

PROJECT BUNDLING IN TRANSPORTATION CONSTRUCTION

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Project bundling is a process through which a single contract is awarded for the continued development of multiple bridges or roadways, i.e., their preservation, rehabilitation, or replacement. One question that past studies on project bundling have not answered is that of how to quantify its benefits on engineering projects. This paper shows the extent to which project bundling enables optimal use of resources and promotes quicker project completion. It also explains how project bundling effectively leverages these efficiencies by simplifying project delivery and exploiting alternative and traditional contracting approaches. Indeed, because the process of bundling individual projects into larger “umbrella” contracts simplifies design, contracting, and construction, it enables organizations to leverage economies of scale for significantly increased efficiency. This process also encourages more partnering during project delivery, execution, and project completion. In addition to discussing the efficiency of bundling, this paper also identifies implementation strategies and scenarios for project bundling that can be applied by counties, municipalities, districts, or states. These implementation practices can also be layered to allow any combination of project types, beyond the combinations most common to current bundling contracts. Ultimately, this research shows that overall contract cost can be significantly reduced through carefully designed strategic project bundling.

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1 INTRODUCTION

As states across the country face the ongoing degradation of their aging infrastructure, they are turning to practices such as the bundling of two or more projects into single contracts to directly expedite needed improvements. Indeed, several state and local public agencies now employ this approach; however, because project bundling practices and methods are not yet standardized, the Federal Highway Administration (FHWA) has sought to identify tools and techniques to help agencies implement project bundling for all funding sources (EDC-5 2020).

The FHWA's Every Day Counts (EDC) Program selected project bundling (PB) for an EDC Round 5 (EDC-5) initiative because of its proven, though relatively brief, record of success. The EDC-5 supports a state-based model aimed at identifying and deploying underutilized innovations that consistently save time, money, and resources for use on other projects in an agency's pipeline. However, although it is state-based, the program is not limited to state DOT projects. Moreover, in addition to participating in efforts coordinated by their state highway agencies, counties, municipalities, townships, and other entities use EDC practices in programs completely detached from these state agencies (EDC-5 2020).

In any case, PB is not new to some state and local transportation agencies. PB differs from the traditional approach of one project-one contract, in that any number of projects, from two to hundreds of projects can be let and executed under a single contract. Projects have been bundled together into single contracts for many years for many good reasons, including making a single contract large enough to attract healthy competition among qualified contractors, subcontractors, or designers; reducing any long-term disruption to the traveling public; optimizing available funding by leveraging economies of scale; accelerating the planning, design, and construction of transportation improvements; building political capital (accelerating or getting projects “off the books”); optimizing project schedules through contractor “smart” phasing (enabling contractors to break ground quickly and shift accordingly) to reduce mobilizations, and; supplementing owner staff through the strengths of the contractor, designer, or construction manager (especially helpful when an owner’s internal staff is limited, or workloads are high).

Bundling also supports the national goal of reducing project delivery delays. Yuba County, California bundled four years of road repairs into a single contract completed in a single summer. While the primary objective of the bundled contract was to minimize disruption to the road network, Yuba County also managed to save about \$3 million. Bundled project delivery resulted in both faster and cheaper project execution (D’Angelo *et al.* 2019).

The research team developed a document to help agencies plan and implement project bundling throughout their programming and project development processes, for better construction program delivery. This document, called the Quick Start Reference (QSR), lays out the business case for project bundling and elucidates the process for identifying projects that are good candidates for bundling. The team also developed a decision-support tool that first estimates the potential cost and schedule impacts of bundling a set of projects, and then compares them with estimates of completing those projects one at a time. This tool also provides a checklist for assessing and managing the risks associated with bundling, along with a methodology for collecting and evaluating project performance data.

Figure 1 illustrates the bundling concept and shows how the terms “projects” and “contracts” are used in the context of the QSR. The figure shows the two ways of funding bundled contracts. The first is through a routine process of examining the authorized projects in a given fiscal year’s capital improvement portfolio (or in a multi-year program) and then developing a pool of projects that are candidates for inclusion in a bundled contract. The remainder are assigned to a pool containing projects best delivered as stand-alone contracts.

Bundling contracts can also be developed when funding is allocated for a specific purpose. Examples of this type of targeted funding include the “shovel-ready” American Recovery and Rehabilitation Act (ARRA) of 2009 program; funding allocated for specific local infrastructure improvements, such as the Iowa Competitive Highway Bridge Program; and emergency funding for the restoration of service after a natural disaster. These funding instruments can be allocated through a single authorization like ARRA or an annual legislative set-aside like the Iowa Local Bridge Fund. While much infrastructure project bundling comes out of this more specialized funding process, this paper will focus on the routinized and institutionalized process used by most public agencies. However, the steps of the routine approach can be directly applied to bundled contracts that result from specially funded infrastructure improvement programs.

Figure 1 shows that after projects are placed in the general bundling candidate pool, they are assigned to specific bundles based on particular criteria (discussed later in this section). The final grouping of these projects becomes a bundled contract for letting and delivery. Lastly, the total number of routine bundled contracts, specially funded bundled contracts, and stand-alone contracts comprise the agency’s construction program for a given fiscal year.

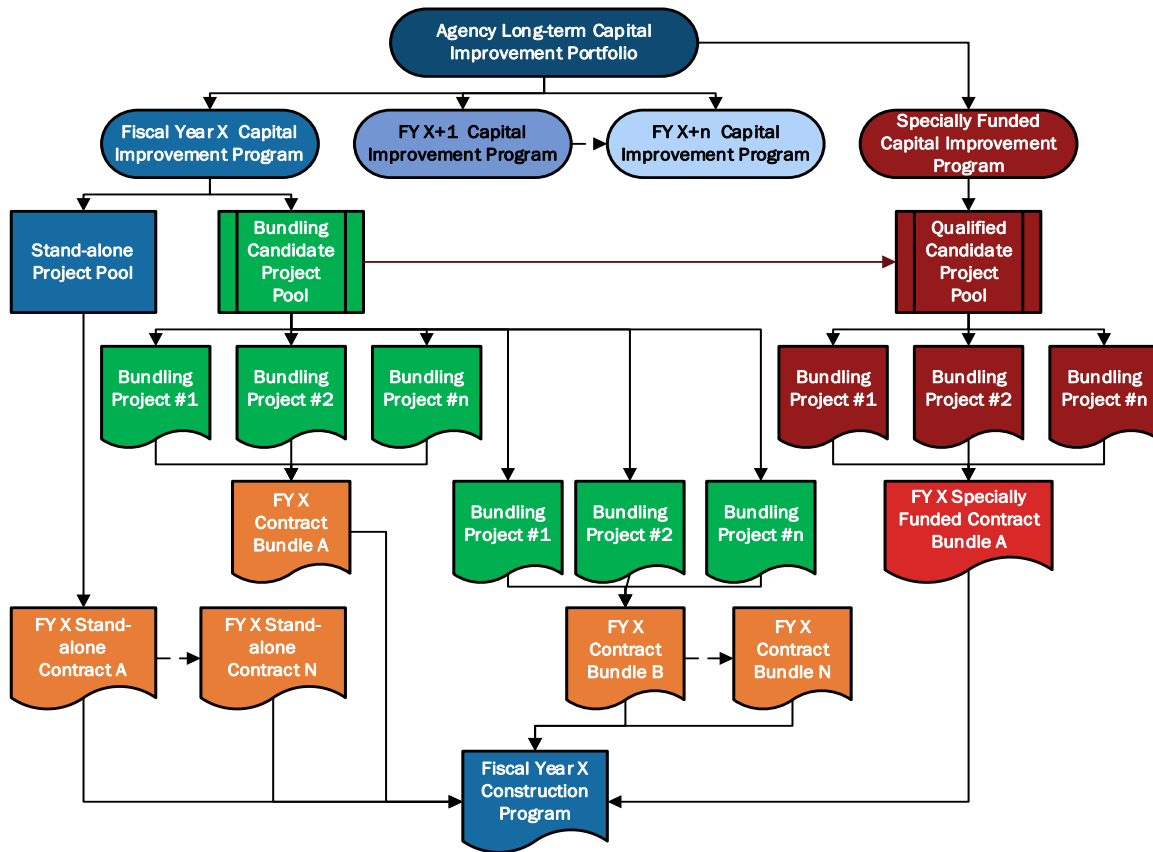


Figure 1. Contract Bundling Concept (from the APB).

2 BUSINESS CASE FOR PROJECT BUNDLING

While most public transportation agencies have used project bundling for a variety of projects, it is the exception rather than the rule. The goal of the EDC-5 project bundling initiative is to institutionalize this valuable but underused tool, making the process shown in Figure 1 a routine agency business process. This process should use agency-specific procedures and rules to assess whether projects in the statewide transportation improvement program would benefit from bundled delivery. Once the decision to bundle is made, the individual projects should be grouped into optimum-sized bundled contracts. This paper provides guidance on how to employ this approach (FHWA 2020).

The successful track record of bundling validates the business case for its implementation in agencies not familiar with it. Part of the history of project bundling is that it has mainly been used in special circumstances, such as when several projects must be combined to make the contract large enough to attract competition among qualified contractors, or when an agency or the traveling public can gain a tangible benefit from having a single contractor complete a series of smaller projects in a single geographic area. However, today, project bundling should be viewed as an essential tool in an agency’s procurement toolbox. Because bundling provides a better approach to rapidly delivering transportation improvements, it enables agencies to accomplish their program and performance goals faster and more effectively (FHWA 2020).

An agency’s desired project delivery method does not constitute a constraint on bundling. Project bundling has been successfully applied with all the following project delivery methods:

- Design-Bid-Build (D-B-B)
- Indefinite Delivery/Indefinite Quantity (IDIQ)
- Construction Manager/General Contractor (CM/GC)
- Construction Manager-at-Risk (CMAR)
- Design-Build (D-B)
- D-B with Alternative Technical Concepts (ATC)
- Progressive Design-Build (PDB)
- Public –Private Partnerships (P3), with and without ATCs.

Past reasons for employing project bundling are as follows:

- Maximize use of existing funding.
- Utilize existing agency staff efficiently.
- Improve project and program delivery time.
- Reduce design costs and construction costs.
- Take advantage of economies of scale.
- Take advantage of financing opportunities.
- Deliver transportation benefit to the public faster.
- Reduce disruption.
- Respond to political pressure to complete projects/programs (FHWA 2020).

A comprehensive study by the Indiana Department of Transportation (INDOT) in 2018 compared bundled contracts to individual projects, in a sample that covered ten years' worth of construction and a total of nearly 8,800 projects (Qiao *et al.* 2018). Over 1,300 contract bundles comprised nearly 7,000 of these projects. The stand-alone project sample had roughly 3,500 contracts. The population covered the full gamut of typical transportation projects: bridges, roads, traffic, and utility projects. The study found the following general benefits:

- As project size increased, economies of scale reduced unit costs.
- Bundling reduced per project cost on bridge and road projects.
- Competition was maximized when a bundle included two to four related projects.
- Traffic maintenance costs were reduced on bundled projects of all types, with roadway projects experiencing the most benefit in this area (D'Angelo *et al.* 2019).

Another key finding of the INDOT study was that there was a functional limit to the number of projects included in a bundle; beyond which the benefits either reached a point of diminishing returns or actually declined. This insight led INDOT to develop business rules for more strategic bundling during early project programming. These rules effectively institutionalize the process to allow for greater economies of scale throughout project development and delivery.

The lesson learned from the INDOT study supports the objective here, which is to provide a systematic method for strategically evaluating project bundling. Secondly, if agencies are interested in bundling, this paper will help them determine the appropriate number and types of projects included in any given final bundled contract scope of work (FHWA 2020).

3 OPTIMIZING THE BUNDLE

Bundles may be based on the following project characteristics: similar type and/or size; particular geographic area; shared funding source; or guaranteed funding (as part of a construction program) at the time the bundling is required. The size of a bundle is an important consideration, and certain laws of finance apply to bundling. For instance, the concept of “economies of scale” holds that unit cost decreases as contract size increases, and in “economies

of competition,” unit cost decreases as the number of bidders increases. Research has shown that not only do returns diminish when a bundle size exceeds the ideal number of projects, but bundles of two to four projects tend to attract the highest number of bidders. To maximize economies of scale, projects should use similar pay items to significantly reduce unit prices (FHWA 2020).

Bundles should be developed as early in the process as is practical, to accrue economies of scale benefits throughout project development. Early bundle development has other benefits as well. If the decision to bundle is made early enough, a single permit transaction can cover all the projects in the bundled contract. Since the construction sequence of work greatly depends on utility coordination, assigning this activity to the contractor organization gives it full control of the sequence of work for all the projects in the bundle (FHWA 2020).

Restricting the geographic distribution of the projects in a bundle reduces the complexity of construction management and facilitates coordination of activities. In bundles limited by proximity, consolidated utility agreements can be negotiated in advance of advertising the bundled projects. Such agreements enable phasing of the sequence of contracts around right-of-way (ROW) availability, with work starting as necessary parcels become available (FHWA 2020).

Bundling being a new phenomenon, there are many gaps in the application of the process. One such gap is being filled by Native American Indian tribes that are beginning to combine project bundling with the CM/GC project delivery system, while at the same time bundling vertical construction projects with horizontal construction projects.

4 LESSONS LEARNED

The following practices were successfully applied by five or more public agencies, and so are classified as most effective:

- Make bundling decision early, during planning.
- Determine optimum bundle size.
- Limit bundle by work type and by geographic proximity.
- Reach out to stakeholders.
- Partner locally.
- Assign utility coordination to industry.
- Use ACMs.
- Coordinate construction staging.

Although this set of practices supports successful bundling, it is not presented as an exhaustive list; individual agencies can incorporate additional practices to fit their particular circumstances. Regardless, establishing a bundling policy greatly increases the likelihood of success of bundled projects and significantly improves the ability to consistently realize the benefits. Conducting stakeholder outreach and partnering with local entities are both effective practices. The other practices allow contractors to optimize project sequence and to use ACMs to leverage their creativity and become involved early on in the design and delivery of bundled projects (FHWA 2020).

5 SUMMARY

Project bundling programs target infrastructure project types that are planned for preservation/preventive maintenance, rehabilitation, or replacement. Bundling enables the delivery of such projects in a timely and efficient manner through a series of contracts. Supported by various funding options and/or partnerships, these contract bundles may include a

program completion time frame. The likely benefits of bundling include the following: better risk allocation; cost savings (economies of scale); expedited procurement (faster construction start); earlier completion; technical innovation; increased service life of assets; coordinated construction staging; reduced burden on agency staff; and funding and financing innovation. Ultimately, the success of bundling depends greatly on the early consideration of the potential benefits of bundling as part of an agency's routine project development process. Additionally, having a bundling process in place positions an agency to rapidly take advantage of special funding opportunities such as ARRA.

Every bundling project starts with a statement of goals and objectives that the agency should modify iteratively as detailed information becomes available. With the goals identified, the agency can establish a guiding coalition and select a project manager. As it progresses, the process of developing this statement depends on an understanding of the opportunities and threats to achieving the goals and objectives.

The agency should conduct an initial risk assessment and produce a risk register to be updated throughout the project life. Preparing a communication plan outlining stakeholder (internal and external) engagement is beneficial. Identifying the necessary / available funds (e.g., existing budgets, federal or state sources, or private equity through P3 arrangements) is critical to limiting the scope of work. Technical issues must also be addressed, including project selection criteria, design standards, ROW needs, environmental approval process, and third-party coordination.

Based on its updated risk analysis, the agency must select a project delivery method (e.g., D-B-B, IDIQ, CM/GC, D-B, or P3). The procurement methodology also must be determined (e.g., low bid, best value, or QBS). Moreover, consideration should be given to incorporating the ATC process into procurement and contract execution. The contract documents must also include the details of how quality assurance will be conducted, and how civil rights requirements will be met. As the post-award activities commence and progress, an updated risk assessment can help the agency determine where its resources can best be used. Finally, closing out the project and capturing lessons learned for future projects is vital to continuous improvement and optimization of the agency's bundling program.

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