Center for Accelerating Innovation

U.S. Department of Transportation
Federal Highway Administration





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Advanced Project Bundling: A Reference for Getting Started

Disclaimer

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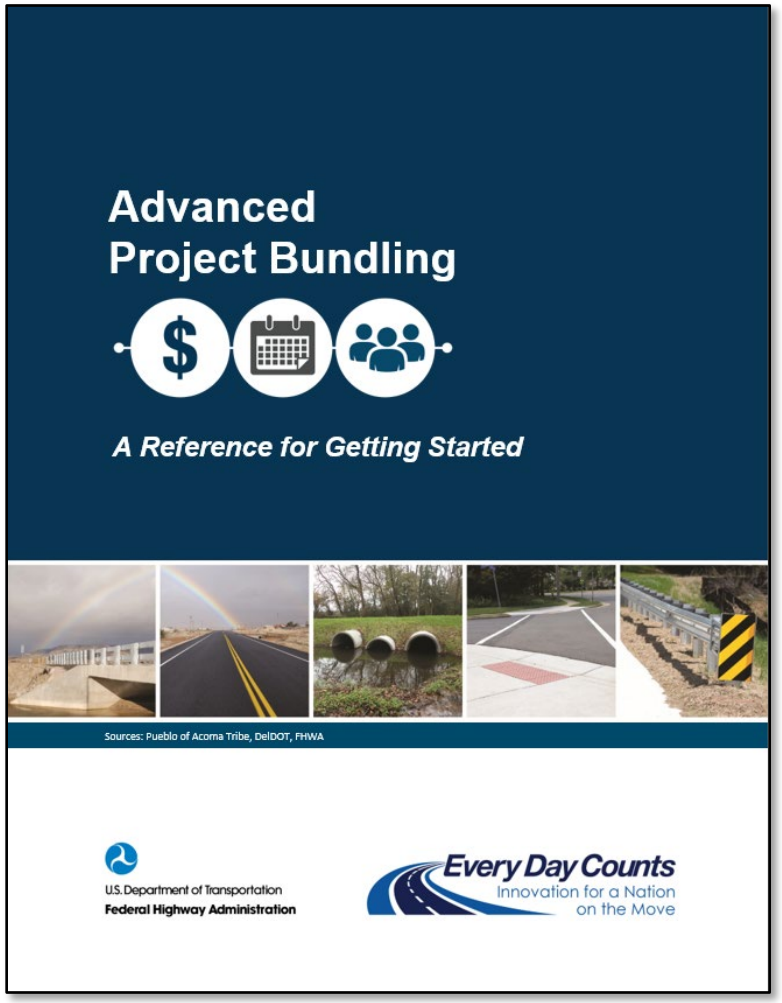
What is the *ADVANCED PROJECT BUNDLING: A Reference for Getting Started?*

- Supports the FHWA EDC-5 Project Bundling initiative.
- Supplements the FHWA Bridge Bundling Guidebook.
- Provides additional information on
  - creating bundles
  - bundling process



Source: FHWA

Organization

Chapter 1. The Basis for Advanced Project Bundling

Chapter 2. Advanced Project Bundling Practices

Chapter 3. Initial Implementation Steps

Chapter 4. Getting Started: Planning and Funding

Chapter 5. Process & Procedures for Selecting Bundled Projects

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Development

- Internal FHWA Project Bundling Implementation Team (PBIT)
  - 18 offices represented
- External Project Bundling Technical Work Group (TWG)
  - 14 State DOT's
  - 6 LPA's
  - 2 Tribal Nations
  - 5 Academia
  - 2 Contractors
  - 2 Consultants

Chapter 1. The Basis for Advanced Project Bundling

Why Bundle?

Capitalize on Economies of Scale

Saves Cost!

Source: FHWA

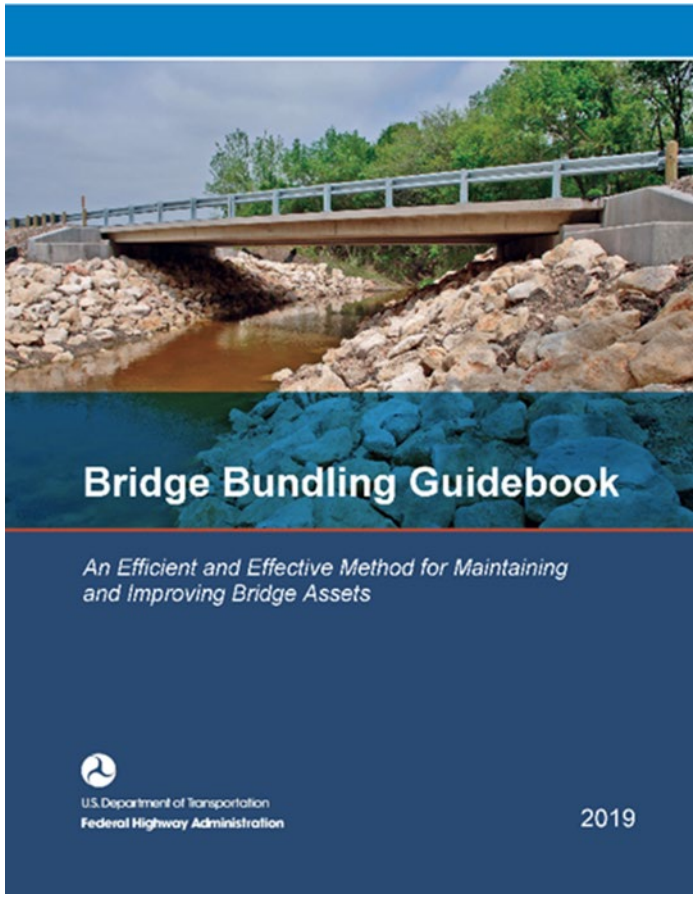
Saves Time!

Source: FHWA

Saves Resources!

Source: FHWA

Chapter 1. The Basis for Advanced Project Bundling (1 of 3)



Source: FHWA

Bridge Bundling "How-to"

1. Define successful bridge bundling (Chapter 1)
2. Determine goals & objectives (Chapter 2)
3. Identify funding or financing (Chapter 3)
4. Build a coalition & outreach (Chapter 4)
5. Perform risk assessment (Chapter 5)
6. Select bridges (Chapter 6)
7. Select delivery method (Chapter 7)
8. Determine environmental review & preliminary design considerations (Chapter 8)
9. Bundle & let contract(s) (Chapter 9)
10. Conduct quality assurance, close-out & celebrate! (Chapter 10)

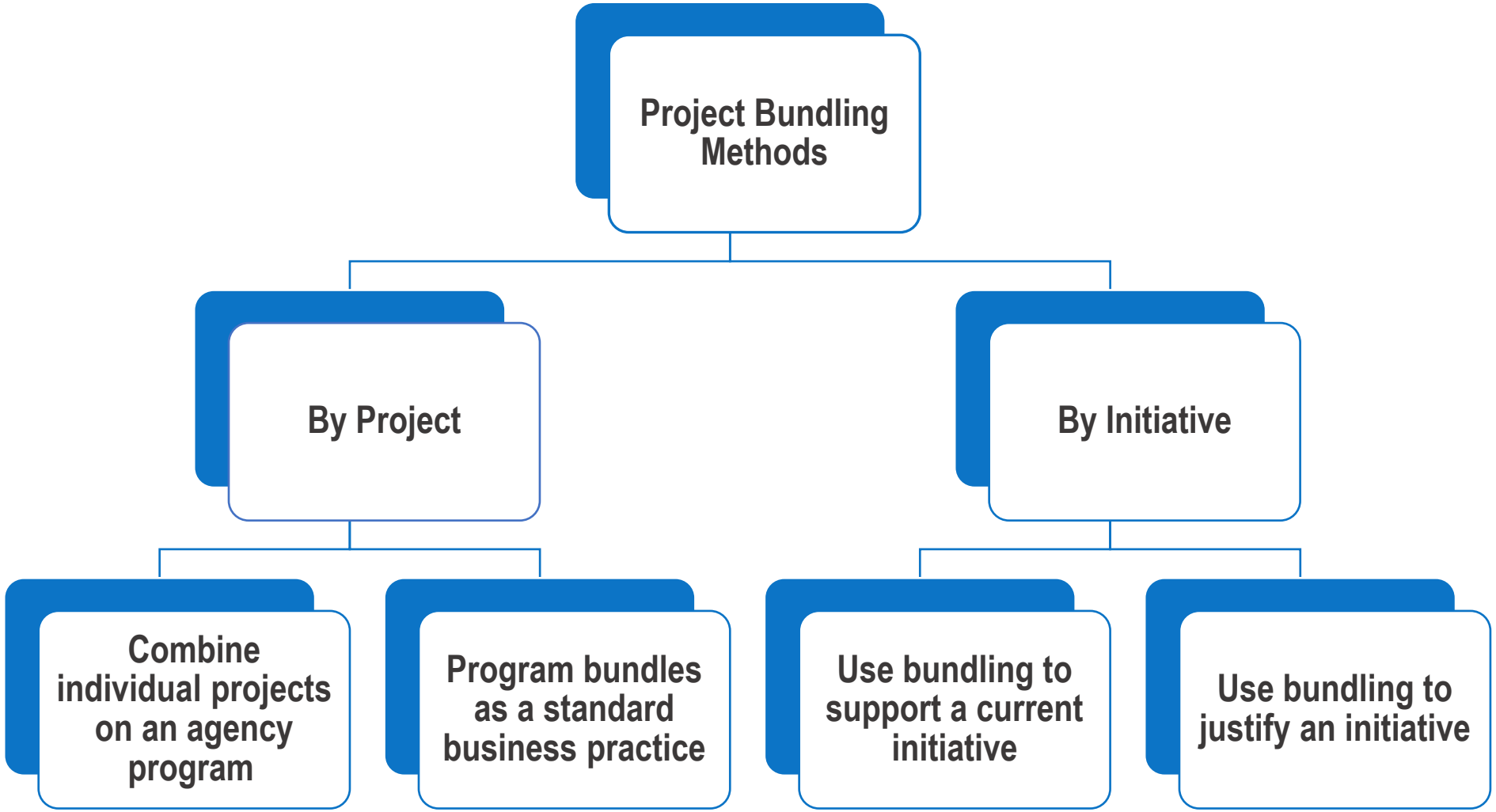
Objective

Tools

Outcome

Source: FHWA

Chapter 1. The Basis for Advanced Project Bundling (2 of 3)



Source: FHWA

Chapter 1. The Basis for Advanced Project Bundling (3 of 3)

Use Cases

- Traditional/Specialty
- Initiative Based/Incidental
- Last Minute
- Catch-All
- Advanced / Optimized

The business case for project bundling

A comprehensive study completed by INDOT found -

- ✓ Economies of scale resulted in a reduction in unit costs as project size increased.
- ✓ Bundling resulted in a reduction in per project cost 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 most benefit in this area.

Results from INDOT's **bundled contracts study**:

Bundled projects saved from 8% to 27% compared to engineer's estimates.

Program savings enabled $20 million in additional projects to be programmed.

(Qiao, Fricker, & Labi, 2018)

Chapter 2. Advanced Project Bundling Practices

Evaluation Factor
Economy of Scale
Economy of Bundling
Economy of Competition
Project Similarity
Bundle Size

Asset Types Evaluated
Road
Traffic safety
Pipes, culverts
Bridges
RR, utility relocation

Policy practices

No.	Practice
1	Making the bundling decision early during planning
2	Determining optimum bundle size
3	Limiting bundle by work type
4	Limiting bundle by geographic proximity

Stakeholder communication practices

No.	Practice
5	Performing industry outreach
6	Performing stakeholder outreach
7	Engaging in local partnering

Funding and finance practices

No.	Practice
8	Identifying Federal-aid eligible work types
9	Using innovative financing
10	Using State funding only

Environmental permit practices

No.	Practice
11	Bundling to reduce the number of permit actions
12	Receiving programmatic permits
13	Assigning permitting tasks to industry

Utility coordination and ROW practices

No.	Practice
14	Negotiating consolidated utility agreements
15	Assigning utility coordination to industry
16	Staging ROW acquisition sequence
17	Using IDIQ to stage ROW, permits, and/or utilities
18	Assigning ROW tasks to industry

Contracting practices

No.	Practice
19	Using ACMs (i.e., something other than traditional D-B-B)
20	Using Alternative Technical Concepts (ATCs)
21	Coordinating construction staging
22	Coordinating Maintenance of Traffic (MOT) plans
23	Applying progressive guaranteed maximum price (GMP)
24	Using open-end contracts (on-call contracts)
25	Using IDIQ contracts

Other Practices to consider

- Standardized design
- Budget control
- Preliminary engineering cost

Lessons Learned

- Making the bundling decision early during planning.
- Determining optimum bundle size.
- Limiting bundle by work type.
- Limiting bundle by geographic proximity.
- Performing stakeholder outreach.
- Engaging in local partnering.
- Assigning utility coordination to industry.
- Using ACMs.
- Coordinating construction staging.

Chapter 3. Initial Implementation Steps

3.1 Leadership Vision and Goals for Bundling

3.2 Organizational Self-Assessment Tool

3.3 Change Management –- First Steps

3.4 Organizational and Workforce Considerations

3.1 Leadership Vision and Goals for Bundling

- ✓ Agency defines what their project bundling goals and objectives are.
- ✓ What is the desired end state and what does success of a bundling program truly look like?
- ✓ These goals and objectives should be connected or aligned with other agency goals

3.2 Organizational Self-Assessment Tool

Capability Level Criteria			
Level	**Description**	**EDC definition**	**Definition applied specifically to bundling**
1	**Not Implementing**	The agency is not pursuing innovation anywhere and is not interested in pursuing innovation	Project bundling is not considered.
2	**Development Stage**	The agency is collecting guidance and best practices, building support with partners and stakeholders, and developing an implementation process.	No formal policy, process or tools. Ad hoc approach to project bundling is applied when required.
3	**Demonstration Stage**	The agency is testing and piloting the innovation	Basic project bundling process and tools are repeatedly used but not standardized. Approach varies from project to project.
4	**Assessment Stage**	The agency is assessing the performance of and process for carrying out the innovation and making adjustments to prepare for full deployment	Draft organizational standard process for developing project bundling strategy is documented. Supporting methods, tools, and staff training are being assessed.
5	**Institutionalized**	The agency has adopted the innovation as a standard process or practice and regularly uses it on projects.	Organizational standard process for developing project bundling strategy is documented. Supporting methods, tools, and staff training are established and documented.
6	**Optimized**	- not applicable -	Lessons learned and best practices are applied for continuous improvement. Performance metrics have been established to enable quantitative feedback.

Source: FHWA

Self-Assessment Tool Input

Step 1 - Indicate if each practice is applicable for bundling in your agency (practices 1-4 are required, for practices 5-25 use pull-down menu to select yes or no if applicable to your agency).			Step 2 - Select the project stage(s) in which the practice would be applied in your agency (the checked project stages should be adjusted to meet your agency practice stage).					
Practice # (Step 1)	**Practice (Step 1)**	**Applicable? (Step 1)**	**Planning (Step 2)**	**Programming (Step 2)**	**Prelim Engineering (Step 2)**	**Final Engineering (Step 2)**	**Construction (Step 2)**	**O&M Stage (Step 2)**
1	Early bundling decision during planning/programming	**Required**	☑	☑				
2	Determine optimum bundle size	**Required**	☐	☑	☑	☑	☐	☐
3	Limit bundle by work type	**Required**	☐	☑	☑	☐	☐	☐
4	Limit bundle by geographic proximity	**Required**	☐	☑	☑	☐	☐	☐
5	Outreach - Industry	YES	☑	☑	☐	☐	☐	☐
6	Outreach - stakeholders	YES	☑	☑	☐	☐	☐	☐
7	Local partnering	YES	☑	☑	☐	☐	☐	☐
8	Identify Federal-aid eligible work types	YES	☑	☑	☑	☐	☐	☐
9	Use innovative finance	YES	☐	☑	☐	☐	☐	☐
10	Use state funding only	YES	☐	☑	☐	☐	☐	☐

Source: FHWA

Capability Assessment Result Review Sheet

Practice #	Practice	Planning	Program	Prelim. Eng.	Final Eng.	Constr.	O&M	Capability for Each Practice
1	Early bundling decision during planning/programming	3	1					1
2	Determine optimum bundle size		2	2	2			2
3	Limit bundle by work type		4	4	4			4
4	Limit bundle by geographic proximity		4	4				4
5	Outreach - industry			2	3			2
6	Outreach - stakeholders			2	3			2
7	Local partnering			1	1			1

Source: FHWA

Capability Assessment Action Plan Sheet

Practice #	Practice	Capability (from 1 to 5)	Capability Level Goal (enter desired level)	Action Plan to Raise Capability Level* (Enters action steps to reach desired level.)
1	Early bundling decision during planning/programming	1	4	1. Develop a draft policy & process (business rules) to provide guidance on including bundling program development. 2. Coordinate with asset managers for piloting process, refine as necessary, adopt.
2	Determine optimum bundle size	2	4	1. Develop a draft policy & process (business rules) for determining optimum bundle sizes. 2. Coordinate with asset managers for piloting process, refine as necessary, adopt.
3	Limit bundle by work type	4		
4	Limit bundle by geographic proximity	4		
5	Outreach - industry	2	3	Formalize an outreach plan template for industry input on potential bundles projects
6	Outreach - stakeholders	2	3	Formalize an outreach process for internal stakeholders to provide input on potential bundles projects.
7	Local partnering	1	3	1. Identify one or more local public agencies to pilot a bundle project with. 2. Local Public Project Group educates local agencies on benefits of bundling. Identify pilot project between local agencies.

Source: FHWA

3.3 Change Management – First Steps

- ✓ Appoint a champion
- ✓ Initiate a pilot project or program with an objective to establish published processes.
- ✓ Implement training
- ✓ Pursue continuous improvement

3.4 Organizational and Workforce Considerations

- New or modified business processes
- New approaches for staffing
- Construction engineering and inspection (CEI)
- Centrally organized or decentralized managed

Chapter 4. Getting Started: Planning and Funding

4.1 Transportation Planning Process

4.2 Transportation Planning with Project Bundling in Mind

4.3 Incorporation of Appropriate Data into the Bundling Strategy

4.4 Business Processes

4.5 Examples of Bundling Opportunities

4.1 Transportation Planning Process

As a continually evolving document, the STIP[1] offers opportunities for inclusion of project bundling.

The STIP[1] is a programming document that must list the following:

- All projects programmed for Federal funds.
- All regionally significant projects, regardless of funding source.
- State-funded projects, for information purposes.

[1]23 CFR § 450.218

4.2 Transportation Planning with Project Bundling in Mind

Benefits -

- Enhanced strategic, long-term outlook.
- Increased cost-effectiveness in use of limited resources.
- Reduced traffic disruptions.
- Reduced project delivery delays.
- Improved highway system reliability.
- Increased opportunities for innovations.
- Reduced risk to the owner.

Grouping of projects provides flexibility in project selection and bundling opportunities.

4.3 Incorporation of Appropriate Data

Project bundling offers a way to implement LRTP, TAMP, and STIP goals and objectives.

Types of data (often available in the TAMP):

- Crash data
- Congestion/delay data
- Service life
- Condition ratings
- Maintenance levels
- Predicted future condition ratings

4.4 Business Processes

4.4.1 Funding Evaluation

Research shows that bundling can reduce the average per project cost, as well as transaction costs for the agency.

4.4.2 Bundle Considerations

Maximizing bundling benefits means carefully selecting candidate projects using two primary considerations – work type and proximity.

4.4.3 Competition Considerations

Determine availability of qualified, experienced contractors.

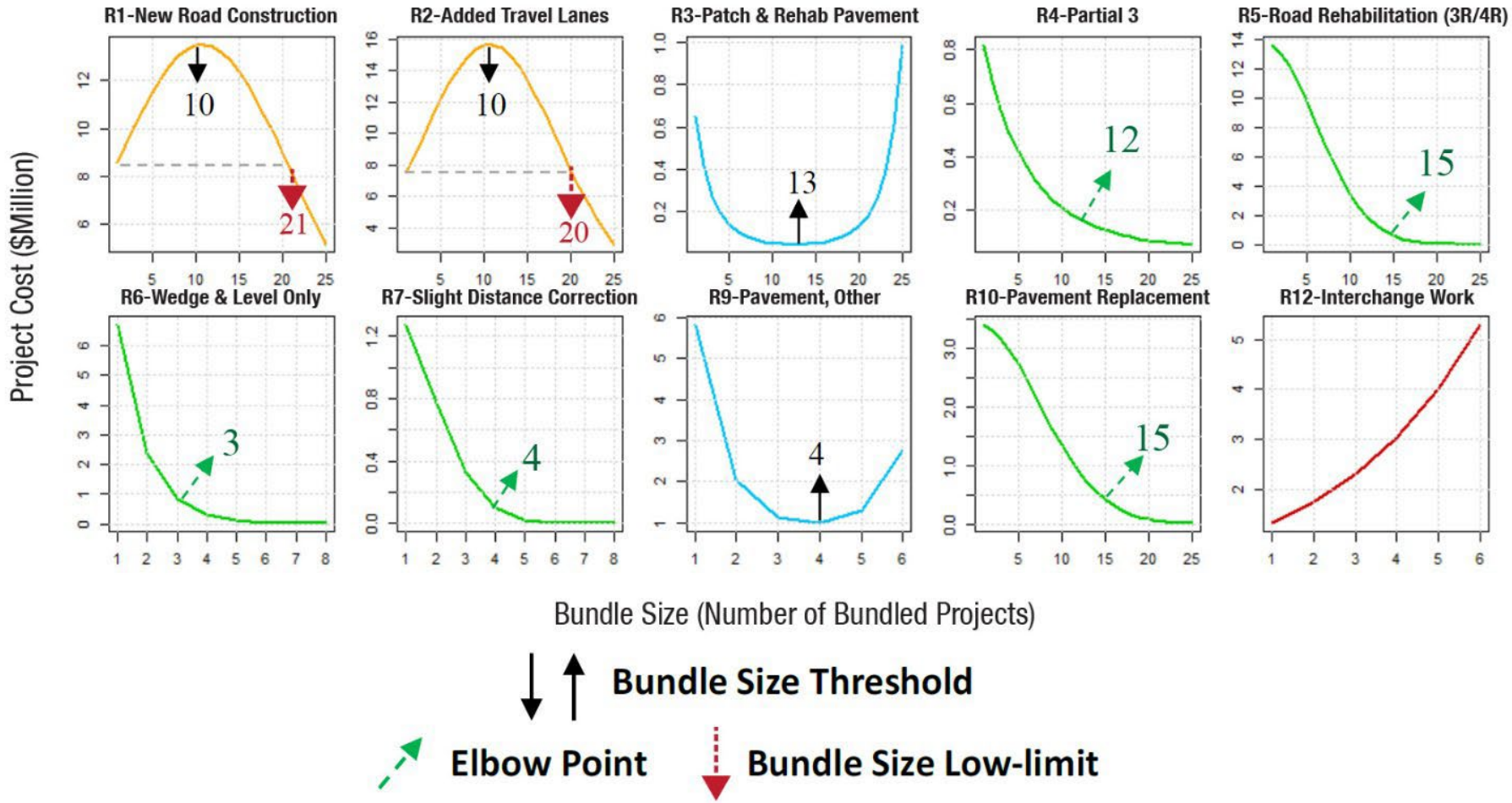
Business Rules

Table of Contents

Agency Bundling Business Rules

Source: FHWA

4.4.1 Funding Evaluation - Effects of bundle size on project cost for road work types (Qiao, 2019)



Source Indiana Department of Transportation, used with permission.

4.4.2. Bundle Considerations

Two primary considerations:

- Work type or asset classes

  e.g., bridge, highway, culvert, sign, signal, guardrail, pedestrian facilities, etc.

- Proximity

  e.g., geographic location and dispersion, corridor

4.4.3 Competition Considerations

- **Contract size:** Creating bigger bundles will attract larger contractors but reduce competition among smaller contractors.
- **Bid alternatives:** Developing bundled contracts with bid alternates for different-sized bundles provides some flexibility with respect to bonding capacity constraints.
- **Transaction cost:** Increasing the number of projects in a bundle decreases agency transaction cost.
- **Homogeneity:** Keeping bundles homogenous by work type reduces the amount of subcontracting and may reduce the price as well as increase competition among subcontractors in each trade.
- **Series vs parallel:** Allowing enough time to construct bundled projects in series instead of multiple projects at one time can increase competition from smaller contractors with a limited workforce

4.5 Examples of Bundling Opportunities

- ✓ 8 case studies in the "Advanced Project Bundling: A Reference for Getting Started."

  17 case studies in Bridge Bundling Guidebook.

  Additional case studies on FHWA website.

- ✓ Statewide programs, bridges, pavement, historic preservation, culverts, intersection safety, ADA, guardrail, preventative maintenance, State-local projects, local-local projects.

- ✓ All ACMs have been used – D-B-B, CM/GC, PDB, D-B, P3.

Chapter 5. Process & Procedures for Selecting Bundled Projects

5.1 Project Bundling Process

5.1.1 Optimum Bundle Size Tool

5.1.2 Agency Data Requirements

5.1.3 Simplified Determination of Optimum Bundle Size

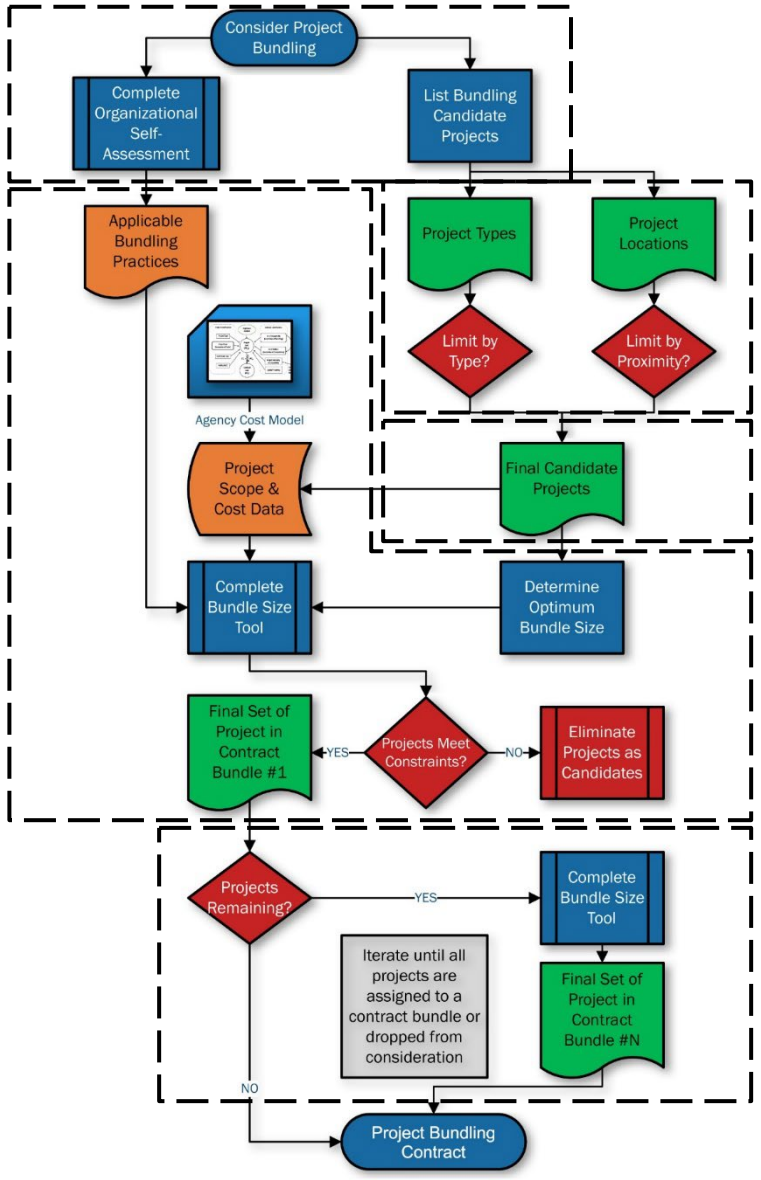
5.1.4 Project Selection

5.1.5 Bundling Decision Documentation

Source: FHWA Bridge Bundling Guidebook

5.1 Project Bundling Process

1. Consider project bundling.
   A. Complete organizational self-assessment.
   B. List bundling candidate projects.
2. Determine constraints by work type and proximity.
3. Determine final candidate projects.
4. Determine optimum bundle size.
5. Iterate.
6. Establish project bundling program



Source: FHWA

5.1.1 Optimum Bundle Size Tool

Can be created using –

- ✓ Agency cost models
- ✓ Work types
- ✓ INDOT algorithm or another framework

The **Indiana Department of Transportation** (INDOT) has established "business rules" and a scoring system for evaluating projects to bundle.

5.1.2 Agency Data Requirements

Historical data

- Use what is available by existing cost models.
- Do not need detailed cost estimate for potential projects to bundle.

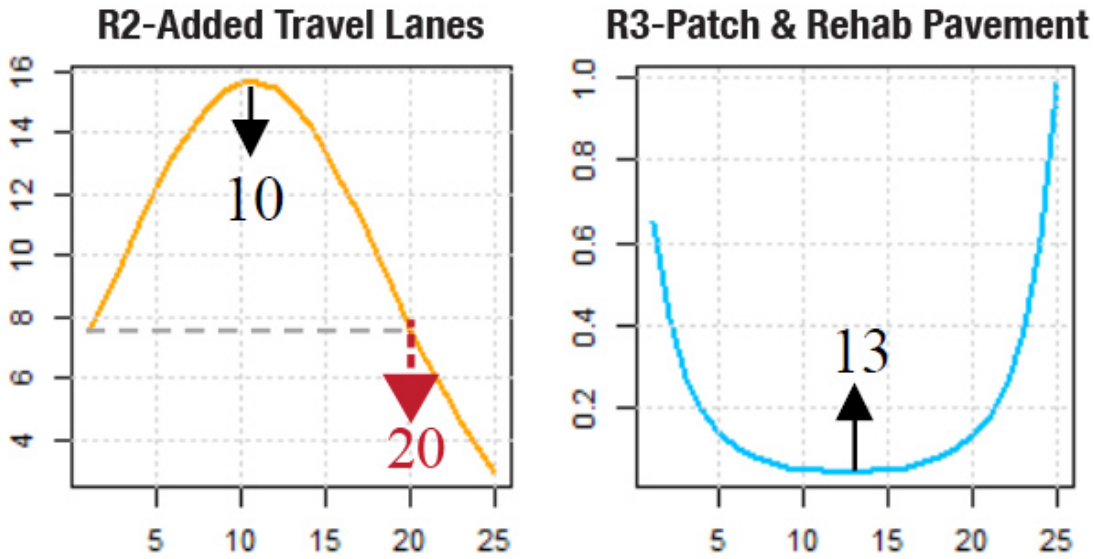
Top-down models

- Pareto principle - 80% of cost is found in 20% of pay items.

5.1.3 Simplified Determination of Optimum Bundle Size

Incremental savings approach, need –

- Quantities of work
- Estimate unit prices
- Extrapolation



Source Indiana Department of Transportation, used with permission.

5.1.4 Project Selection – Screening Criteria

Geographic Location and Proximity
Road Type, Geometry, Traffic, and Work Zone Control
Project Size
Similar Project Types
Similar Work Types
Similar Risk Profiles
Similar Benefits from Alternative Contracting Methods
Environmental Permitting
Hydrology and Hydraulics
Geotechnical Conditions
Utilities/Third Parties
Right-of-Way
Railroads
Geotechnical Conditions
Utilities/Third Parties
Right-of-Way
Railroads

5.1.5 Bundling Decision Documentation

Important to capture,

- ✓ the rationale
- ✓ quantitative criteria used

To compare with,

- ✓ actual project performance
- ✓ to adjust the cost models and the decision process for future bundles.
- ✓ assists in capturing lessons learned to improve creating success stories

Source: https://pixabay.com/users/geralt-9301/

Chapter 6. Final Steps for Most Effective Bundling (1 of 2)

Conduct risk assessment to help guide -

- Selecting a project delivery method
- Determining environmental review & preliminary design considerations

Let contracts

Conduct quality assurance

Complete project close-out

Celebrate your successes!

Chapter 6. Final Steps for Most Effective Bundling (2 of 2)

PROCESS STEPS	OBJECTIVE	TOOLS	OUTCOME
Step 7. Select delivery method (Chapter 7)	To identify the most appropriate project delivery and procurement method.	• Comparison tables of project delivery and procurement methods. • Project Delivery Selection Tool.	Selected project delivery and procurement method.
Step 8. Determine environmental review & preliminary design considerations (Chapter 8)	To identify environmental clearance and permitting issues and preliminary design issues.	• List of potential issues. • Case studies. • Noteworthy practices.	Identification of environmental and preliminary design issues to address.
Step 9. Bundle & let contract(s) (Chapter 9)	To identify roles and responsibilities for contract creation and management.	• Responsibility matrix. • Civil rights and Disadvantaged Business Enterprise table. • Sample contract documents.	Project management plan.
Step 10. Conduct quality assurance close-out & celebrate! (Chapter 10)	To understand the issues to consider and options available for quality assurance.	• List of items to consider. • Comparison tables of quality assurance options.	Quality assurance plans.
	To celebrate the project successes and capture lessons learned.	• List of close-out and celebration items to consider. • Implementation checklist.	Celebration actions. Close-out actions.

Additional Resources

- FHWA EDC-5 Project Bundling Website
- Bridge Bundling Guidebook
- Agency Self-Assessment Tool
- Resource Database
- Case Studies
- On-demand webinars (series of 12)
- LPA online training course
- How-to Briefs
- College/University lecture

Advanced Project Bundling: A Reference for Getting Started Appendices

Appendix A. Case Studies

Appendix B. Project Groupings by Type in Transportation Improvement Programs

Appendix C. Organizational Self-Assessment

Appendix D. Project Bundling Policy and Process Checklist

Appendix E. Project Bundling Risk Management

Appendix F. Resource Database

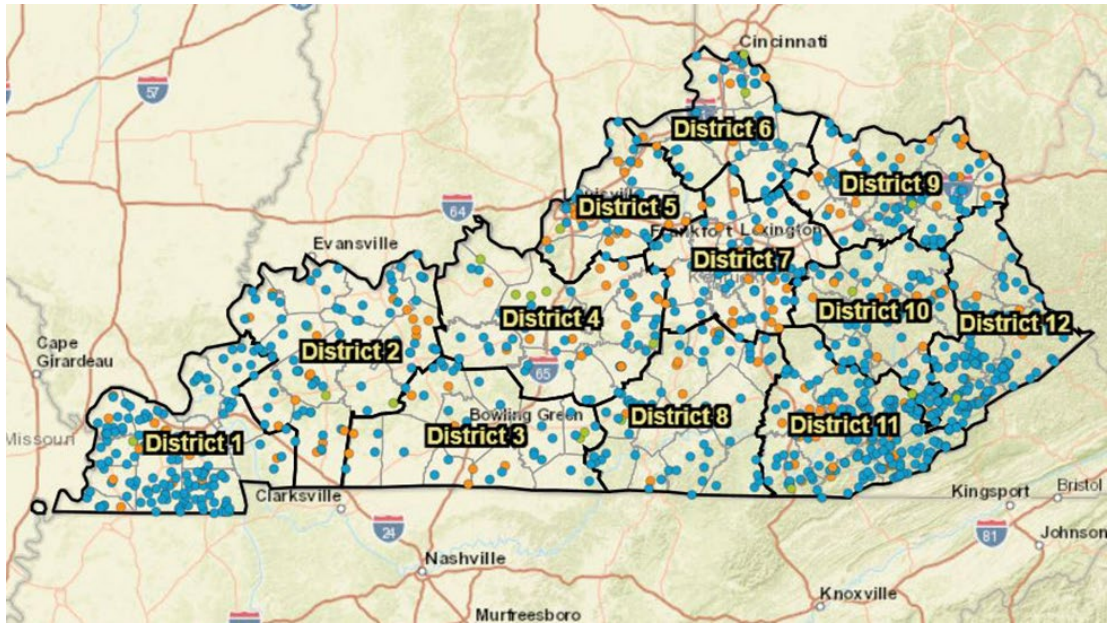
Appendix G. INDOT Project Bundling Business Rules

Appendix A. Case Studies

- Bridging Kentucky – Statewide Bridge Bundling Program
- DelDOT I–95 Pavement and Bridge Bundle
- INDOT Project Bundling Program
- INDOT Pavement Project Bundle R-37841
- Iowa Competitive Highway Bridge Program (CHBP)
- Iowa Competitive Highway Bridge Program (CHBP) – Bridge Bundle #16 Scott and Jackson Counties
- City of Oakwood, Georgia, Multi-City Pavement Bundling
- Historic Hudson Valley Steel Truss Bridges, New York State

Bridging Kentucky – Statewide Bridge Bundling Program

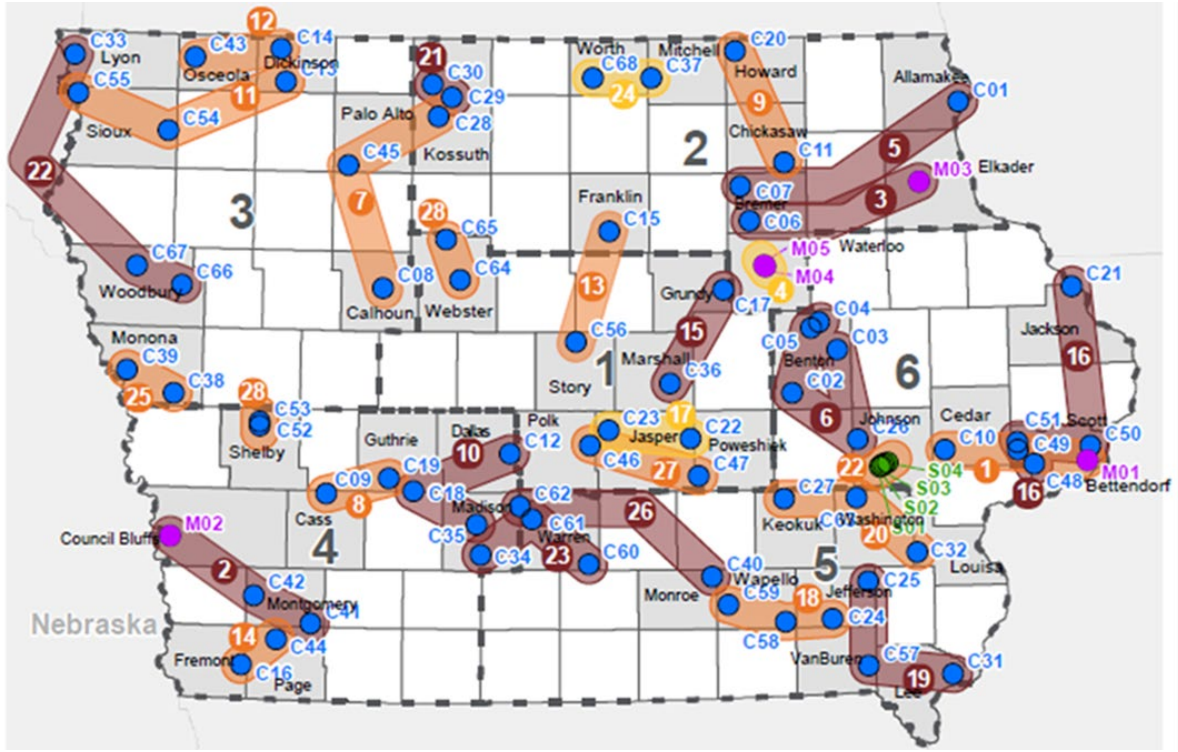
- Goal to improve safety & mobility
- Multiple bundles
- Bundled by bridge type & location
- D-B-B and D-B delivery



Source: Kentucky Transportation Cabinet, used with permission

Project Website: https://bridgingkentucky.com/bridges/

Iowa Competitive Highway Bridge Program (CHBP)



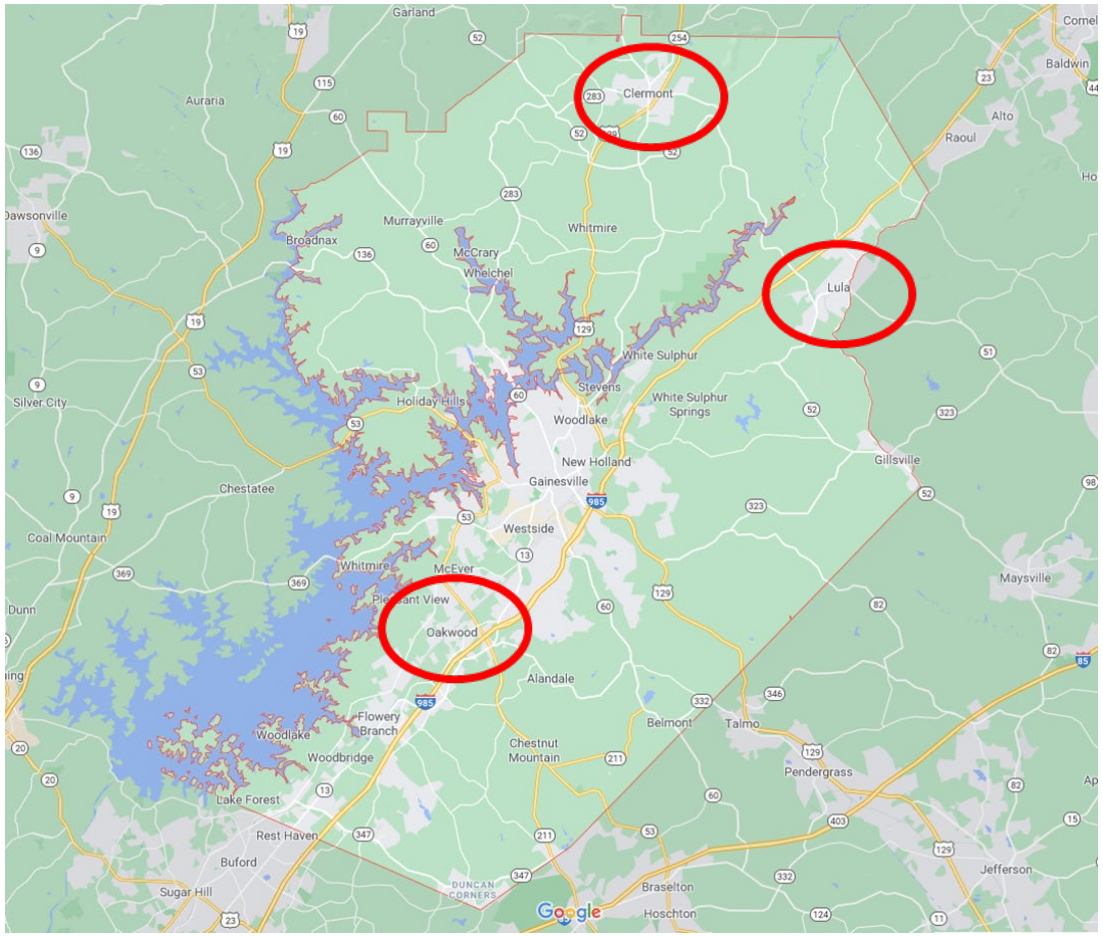
Source: Iowa DOT

Project Website: https://iowadot.gov/local_systems/

- 77 bridges with 50 different owners
- Iowa DOT took the lead for the program organizing the bundles and executing agreements with each LPA
- One LPA lead for each bundle

City of Oakwood, Lula, and Clermont, Georgia Multi-City Pavement Bundling

- Goal to reduce unit cost
- Utilize new treatments that were cost prohibitive for a single project



Source: Map data ©2021 Google

Appendix B. Project Groupings by Type in Transportation Improvement Programs

- ✓ **Safety projects**
  e.g., shoulder improvements, traffic control devices, guardrails, pavement markings, lighting improvements
- ✓ **Mass Transit projects**
  e.g., communication systems, passenger shelters
- ✓ **Air Quality projects**
  e.g., bicycle & pedestrian facilities
- ✓ **Other projects** – Specific activities that do not involve or lead directly to construction
  e.g., technical studies, landscaping, natural disaster repair

Appendix C. Organizational Self-Assessment

Capability Level Criteria			
Level	**Description**	**EDC definition**	**Definition applied specifically to bundling**
1	**Not Implementing**	The agency is not pursuing innovation anywhere and is not interested in pursuing innovation	Project bundling is not considered.
2	**Development Stage**	The agency is collecting guidance and best practices, building support with partners and stakeholders, and developing an implementation process.	No formal policy, process or tools. Ad hoc approach to project bundling is applied when required.
3	**Demonstration Stage**	The agency is testing and piloting the innovation	Basic project bundling process and tools are repeatedly used but not standardized. Approach varies from project to project.
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5	**Institutionalized**	The agency has adopted the innovation as a standard process or practice and regularly uses it on projects.	Organizational standard process for developing project bundling strategy is documented. Supporting methods, tools, and staff training are established and documented.
6	**Optimized**	- not applicable -	Lessons learned and best practices are applied for continuous improvement. Performance metrics have been established to enable quantitative feedback.

Appendix D. Project Bundling Policy and Process Checklist

Policy Statement

- Agency policy statement

Processes

- Planning
- Programming
- Environmental
- Preliminary Design
- Final design
- Construction
- Close-out, lessons-learned

Appendix E. Project Bundling Risk Management

Source: FHWA Bridge Bundling Guidebook

THREATS	OPPORTUNITIES
Transfer	Share
Avoid	Exploit
Mitigate	Enhance
Accept (Actively or Passively)	

Source: FHWA Bridge Bundling Guidebook

Project Bundling Risk Categories

- Environmental risks
- Third-party risks
- Utility, right-of-way, and real estate risks
- Organizational risks
- External risks
- Geotechnical and hazmat risks
- Design risks
- Procurement risks
- Construction risks
- Operations and maintenance risks

Appendix F. Additional Resources – Resource Database

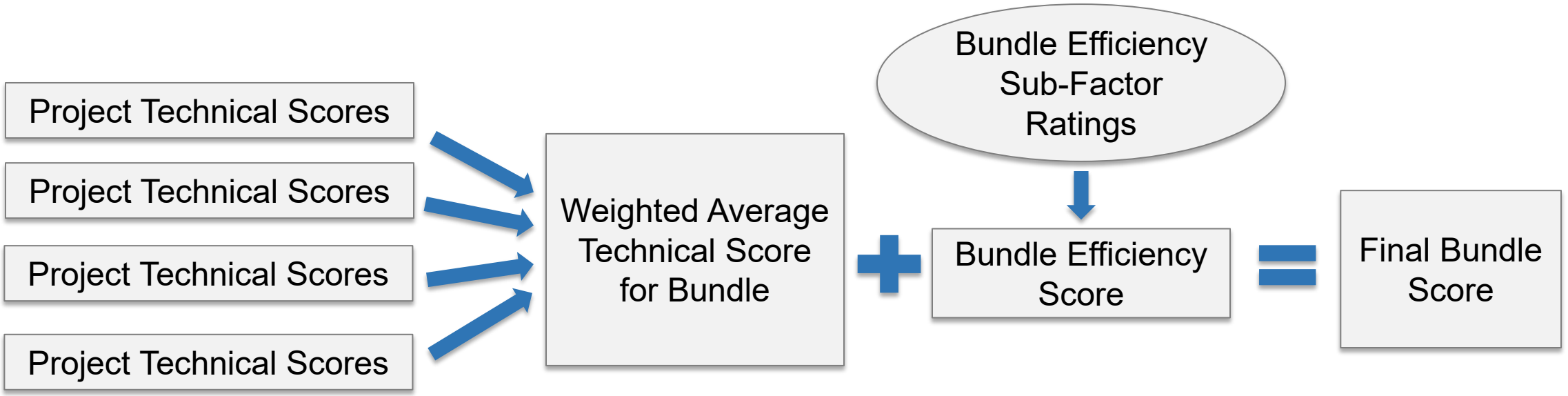
PROJECT BUNDLING CASE STUDIES

ID#	Lead Agency	Publication	Project Description	Work Type
003	Delaware DOT	Project Bundling Quick Start Reference	Rehabilitation of I-95 from I-495 to North of the Brandywine River Bridge Project includes the rehabilitation of 17 bridges and 3.5 centerline miles of interstate highway.	Bridges. Pavement.
004	Erie County, NY	Bridge Bundling Guidebook	Erie County uses a series of bridge bundling contracts to address preventative maintenance issues. The bridges ar bundled primarily by work type. Location is also a consideration. There are four types of bundled maintenance contracts: steel repair contracts, deck repair contracts, bridge washing contracts, and deck sealing contracts.	Bridge preservation. Bridge maintenance.

Introduction | Case Studies | Contracts | Programs | References | Research

Source: FHWA

Appendix G. Indiana Department of Transportation (INDOT) Project Bundling Business Rules



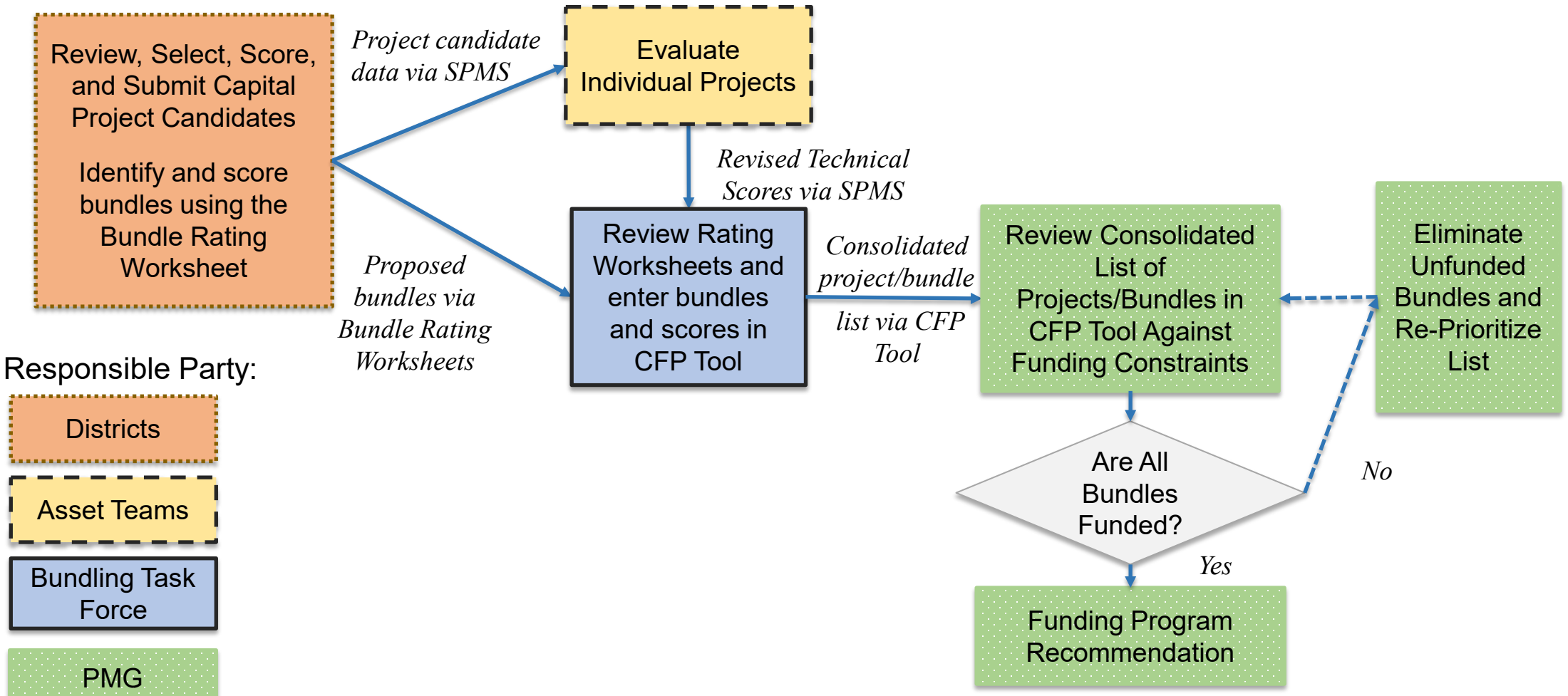
Source Indiana Department of Transportation, used with permission.

INDOT Project Bundling Business Rules – Efficiency Factors

List of Efficiency Sub-Factors by Bundle Type		
Bridge Portfolio Bundle	Road Portfolio Bundle	Corridor Bundle
Homogeneity of bridge types	Homogeneity of pavement types	Bundle composition
Homogeneity of work types	Homogeneity of work types	Geographic concentration
Size of bundle	Size of bundle	Similarity of site conditions
Geographic concentration	Geographic concentration	Flexibility of contracting in scheduling / sequencing
Similarity of site conditions	Similarity of site conditions	Cost effectiveness of MOT
Flexibility of contracting in scheduling / sequencing	Flexibility of contracting in scheduling / sequencing	Reduced user impact
Cost effectiveness of MOT	Cost effectiveness of MOT	
Reduced user impact	Reduced user impact	

Source Indiana Department of Transportation, used with permission.

INDOT Project Bundling Business Rules – Call For Project (CFP) Process



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Questions?

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