects and as seen in the sample PMPs. These categories were then used as a platform to tie in information from the literature review and expert feedback/recommendations.

The initial framework was divided into 13 components as listed below (Table 1). These 13 components identified as important for the PMP for ABC have been explained in detail below.

Table 1: Major components in the PMP for ABC in the first iteration

First Iteration
1. Introduction
2. Project description and scope
3. Project goals objectives and metrics
4. ABC project construction
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

3.1.1. Components of the Framework

The following sections cover the details about the components of the framework that was developed.

Introduction

This part of the project management plan which 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 to 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 are going to be build, 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 teams 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 identify Set of 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 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)

3.2. Interviews with Subject Matter Experts

The team made connections 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 key findings from the interviews which were conducted are listed in Table 2 below.

Table 2: Key Findings (First Round of interviews)

Position Duration	Experience with ABC Or PMP	Advantages/Disadvantages of ABC	Benefits of ABC PMP	Initial Framework Review
Vermont DOT				
-24 years in position. -ABC Program stated in 2011	- ABC is an embedded process for VTrans -Practiced in Bridge Construction - Process for all projects – schedule driven (all activities are on it) -Had an ABC template ... modifies durations a little but overall, very similar to conventional.	- Helps with cost and safety - no temporary bridge=cost savings -No excessive Traffic delays - schedules are aggressive (conventional 3-5 years, ABC is much shorter – 18-24mo)	- Gives a hint of how to do things per ABC process -Local road closures/bypasses -A reminder to Project Manager to fill out local bypass agreement	-Try not to get too involved in design in scoping/planning Move the Public input portion to Scope of Work -Want management buy-in FIRST (before going to public) – need the local knowledge (when going to public they can sell the flexibility of the schedule – businesses, school) -Utilities – risk to the schedule? DOT may not own those utilities and the entity needs to act and you may not have control over them -FHWA needs to offer an incentive to the utility companies to be responsive -Traffic Control during Design Phase
Minnesota DOT				
-10 years engineer in bridge office	-Got very involved with ABC 10 years ago -Commissioner was a supporter of the program and pushed it for construction -SPMT moves, floated in arch bridge, lateral slides, deck panels (with and without UHPC)	-Helpful when chance of significant traffic impacts -Downside is the cost -ABC is more expensive sometimes -If ABC is not designated early then it's hard to get additional funding for it	-MnDOT doesn't use PMP unless required by FHWA -Still do a plan, not in a formalized document -Even the FHWA thinks they might get put on a shelf once they're written	-Nothing missing at a glance. -MnDOT is doing a lot of this already but just not formalized as a PMP - Involve contractor during scoping phase and they help scope project during design phase

		-Now working on early identification		
FHWA				
-46+ years in bridge construction -7 years in current position	-Steady involvement since 2010 -if there is federal funding, FHWA requires the state to have PMP ... on <\$500MM, state can require it anyways. -state usually requires some plan, just may not call it a PMP	-The incentive to have a PMP is to manage the increased pressure ... it's different when there is not the pressure to get in and get out	-Protects Owners interest - Reduction in production pressure.	-Utah has been a leader in ABC and is good resource for interview -Section 5 and below are the big payoff, 1-4 are incidental - Look at ABC-1 AASHTO LRFD Guide to ABC - Project financial plan (typically required for "major" projects – ABC typically not "major") -project personnel need to be watching for scope creep that could have negative financial implications but this big picture might not be the right fit. -PMP could note that they need to adhere to AASHTO specs
Oklahoma DOT				
-Working with ODOT from 40 years - Been in leadership for 10	-Worked on a couple of slide bridges -Not many precast elements -Focused on specifications	-Need to get in and out quickly, Construction zones are dangerous, and safety is a priority. -Traffic control a major factor -Work zone control -User Cost reduction	-The more though you put upfront, the more reliable the project delivery will be -There are teams which are designed to address each need. -PMP can provide check list of the Dos and Don't	-FIU website has fabrication/dimension data - Should be a focus of scheduling as there is a need to be aggressive with the timeline of the project -Need to address design process as it relates to ABC. Can be found in the specs of how to handle these prefabricated elements. -Might be too length because there is already not many people with down time who can focus on the completion of the project. -Financial is a huge part especially for major projects. -Must also Focus on Quality because it is essential for project delivery. Must address environmental concerns

Iowa DOT				
-37 years with DOT and involved with ABC projects for the last 20 years	-Helped develop program for ABC -Part of the ABC advisory committee for UTC	-Well-known for minimizing construction time -Minimizing traffic restriction -User Cost through Detours (1 year vs 2 weeks) Improved safety for workers -No formal PMP for Iowa -Major Projects involving multiple structures but no formal written down plan. -Handled by Project Teams	Users are Neutral about having a PMP.	-Design Bureau in concept phase covers different option for whether you want to detour traffic, close road, or keep it open, or staging requirements -Determination of Duration -Designers will determine what method is used based on duration. -Quality concerns taken care of through provisions and specifications -Want ABC to become part of normal practice. -Look at IADOT website Chapter 8 design Manual as a reference for ABC -Look at Highway Division Project Management Office
Utah DOT				
Two interviews with Utah. Both with different experience as bridge and structural engineering and both are leading the charge from the ABC implementation	- Both have been at the forefront for ABC with the Utah DOT for about 10 years	-compressed schedules allows for quicker project delivery - Traffic delays are minimized -Safety a priority	-User's current models are more advanced than the PMP. - Users project documentation process is suited for every project, including ABC	-Communication plans are necessary. -This is the "who do we call, what's your back up plan" -Project scheduling dependent on the ABC techniques -There needs to be an avenue for the submission of plans for safety, traffic, and design.

California DOT				
-Civil Engr, been in bridge dept whole career - last 10 years has focused on promoting ABC -job is part technical/marketing/promotion/ -30k employees, 8200 engineers at CalTrans	-Just put out ABC manual -“ABC” defined by CalTrans as minimizing construction impact as opposed to doing it faster In California, prefab elements almost always means precast (not steel) -UHSC (UHPC) – helpful in connecting precast elements	-minimizing construction impact -Helps with cost and safety -No excessive Traffic delays - schedules are aggressive	User sees benefits in having a PMP but still needs to know how the PMP can adjust from design bid build, to design build delivery	-Will need to adapt to have a side for Owners and contractors Tricky when you get too prescriptive ... if you miss something Background – contractor won’t want to tell you that -Purpose – is internal to DOT, contractor doesn’t care about that -Would be better to have them define a purpose (minimize traffic) -Whatever is on the critical path is ABC ... not all elements are ABC on a large project ... ABC is “used surgically” -Safety beyond what is already required

With the feedback above, the team put together the recommendations from the first round of interviews and created the second iteration of the framework. The team was able to identify the leaders in ABC as the California and Utah DOTs and was able to set up interviews with the DOTs to get feedback and recommendations on how to improve the framework. The second round of interviews was conducted, and the following findings were obtained. These findings can be seen in Table 3 below.

Table 3: Key findings (Second Round of Interviews)

California DOT
<p>Project Owners should have project goals tracking mechanisms Owner takes responsibility of public outreach Contractor handles project communication (task related) Acquisition strategies should also involve utilities There should be a section where the constructor section is asked if they have identified items that require contingency plans What are the hard stop points /pull out points for the project? When does your schedule change? At what point do you bring in the contingency? Risk b) what are the options and when do you initiate it Longitudinal launches can also be considered onsite</p>

There should be scheduled milestones
 Should mention that the initial document is a template
 In terms of the guidelines, list them in order as they appear on the template

Utah DOT

Need to establish who the two teams are in the communication plan.
 Need a communication plan with a consultant who is designing the project. Another communication plan with the contractor. The PMP is designed during the design phase and the contractor is not involved at that time.
 In most cases the owner hires consultants to design projects. Consultants put together PMP all the time. Get feedback from the consultant. Owners are involved at the top. Should not separate ABC from the project.
 Should not use terminology like “consistent definition of success” to define “success”. Use consistent language cost, time, and quality.
 Project delivery needs to be redefined.
 What are the incentives/disincentives to make the project ABC?
 Typically, the PM of the project manages all of those items. Utah hires a consultant to design the project and manage the project with the PM
 Contractors don’t provide Project scope – have they received the scope from the owner?
 Contractors only receive Plans, Spec, measurements, and payments
 The contractors develop the control plan. They are responsible for developing safety plans.
 The resident engineer checks to make sure the contractors have these. The contractors don’t check these. Should redefine the term Project Delivery
 The resident engineer will check whether the contractor has submitted all the items listed on the Project Delivery. Contingency plan is important for the ABC projects.
 Most states define the expectation for quality. It is listed in the specification under tests and inspections.
 The resident engineers will check whether the contractors have done these. The contractor is not going to check these.
 First few questions need to be with design.

One of the major findings from the second round of interviews was that our framework needed the input of a consultant. The input of the consultant was going to round up the feedback and help us evaluate the pieces which were missing from the second iteration. Table 4 captures the perspective of the consultant.

Table 4: Key findings (Consultant perspective)

Consultant: Olsson

- It is important to add the location of the document as part of the PMP so that all parties involved know where to access the document

- The ABC goals and implementation technique to be used is going to drive all the other aspects of the PMP so it is important to establish those two first.
- The technique is going to drive the project delivery method, that is, sometimes ABC can be in the form of Fast-track Contracting which is concerned with accelerating project delivery using contracting methods and language.
- Contactor may or may not be involved in the creation of the PMP depending on the contracting methods and language selected for the project, so contractor involvement is not a given in the creation of PMP.
- Project construction, Safety plans, project quality requirements, and risk management are all governed by the techniques used.
- Some consultants develop PMPs in house so information may already exist somewhere, so it is important for parties involved in the creation of the PMP to be familiar with the already existing information.
- Apart from safety from establishing safety requirements, safety training or certification requirements need to be considered
- There needs to be a plan for safety briefings to ensure standards are kept and all involved parties are aware of what is going on.

CHAPTER 4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Final Framework

Based on the feedback of the subject matter experts, the initial framework with 13 components (shown in Table 1) were condensed into eight components in the final iteration which encompass both industry standard PMP practices and components that address ABC projects (Table 5). The template of the ABC *for* PMP has been provided in Appendix A.

Table 5: Major components in the ABC-PMP in the first and final iterations

First Iteration	Final Iteration
1. Introduction	1. Introduction
2. Project description and scope	2. Goals, Objectives, and Metrics
3. Project goals objectives and metrics	3. Project Organization
4. ABC project construction	4. Project Communication
5. Project Organizational Management	5. Project Delivery
6. Project Phases	6. Project Controls
7. Project Financial Plan	7. ABC Implementation
8. Project Schedule	8. ABC Project Considerations
9. Project Management Controls	
10. Project Quality	
11. Safety and Security	
12. Traffic Management Plan	
13. Project Communications	

In the final template, the research team has provided leading questions to develop details for each of the components of the PMP relevant to the ABC project.

Introduction

How is the Project Management Plan used for the Project?

- What is the purpose of the PMP?
- Who is the PMP completed by?
- Who is the PMP directed to or how is it distributed?
- Have all the acronyms and the abbreviations been explained?
- Where is the PMP stored and how can it be accessed?

Goals, Objectives, and Metrics

What are the goals of the ABC project and how are they measured?

- List project goals
- List project objectives
- List the metrics to be used to track progress

Project Organization

How is the Project Organization and Communication managed?

- Provide Project management team and list their responsibilities
- Provide project management organization chart and team contact information
- Provide a communication plan for the project team

Project Communication

Who are the participants and what is the frequency of occurrence?

- Client Kickoff meetings
- Internal Kickoff meetings
- Progress and Project Status meetings
- Lessons Learned briefings

Project Delivery

Is there a clear path for the project delivery?

- What is the Financial Plan?
- What are the Project Cost Estimates?
- What is the ABC Project Schedule?

Project Controls

Are the controls adequate to keep track of the status of the project?

- Have cost, schedule, scope, quality, safety, and security controls been established?
- How are project changes managed and reported?

ABC Implementation

- What ABC Technique was used?

If **Foundation and Wall elements** are used, expand on the selection criteria and techniques used to implement the technology. Some common techniques used in the implementation of foundation wall elements are listed below.

- Continuous Flight Auger Piles
- Geosynthetic Reinforced Soil Integrated Bridge System
- Prefabricated Pier Cofferdams

If **Rapid embankment construction** is used, expand on the selection criteria and techniques used to implement the technology. Some common techniques used in the implementation of foundation wall elements are listed below.

- Expanded Polystyrene (EPS) Geofoam
- Accelerated Embankment Preload Techniques

- Column Supported Embankment Techniques

If **Prefabricated bridge elements and systems** are used, expand on the selection criteria and technique used to implement the technology. Some common techniques used in the implementation of PBES are listed below.

- Prefabricated Elements
- Prefabricated Systems

If **structural placement methods** are used, expand on the selection criteria and techniques used to implement the technology. Some common techniques used in the implementation of structural methods are listed below.

- Self-Propelled Modular Transporters (SPMTs)
- Longitudinal Launching
- Horizontal Skidding or Sliding
- Heavy Lifting Equipment and Methods
- Conventional Cranes

If **Fast-track Contracting** is used, expand on the selection criteria and techniques used to implement the technology. This technology is primarily concerned with accelerating project delivery using contracting methods and language. Some common fast track contracting techniques used in fast tracking are listed below.

- Accelerated Project Delivery
- Design-Build (DB)
- Construction Manager General Contractor (CMGC)

ABC Project Considerations as per ABC technique selected for the project

The following section of the document will discuss the **quality, safety, and risk management** and **must be associated and specific to the ABC technology and techniques used**. *The sections below are in reference to items that are likely already addressed in other project documents. Review each item and elaborate on any items that might be missing. The questions and checklist items below are a continuation of the elements to be considered when formulating a project management plan for ABC projects. Ideally, these items below should be used as thinking/consideration points which should be explained or provided in the PMP in some form.*

REFERENCES

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APPENDIX A: TEMPLATE – PMP *for* ABC

Bridge No.:	Owner:
Project Description:	

Template Guide to Creating PMP *for* ABC

The questions below are provided as guidance for the elements to be considered when formulating a project management plan for ABC projects.

1. Introduction

How is the Project Management Plan used for the Project?

- What is the purpose of the PMP?
- Who is the PMP completed by?
- Who is the PMP directed to or how is it distributed?
- Have all the acronyms and the abbreviations been explained?
- Where is the PMP stored and how can it be accessed?

2. Goals, Objectives, and Metrics

What are the goals of the ABC project and how are they measured?

- List project goals
- List project objectives
- List the metrics to be used to track progress

3. Project Organization

How is the Project Organization and Communication managed?

- Provide project management team and list their responsibilities
- Provide project management organization chart and team contact information
- Provide a communication plan for the project team

4. Project Communication

Who are the participants and what is the frequency of occurrence?

- Client and Internal Kickoff meetings
- Progress and Project Status meetings
- Lessons Learned briefings

5. Project Delivery

Is there a clear path for the project delivery?

- What is the Financial Plan?
- What is the ABC Project Cost Estimate?
- What is the ABC Project Schedule?

6. Project Controls

Are the controls adequate to keep track of the status of the project?

- Have cost, schedule, scope, quality, safety, and security controls been established?
- How are project changes managed and reported?

7. ABC Implementation

- What ABC techniques are planned?

If **Foundation and Wall elements** are used, expand on the selection criteria and techniques used to implement the technology. Some common techniques for foundation wall elements are as listed.

- Continuous Flight Auger Piles
- Geosynthetic Reinforced Soil Integrated Bridge System
- Prefabricated Pier Cofferdams

If **Rapid embankment construction** is used, expand on the selection criteria and techniques used to implement the technology. Some common techniques for rapid embankment are as listed.

- Expanded Polystyrene (EPS) Geofoam
- Accelerated Embankment Preload Techniques
- Column Supported Embankment Techniques

If **Prefabricated bridge elements and systems** are used, expand on the selection criteria and technique used to implement the technology. Some common techniques for PBES are as listed.

- Prefabricated Elements
- Prefabricated Systems

If **structural placement methods** are used, expand on the selection criteria and techniques used to implement the technology. Some common techniques for structural placement are as listed.

- Self-Propelled Modular Transporters (SPMTs)
- Longitudinal Launching
- Horizontal Skidding or Sliding
- Heavy Lifting Equipment and Methods
- Conventional Cranes

If **Fast-track Contracting** is used, expand on the selection criteria and techniques used to implement the technology. This technology is primarily concerned with accelerating project delivery using contracting methods and language. Some common fast track contracting techniques are as listed.

- Accelerated Project Delivery
- Design-Build (DB)
- Construction Manager General Contractor (CMGC)

8. ABC Project Considerations as per ABC technique selected for the project

The following section of the document will discuss the **quality, safety, and risk management** and **must be associated and specific to the ABC technology and techniques used**. *The sections below are in reference to items that are likely already addressed in other project documents. Review each item and elaborate on any items that might be missing. The questions and checklist items below are a continuation of the elements to be considered when formulating a project management plan for ABC projects. Ideally, these items below should be used as thinking/consideration points which should be explained or provided in the PMP in some form.*

Question/Issue	Yes	No	N/A	Comments
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Project Scope				
a. Are there effective scope reports detailing the list of activities for the successful completion of the project?				
b. Is there a clear traffic control plan for the duration of the construction phase?				
c. Is there a clear project specific safety, and security plan?				
d. Does the project include an established safety policy for the ABC technique?				
e. Is there a clear project communication plan for the public and shareholders, project internal and external communication?				

Project Construction				
a. Are the bridge components built onsite? If so, describe the technologies used on the project.				
b. Are bridge components built offsite? If so, describe the technologies used on the project.				
c. Do you have clear and defined ABC Project Schedule milestones? Expand on them.				
d. Have you identified items that require contingency plans? If not, why? If so, please give a summary of the contingency plans provided for those items.				
e. Is there an acquisition strategy to execute the project most efficiently? Right of way, design, and construction.				
f. Have the necessary permits been secured? Provide a list of the permits which have been secured.				

Project Quality				
a. Are there clear goals and Objectives for Quality? Expand.				
b. Is there a party responsibility for Quality? Expand.				
c. Are there quality standards and plans for the project delivery?				
d. Has Quality Assurance been considered? If so, please expand on Design, construction, and operation?				
e. Is there a process for project quality review and owner verification?				

Safety Plan				
a. Have safety requirements been identified?				
b. Has Personal Protection Equipment been provided?				
c. Have safety training or certification requirements been considered?				
d. Have the client / contractor safety requirements been considered and established?				
e. Is there a plan for safety briefings? How is it implemented?				

Project Risk Management				
a. Are there clear Objectives for Risk Management and a plan to execute? Expand.				
b. Is there a party responsibility for Risk Management? Expand.				
c. Have Risks to the construction schedule and options for mitigating them been considered? Expand.				

d. What are the pivot/pull out/hard stop points to an ineffective project delivery plan or schedule?				
f. Did you consider a point where you bring in the contingency?				

Guidelines for Completing the Template

Project Introduction

This part of the project management plan provides background information. This information is intended to answer the question regarding the purpose, the author, the recipient, and accessibility of the PMP. This section is also going to provide an explanation of the abbreviations to be used in the PMP. The PMP could be completed by multiple authors.

Project Goals, Objectives, and Metrics

In this section, the questions which must be answered are, what are the goals of the ABC project and how are they measured? These goals, objectives and metrics may be in the form of design, construction, traffic control and delay minimization during construction, and other aspects involved in the delivery of the ABC Projects. This summary is 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.

Organizational Management and Communication

The project management team should be organized in such a way to achieve all of 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 of the agency leadership and the project team. The plan should explain how the project team members are expected to collaborate with each other throughout the course of the project implementation process. Examples of roles and responsibilities may include senior leadership, project managers, technical support or subject matter experts from Project Sponsors, consultants, contractors and partnering agencies. A graphical representation of the organization such as organizational chart should be included for clarity. A communication plan with the public and other shareholders should be considered and provided.

Project Controls

Project Controls is a process that encompasses the resources, procedures, and tools for the planning, monitoring, and controlling of all phases of the capital project lifecycle. This includes estimating, cost and schedule management, risk management, and change management

Project Scope

The scope document details the list of activities for the successful completion of the project. The scope is defined by understanding the project requirements and the client's expectations. The scope statement usually contains project deliverables. The scope should focus on the technical range of work to be completed for the delivery of the ABC project. This part of the project should include the traffic control, safety and security plans, and public and shareholder communication plans. Communicating with stakeholders. A proactive communication plan with stakeholders is essential to increasing awareness, minimizing traffic and economic disruption, building trust, and gaining project buy-in. The following can also be included, that is, Site Information- Need, Traffic, Design Criteria, Inspection Report Summary, Hydraulics, Utilities, Right of Way, Environmental Resources.

Project Delivery

Determining the appropriate method of ABC for a specific project is highly dependent on the Maintenance of Traffic requirements at the site, the site geometrics and project funding.

ABC methods are in two main categories:

1. **Offsite Construction.** Constructs the bridge outside of the final location using normal construction and/or prefabricated elements. Once construction is essentially complete, the bridge is moved into place.
2. **Onsite Construction.** Constructs the bridge in its final location using prefabricated elements to accelerate construction. Prefabricated elements range from localized use of prefabricated elements to structures entirely composed of prefabricated elements.

Onsite ABC Technologies

There are a variety of available ABC technologies which are classified under five different headings:

- Foundation and wall elements
- Rapid embankment construction
- Prefabricated bridge elements and systems (PBES)
- Structural placement methods
- Fast track contracting

The first four components focus primarily on methods designed to accelerate the actual on-site bridge construction. The fifth technology is primarily concerned with accelerating project delivery using contracting methods and language.

Offsite ABC Technologies

These are the following offsite techniques which are currently being used in the delivery of ABC projects. There are mainly 4 methods, and these are presented below.

- Lateral Slides
- SPMT Moves
- Longitudinal Launches
- Crane Based

Project Quality

Specifications often specify construction tolerances for component dimensions and component placement. The tolerances in the Specifications may not be suitable for proper fit-up between prefabricated bridge elements and placement of prefabricated bridge systems. Additionally, the Specifications may not address construction tolerances that are important to the successful implementation of a particular ABC technology. There should be a careful consideration of the tolerances for a successful project. The project team should establish the party responsible for quality control during the delivery of the project. The project team completes quality project

milestone reviews frequently with the owner. There should also be clearly stated project quality goals, standards to be followed, milestone reviews and processes which the owner can use to access project quality reports.

Safety Plan

The safety plan provided must be specific to the ABC technique selected for the project and must address safety requirements, the provision of Personal Protection Equipment, client / contractor safety requirements and plans for safety briefings.

Project Risk Management

Managing risks on projects is a process that includes risk assessment and a mitigation strategy for those risks. Risk assessment includes both the identification of potential risk and the evaluation of the potential impact of the risk. For example, risk to schedule can be managed through simplicity of design, clear detailing, proactive mitigation of risk items, work plans and communication with stakeholders. A simple design is easier and faster to construct. Prefabricated elements should be designed to avoid complex geometry and connections, account for tolerances, and sized to ensure economical transport and erection. Overly complicated designs have the inherent risk of fit-up issues in the field that can result in unwanted delays to the construction schedule.

Utility relocations, railroad coordination, environmental windows, temperature sensitive curing, and foundation type can also pose a significant risk to the schedule. Management of these risks requires proactive communication with stakeholders early in the project development. Construction activities with risks that cannot be effectively reduced or eliminated should be moved off the critical path in the construction schedule when possible. **Risks to the construction schedule and options for mitigating them should be included in the creation of the PMP.** The risk management plan should also include identifiers or pivot/pull out/hard stop points to an ineffective project delivery plan or schedule which allow for the implementation of the contingency plan.