

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

**Quarterly Progress Report  
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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. To ensure efficient movement of people and goods, the existing bridges need to be maintained and new bridges constructed. 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. Having a formal Project Management Plan (PMP) crafted specifically for the ABC projects will guide contractors and other stakeholders during the course of the projects and support adoption of the approach and not overlook 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 are not addressed in the guidance provided by the FHWA 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 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 did not specifically address the implementation of PMP in ABC projects.

## **3. Objectives and Research Approach**

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 is divided into two main parts: one part to be completed by the owner and the second part to be completed by the contractor. The part to be completed by the owner includes information related to the project goal, project team organization, details of the adopted delivery method, and planning tools. The second part to be completed by the contractor will address items such as project scope, process of construction adopted for the project, quality of the project, and risk management.

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

The exploratory approach adopted for the research project had four major tasks. 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

**Steps taken to Complete the Task:** 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 activity is 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.

Through review of about 60 ABC projects from the Florida International University's ABC database, Method #2 was found to be most frequently used.

## **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 are 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

***Steps taken to Complete the Task:*** 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 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 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 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 was presented as the initial framework to further refine through additional data gathering and feedback 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 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 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 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.

### **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 have been 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 initial framework

***Steps taken to Complete the Task:*** 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 feedback/recommendations.

The initial framework was 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 and 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

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 Goals, Objectives, and Metrics

This part of the project aims to clearly define what the ABC Goals are and how they are met, as defined by the Owner. 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, measurable, 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

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. Example of roles and responsibilities may include senior leadership, project managers, technical support or subject matter experts from Project Sponsors, consultants, contractors and partnering agencies. The project organizational management should be developed to help ensure that all Federal, State, and local laws, regulations, rules, and mandates applicable to the Project Sponsor and the project are met. A graphical representation of the organization such as organizational chart should be included for clarity. 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 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 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.

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 and the standards and plans to be followed
- 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
- Bridge design considerations based on ABC technique
- Project delivery and ABC technique Implementation: how the projects are 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, off site fabrication

When planning for safety and security for the ABC project, 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 and standards used.

For the Traffic control, these are the major discussion points

- 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)

### ABC Project Delivery

The topics to be discussed in this section involve the following components:

- 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, (Alternative discussion for contingency plan)
- Bridge Design Considerations and standards based on ABC technique
- Project Delivery and ABC technique Implementation: How the projects are going to build, e.g., Design Bid Build, and How the ABC technique is going to be implemented within the project delivery method

As defined by the FHWA, traditional design-bid-build (DBB) methods require design and construction to take place sequentially. Accelerated project delivery (APD) methods generally allow design and construction to take place concurrently thereby requiring less time to complete a project. Additionally, the early involvement of a contractor allows the design to more readily take into account the most likely ABC construction techniques. APD methods are usually achieved by using one of the three methods below:

- Design-Build – A performance based bridge contracting method which allows final design and construction to occur simultaneously. In Design-Build, the owner relinquishes control of the design and construction process as well the risk associated.
- Partial Design-Build – A bridge contracting method which gives contractors enough guidance on bridge type, size, and location to competitively bid the project, but allows the Design-Builder to finish the design process while initial construction is performed.
- Construction Manager/General Contractor (CMGC) – A bridge contracting method similar to design build except for the owner’s contracted involvement. In CMGC, the owner is part of the design team and does not relinquish control or risk.

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 by the use of contracting methods and language.

### **Offsite ABC Technologies**

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

### **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 FHWA goes on to further explain that the schedule should discuss how the Project Sponsor will document, monitor, and control the 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

### Project Management 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, change management, earned value progressing, and forecasting.

- 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. 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, mile stone reviews and processes which the owner can use to access project quality reports.

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

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.

Throughout the literature review 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 creation of the first draft of the initial framework. The following are the key findings from the interviews which were conducted.

Table 1. Key Findings (First Round of interviews)

DOT	Position Duration	Experience with ABC Or PMP	Advantages/Disadvantages of ABC	Benefits of ABC PMP	Initial Framework Review
VTrans	-24 years in position. -ABC Program stated in 2011	- ABC is an embedded process for VTrans -Practiced in Bridge	- Helps with cost and safety - no temporary bridge=cost savings -No excessive Traffic delays	- Gives a hint of how to do things per ABC process -Local road closures/bypasse	-Try not to get too involved in design in scoping/planning Move the Public input portion to Scope of Work

		<p>Construction</p> <ul style="list-style-type: none"> <li>- Process for all projects – schedule driven (all activities are on it)</li> <li>- Had an ABC template ... modifies durations a little but overall, very similar to conventional.</li> </ul>	<ul style="list-style-type: none"> <li>- schedules are aggressive (conventional 3-5 years, ABC is much shorter – 18-24mo)</li> </ul>	<ul style="list-style-type: none"> <li>s -A reminder to Project Manager to fill out local bypass agreement</li> </ul>	<ul style="list-style-type: none"> <li>-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)</li> <li>-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</li> <li>-FHWA needs to offer an incentive to the utility companies to be responsive</li> <li>-Traffic Control during Design Phase</li> </ul>
MnDOT	<ul style="list-style-type: none"> <li>-10 years</li> <li>- Standards engineer in bridge office</li> </ul>	<ul style="list-style-type: none"> <li>-Got very involved with ABC 10 years ago</li> <li>- Commissioner was a supporter of the program and pushed it for construction</li> <li>-SPMT moves, floated in arch bridge, lateral slides, deck panels (with and</li> </ul>	<ul style="list-style-type: none"> <li>-Helpful when chance of significant traffic impacts</li> <li>-Downside is the cost</li> <li>-ABC is more expensive sometimes</li> <li>-If ABC is not designated early then it's hard to get additional funding for it</li> <li>-Now working on early identification</li> </ul>	<ul style="list-style-type: none"> <li>-MnDOT doesn't use PMP unless required by FHWA</li> <li>-Still do a plan, not in a formalized document</li> <li>-Even the FHWA thinks they might get put on a shelf once they're written</li> </ul>	<ul style="list-style-type: none"> <li>-Nothing missing at a glance.</li> <li>-MnDOT is doing a lot of this already but just not formalized as a PMP</li> <li>- Involve contractor during scoping phase and they help scope project during design phase</li> </ul>

		without UHPC)			
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 is 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
ODOT	-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.	-Look at how dimensions and fabrication are done for ABC on FIU website - Should be a focus of scheduling as there is a need to be aggressive with the timeline of the project



				<p>-PMP can provide CheckList of the Dos and Don't</p>	<p>-Need to address the 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</p>
IowaDOT	<p>-37 years with DOT and involved with ABC projects for the last 20 years</p>	<p>-Helped develop program for ABC  -Part of the ABC advisory committee for UTC</p>	<p>-Well know 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</p>	<p>Users are Neutral about having a PMP.</p>	<p>-Design Bureau in concepting, 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.</p>

					-Look at IADOT website Chapter 8 design Manual as a reference for ABC -Look at Highway Division Project Management Office
UDOT	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, whats 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.
CALDOT	-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) –	-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

		helpful in connecting precast elements			project ... ABC is "used surgically" -Safety beyond what is already required
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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. So far, we have received feedback from two DOTs on the second iteration of the document.

Table 2. Key findings

DOT: 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  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</p>
DOT: Utah DOT
<p>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, 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</p>

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.

As mentioned above, the team is still in the process of reaching out to industry experts to receive feedback or validate the findings and format of the second iteration. To complete this stage, the team has reached out to Iowa DOT. The team will also reach out to project managers and transportation program managers from the following consultants:

- HDR
- WSP
- AECOM
- HNTB

Their feedback will be incorporated into the second iteration to produce the final framework. The current state and the format for the initial framework can be seen in Figure 1 in the Appendix.

#### **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**

The team has been reporting the progress via the quarterly reports. So far, the team developed the initial framework and updated it based on the industry experts' feedback. Currently, the team is collecting feedback on the second iteration of the proposed framework.

The final version of the framework will be included in the Final report 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	100%
Task 2 - Interview DOT and Industry Personnel	90%
Task 3 - Develop Initial Framework	80%
Task 4 - Prepare Final Report	0%

AS OF 12.01.21													
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												
	▨ Additional Time												

# Appendix

## Template guide to creating a ABC PMP

Bridge No. :	Owner:
Project Description:	

### For the Project Owner

1. What are the goals of the project and how are they measured?
  - List project goals, objectives, and metrics.
  - List Project Roles and Responsibilities?
2. How is your organization managed?
  - Provide a project management team and list their responsibilities
  - Provide a project delivery team and list their responsibilities
  - Provide a communication plan between the two teams
  - Provide a public and shareholder communication plan
3. Is there a clear path for the project delivery?
  - What are the Project Cost Estimates?
  - What is the ABC Project Schedule?
  - What are the incentives and disincentives for the project delivery
4. Are the controls adequate to keep track of the status of the project?
  - Cost, schedule, scope, quality, safety, and security
  - Meetings, reports, and reviews content, frequency, and distribution

# For the Contractor

Question/Issue	Yes	No	N/A	Comments
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<b>Project Scope</b>				
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 during project construction?				
c. Is there a clear project specific safety, and security plan? Expand on plan and the managing worker fatigue and working conditions				
d. Does the project include an established safety policy for the ABC technique?				
e. Did you consider a communication plan between the delivery team and owner?				

<b>Project Construction</b>				
a. Are the bridge components built onsite? If so, expand on the technologies used to deliver the project and the specifications followed				
b. Are the bridge components built offsite? If so, expand on the technologies used to deliver the project and the specifications followed				
c. What is the ABC Project Schedule and schedule milestones?				
d. Have you identified items that need contingency plans? If so, what is the plan and how are those items managed? Otherwise, Why not? Expand				
e. Is there an acquisition strategy to execute the project most efficiently? Right of way, Utilities, Design, and construction.				

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<b>Project Quality</b>				
a. Are there clear goals and Objectives for Quality? Expand on the quality objectives and on the Tolerances for the ABC technique				
b. Is there a party responsibility for Quality checks during the project construction based on ABC technique? Expand				
c. Are there quality standards and plans for the ABC project delivery? Provide the standards followed.				
d. Has Quality Assurance been considered and are there quality milestone reviews with the owner? If so, please expand				
e. Is the process for project quality review and owner verification clear				



<b>Project Risk Management</b>				
a. Are there clear Objectives for Risk Management and 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? When is that point?				

# Guidelines for Completing the Template

## **Project description**

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. 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**

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, change management, earned value progressing, and forecasting.

## **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 by the use of 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, mile stone reviews and processes which the owner can use to access project quality reports.

## 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.