



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

ABC-UTC GUIDE FOR:

BIDDING OF ACCELERATED BRIDGE CONSTRUCTION PROJECTS: CASE STUDIES AND CONSENSUS BUILDING

March 2020

End Date:

February 29, 2020

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ABSTRACT

Accelerated bridge construction (ABC) is a solution for upgrading substandard bridges that reduces construction and closure times and minimizes exposure of the traveling public and road workers to construction activities. To take full advantage of the benefits of ABC, agencies should decide which projects are appropriate for ABC and how to bid these projects given the unique attributes of ABC methods.

The research team compiled information on decision matrices for identifying ABC projects, and outlined bidding processes for projects that utilized ABC. Four ABC projects in three states (Georgia, Indiana, and Minnesota) were then investigated in detail. Note that this project coincides with a partner project which contained similar information collection efforts for project delivery methods (Delivery Methods for Accelerated Bridge Construction Projects: Case Studies and Consensus Building [ABC-UTC-2016-C1-ISU01]). The research team reached out to personnel involved in the projects to discuss bid items, contracting methods, and lessons learned. The results of this effort are included in four standalone case study summaries.

The case studies suggest that when the bids allow for flexibility, innovation is often incorporated into the project, which results in financial savings for the agency and/or time savings for the traveling public. After a project is completed, the agency can benefit from reviewing the lessons learned and successful aspects of the project and applying these to future projects.

ACKNOWLEDGMENTS

The research study resulting in development of this guide was supported by the US Department of Transportation through the Accelerated Bridge Construction University Transportation Center (ABC-UTC).

This work was also made possible by match funds from Kiewit Infrastructure Co. through related work for Iowa State University's Institute for Transportation. Special thanks for Kiewit's financial support, and for their participation in interview and case study efforts to provide valuable contractor perspectives on ABC projects.



1. INTRODUCTION

This work documented past ABC projects with a particular focus on bid items and processes, as well as the lessons learned from each project. The research plan included a detailed review of literature related to how the decision is made to use ABC on a project and how the bid items are selected. The research team also reviewed research related to procuring and contracting ABC projects, as well as project delivery methods.

After the literature review was complete, several ABC projects were identified as candidates for further investigation via detailed case studies to obtain case-specific information on the selection of project delivery, bid item methodology and the lessons learned from each project. The ABC projects were identified by using the ABC-UTC database that can be found on the ABC-UTC website (<http://utcdb.fiu.edu/>). To narrow the pool of projects, the research team focused on ABC projects completed within the last five years. The research team conducted interviews with agency staff and, when possible, the contractor to gather as much information about each project as possible. Representatives from the following states were interviewed as part of this project: Georgia, Indiana, Minnesota, and Tennessee.

Note that the information collection efforts for this project were done simultaneously with those needed for the partner project, *Delivery Methods for Accelerated Bridge Construction Projects: Case Studies and Consensus Building [ABC-UTC-2016-C1-ISU01]*.

2. PROCUREMENT AND BIDDING PROCESSES

ABC projects are most often designed to reduce the amount of time that it takes for a bridge to be constructed. This typically results in a procurement system that differs from the typical low-bid process. The predominant procurement system that was identified for the ABC projects included in this research is best value procurement. Best value procurement takes into account both the technical expertise of the bidders and the bid price. The advantages of best value procurement are that it allows for innovation, the project schedule, and the contractor's safety record to be a part of the bid. A challenge of using best value procurement is that it is typically associated with alternative delivery methods such as design-build (DB) and construction manager/general contractor (CMGC). However, some states do not have much experience with these delivery methods, with some states not able to use alternative delivery methods at all due to legislative restrictions.

Beyond the typical best value procurement process, which considers project cost and the contractor's technical expertise, some of the case study projects specifically focus on bringing project schedule into the procurement process. The first schedule-focused best value procurement system that was identified is A+B bidding. A+B has two components. The first is the bid based on the unit prices of all costs associated with the project in order to meet the specified schedule given with their bid. The second component is the number of days that are needed by the contractor to complete the project. The basic formula for finding the total bid is

$$\text{Total Bid} = A + (B \times \text{Road User Cost per Day})$$

with A being the bid amount and B being the number of days. The Road User Cost per Day corresponds to the additional cost that motorists and the general community must bear as a result of the work zone.



The second schedule-focused best value procurement system that was identified is A+B+C bidding. This approach is rather similar to A+B bidding, but it has an added component. There is no hard rule for what the third component must be, though it is often milestone timeframes or a quality/warranty component. The C component could be a cost that would only accrue during a portion of the project rather than the entire project. In Louisiana and Montana, A+B+C bidding is used as an opportunity to incorporate life-cycle costs into paving projects. The C component of the bid adjusts for maintenance costs associated with concrete vs. asphalt pavements. As this example illustrates, A+B+C allows for creative and case-specific opportunities to incorporate another element of importance to a bid.

Another option that is used in the procurement of ABC projects is to include an incentive/disincentive (I/D) clause in the contract. An incentive or disincentive clause gives contractors the financial motivation to finish the job as fast as they can. In these clauses, the contractor usually receives a certain amount of money for every day, week, or sometimes month that the job is finished early. Alternatively, the contractor may be required to pay money if the project ends up behind schedule and finishes late (usually referred to as liquidated damages). Adding clauses such as these to the contracts is very effective for most projects, but especially so for ABC, since construction time is a significant factor in choosing this method.

3. ABC BID ITEMS

While the previously detailed bidding and procurement information applies to construction projects of all types, bid items and bidding processes specifically for ABC projects can pose unique challenges. When an agency is just getting started with ABC or trying a specific ABC method for the first time, well-defined bid items become critical to obtaining economical bids. When a bid item comes back with a wide range of values from multiple contractors, this can indicate that the bid item was not well understood by the contractors. For example, Table 1 shows several bid items that appeared in a previous ABC project and their corresponding bids from three contractors, along with the engineer’s estimate.

Table 1: Wide range of bid item values example

Bid Item	Unit Price			
	Dept. Estimate	Bid A	Bid B	Bid C
Construct Closure Pours	\$750	\$875	\$900	\$334
Prefabricated Deck Unit	\$125,000	\$128,300	\$158,000	\$177,976
Prefabricated Approach Slab	\$4,500	\$3,500	\$12,000	\$15,523
Prefabricated Moment Slab	\$2,600	\$2,200	\$7,000	\$9,294
Prefabricated Abutment Cheekwall	\$1,250	\$1,500	\$5,000	\$4,153

Source: ADOT at <http://utcdb.fiu.edu/2017-10-2717:07:20.pdf>



As the table shows, the four bid sources proposed a wide range of values for all of the bid items. However, it is important to note that a wide range of values does not always indicate a lack of understanding of bid items. Contractors may lump other components into a particular bid item, leading to a higher bid price for the item in question, but possibly a lower price for another. It is also possible that some contractors have available equipment or experience that better position them to complete certain bid items, resulting in significantly lower costs for particular tasks.

While many agencies have faced challenges in identifying and defining bid items for ABC projects when new methods are being used, these difficulties are often project-specific and cannot be broadly applied to all projects. However, in an effort to better define these challenges in general, several interviews were conducted with state agency and contractor representatives. These interviews also resulted in detailed case studies that are standalone documents. During this information collection effort, the following bid items were identified as challenging from an estimating and bidding standpoint:

- **Bridge Installation:** Float in, roll in, slide in, or other methods specific to ABC can be difficult to bid on because they differ substantially from conventional construction.
- **Engineering of Temporary Structures:** The design of temporary shoring or other engineered devices/processes is challenging from the contractor's perspective.
- **Acquisition and Installation of Specialty Moving Equipment:** This item includes self-propelled modular transport (SPMT) or gantries.
- **Staging or Preparatory Work for Assembly:** This item includes temporary docks or bulkheads.
- **Other Operations:** Operations that must be performed at a high rate of production are especially crucial. For instance, demolition that must be completed within a specifically allotted time during a weekend closure requires a conservative cost estimate to ensure that the contractor can include more resources to cover worst case scenarios.

In general, the approach taken by contractors when bidding on something new to them is to break down the operation into smaller and smaller components until an individual task is identified that is familiar or has been done before. There are very few operations that, when broken down finely enough, are entirely dissimilar to operations on previously completed projects. This breakdown process is a consistent feature of bidding, so the clearer the plan set is, the better for the contractor to accurately (and efficiently) bid.

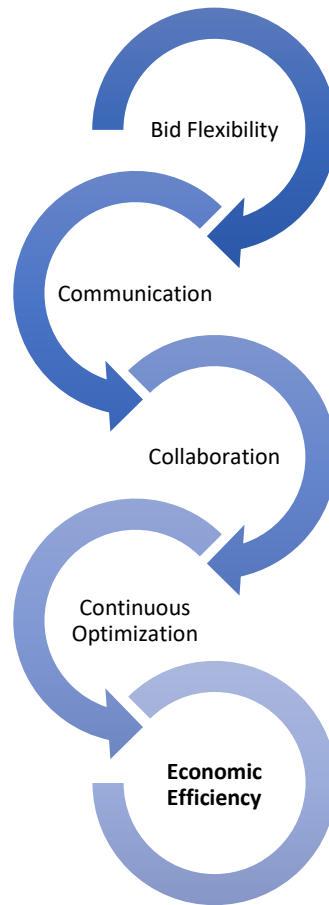
4. KEY TAKEAWAYS

The goal of all construction projects is to achieve economic efficiency, which is especially true for accelerated bridge construction projects due to perceived, and sometimes realized, heightened construction costs. To improve upon the economic efficiency of an ABC project, the following points were identified as a result of the information collection efforts associated with this project:

- When **flexibility is allowed in the bids** (i.e., presenting multiple construction method options or using alternative delivery methods), innovation is often incorporated into the project and results in savings to the DOT, either in terms of financial savings or time savings for the traveling public.



- **Communication and collaboration** between the contractor and the agency will result in a better project outcome. This holds true both during the bid process, and during actual construction.
- After completion of a project, discussions regarding **lessons learned** and successful project components are beneficial and can be applied to future projects to improve upon project and economic efficiency.





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