Bridge Bundling—A New Old Idea

by David Unkefer and Romeo Garcia, FHWA

Bridge bundling using the more advanced practices promoted in the Federal Highway Administration (FHWA) Every Day Counts (EDC)–5 Project Bundling initiative provides cost savings as great as 50% for design and up to 15% for construction, along with other benefits. This article defines bundling, introduces advanced practices, and shares examples of benefits that agencies have experienced as they make bundling a more strategic and consistent part of program delivery.

Bundling is awarding a single contract for similar preservation, rehabilitation, or replacement projects. When designed as a program, multiple bundles of projects are carefully chosen to accomplish larger agency goals, such as reducing the number of bridges classified as poor condition. Early and strategic bundle selection coupled with alternative contracting methods, such as indefinite delivery/indefinite quantity (IDIQ), design-build (DB), and construction manager/general contractor (CM/GC) project delivery, capitalizes on economies of scale throughout project delivery and supports greater collaboration.

With this approach, agencies can streamline design, contracting, and construction to reduce delivery costs and time, effectively decrease transportation project backlogs, and rapidly address agency asset management and system performance goals. Congress recognized the potential of bundling by including it in the Fixing America's Surface Transportation (FAST) Act (23 U.S.C. 144 (j)),[1] and FHWA also incorporated it in the Competitive Highway Bridge Program.[2]

Why Bundle?

The U.S. transportation system is aging, with many states seeing an increasing number of highways and bridges that need immediate attention. As a result, system performance is reduced, leading to adverse impacts on quality of life, mobility, travel time, freight movements, and emergency response times. Data from the National Bridge Inventory showing total values and values for bridges in good and poor condition appear in **Table 1**. The poor condition bridges need immediate attention. Often, the most pressing needs are found in local systems, as evidenced by bridges that are being posted for reduced loads. Bridge bundling offers an excellent approach to addressing these needs rapidly and effectively, and the same approach can also be used for other project types.

The following are some reasons that agencies employ bundling:

- To deliver transportation benefits to the public faster and with fewer disruptions
- To maximize use of existing funding and take advantage of financing opportunities
- To use existing agency staff efficiently and augment staff when needed
- To improve project and program delivery time
- To reduce design and construction costs

A comprehensive study completed by the Indiana Department of Transportation (INDOT) in 2018 compared project bundling to individual contracts in a sample that covered 10 years of construction and nearly 8800 projects.[3] The sample included the full range of typical transportation projects, from bridges and roads to traffic and utility projects. The study confirmed the following:

- Economies of scale resulted in reduced unit costs as project size increased.
- Bundling reduced per-project costs in bridge and road projects.
- Competition was maximized when two to four related projects were included in the bundle.
- Maintenance-of-traffic costs were reduced on bundled projects of all types, with roadway projects experiencing the greatest benefit.

INDOT has since worked to institutionalize bundling into its standard planning and programming and expects $50 million in savings per year.

The Pennsylvania Department of Transportation (PennDOT) used bridge bundling to address local bridge needs in a pilot project that was executed in three contracts (**Fig. 1**). The bundling projects rebuilt, replaced, or removed 40 county-owned structures in three counties for $25 million, resulting in 25% to 50% savings on design and 5% to 15% savings on construction. Only bridge projects (seven bridge replacements, 12 superstructure replacements, 18 rehabilitations, and three removals) with very similar details were chosen for the three contracts awarded. In addition to the cost savings, design and construction were performed in 18 months. Because of the savings achieved in this pilot bundling project, PennDOT chose to waive the local public agency (LPA) contribution; thus, PennDOT provided "no-cost" bridges for the local agencies while addressing critical bridge needs and supporting the local economies (see the Perspective article in the Winter 2020 issue of *ASPIRE*).

Other examples of successful project bundling include:

- The Delaware Department of Transportation uses a series of bundling contracts to address preservation issues on bridges and culverts. The bridge management section prioritizes the work, and the maintenance districts

Table 1. Bridge condition ratings data from the Federal Highway Administration's National Bridge Inventory as of June 2, 2020

		All Bridges		Locally Owned Bridges	
National bridge count	Total	618,411		307,309	
	Good condition	278,507	(45.0%)	141,309	(46.0%)
	Poor condition	44,978	(7.3%)	29,509	(9.6%)
National bridge deck area (m^2)	Total	396,259,573		90,027,336	
	Good condition	173,862,848	(43.9%)	41,823,240	(46.5%)
	Poor condition	20,571,497	(5.2%)	6,623,054	(7.4%)
Average age		44.9 years		43.4 years	

Note: The National Bridge Inventory Data can be accessed using the FHWA InfoBridge portal, which was described in the Winter and Spring 2020 issues of ASPIRE®.

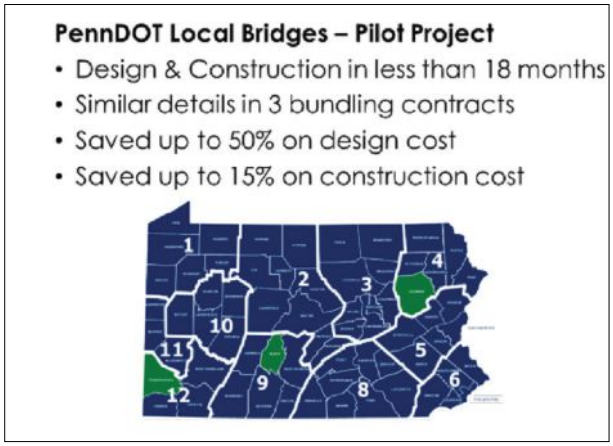

Figure 1. Pennsylvania Department of Transportation pilot bundling project for local bridges. Projects were located in counties highlighted in green. Figure: PennDOT.

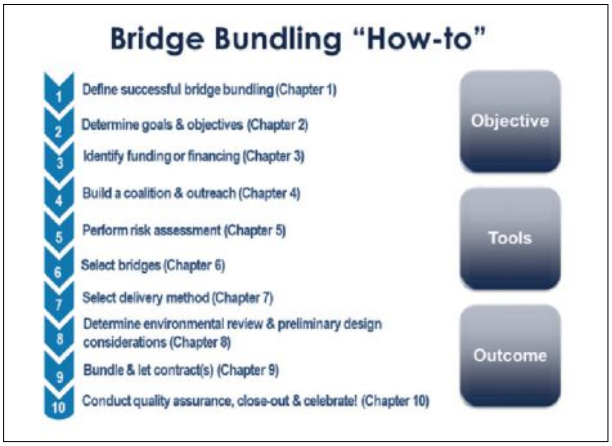

Figure 2. Ten-step bridge bundling process from *Bridge Bundling Guidebook*.[4] Figure: FHWA.

administer the contracts. Scopes include deck sealing, bridge painting, deck patching, joint repair, and culvert replacement.

- The Ohio Department of Transportation Bridge Partnership Program replaced or rehabilitated 220 county bridges over three years by bundling two or three bridges per contract; this program was funded through $120 million in Grant Anticipation Revenue Vehicle (GARVEE) bonds and toll credits.
- The Georgia Department of Transportation Design-Build Bridge Replacement Program, which began in 2016, replaced 25 local bridges in bundles of five to seven bridges within 1095 calendar days through new revenue available under the state's Transportation Funding Act of 2015.
- The Oregon Department of Transportation's $1.3 billion State Bridge Delivery Program replaced or repaired 271 bridges using 87 project bundles.
- The Missouri Department of Transportation (MoDOT) $685 million Safe & Sound Bridge Improvement Program replaced or rehabilitated 802 state-owned bridges over 3.5 years, including 554 bridges replaced through a single DB contract.
- FHWA's Central Federal Lands Division used bundling on a $49 million emergency contract to repair and replace 10 miles of roadway and 12 bridges. The procurement used a design-bid-build best-value, single-award task order contract.

How to Bundle?

Drivers of Bundling

There are two primary approaches to bundling: project-based and initiative-based. Both methods have valid objectives: Bundling on a project basis benefits an agency's standard program by strategically and efficiently combining projects. Bundling on an initiative basis achieves a specific initiative or performance goal, or makes the case for one.

The project-based approach may be executed in one of two ways:

- An agency's existing program is reviewed for project opportunities to bundle.
- Asset management activities are conducted to identify projects that will help achieve performance goals; project locations are identified by similar work types and bundled to take advantage of efficiencies.

Some of the departments of transportation taking this approach are INDOT, MoDOT, and the Michigan Department of Transportation.

The initiative-based approach is also used in two ways:

- To deliver a specially funded program or agency initiative, such as with the American Recovery and Reinvestment Act (ARRA) emergency relief projects, and some tribal examples
- To justify or make the case for an initiative to secure additional funding for projects, such as to address poor-condition bridges

Examples of the initiative-based approach include Kentucky's Bridging Kentucky program (see the State article in the Fall 2019 issue of *ASPIRE*), the Ohio Bridge Partnership Program (see the State article in the Winter 2016 issue of *ASPIRE*), and Nebraska's County Bridge Match Program.

Selecting Bridges to Bundle

States that implement advance bundling use screening criteria and best practices to fully leverage bundling to meet their goals. For example, INDOT has developed business rules to rank and select bundles and to standardize the process.[3]

Examples of INDOT's screening criteria for selecting project bundles are:

- Geographic location and proximity
- Road type, geometry, traffic, and work zone control
- Bridge size
- Similar bridge types
- Similar work types
- Environmental permitting
- Hydrology and hydraulics
- Geotechnical conditions
- Utilities or third parties
- Right-of-way
- Railroads

Bridge Bundling Guidebook

The FHWA's recently published *Bridge Bundling Guidebook*[4] outlines a 10-step process for implementing a bundling program based on best practices from around the United States (**Fig. 2**). It also outlines advanced bundling practices developed through a national study and provides case studies of bundling's benefits and how various agencies have strategically deployed project bundling. The guidebook is available, along with other bundling resources, at the FHWA Office of Innovative Program Delivery website. In addition to the guidebook, the EDC-5 Project Bundling Initiative will soon be completing a bundling "quick start" reference, a database of resources, and a self-assessment tool to assist agencies with implementation.

For more information on technical assistance available through EDC-5, contact Romeo Garcia (Romeo.Garcia@dot.gov) or David Unkefer (David.Unkefer@dot.gov).

References

1. Federal Highway Administration (FHWA). 2015 (May). "Fixing America's Surface Transportation Act or 'FAST Act.'" https://www.fhwa.dot.gov/fastact/legislation.cfm.
2. FHWA. 2020 (March). "Competitive Highway Bridge Program." https://www.fhwa.dot.gov/bridge/chbp.cfm.
3. Qiao, Y.J., J.D. Fricker, and S. Labi. 2018. *Capital Program Cost Optimization Through Contract Aggregation Process.* Joint Transportation Research Program. FHWA/IN/JTRP-2018/09. West Lafayette, IN: Purdue University. https://doi.org/10.5703/1288284316729.
4. FHWA. 2019. *Bridge Bundling Guidebook.* Washington, DC: FHWA. https://www.fhwa.dot.gov/ipd/pdfs/alternative_project_delivery/bridge_bundling_guidebook_070219.pdf.