



U.S. Department of Transportation  
**Federal Highway Administration**

# Bridge Bundling Guidebook

*An Efficient and Effective Method for Maintaining  
and Improving Bridge Assets*

Event Name

Agency/Sponsor  
Meeting Location - Room  
City, State

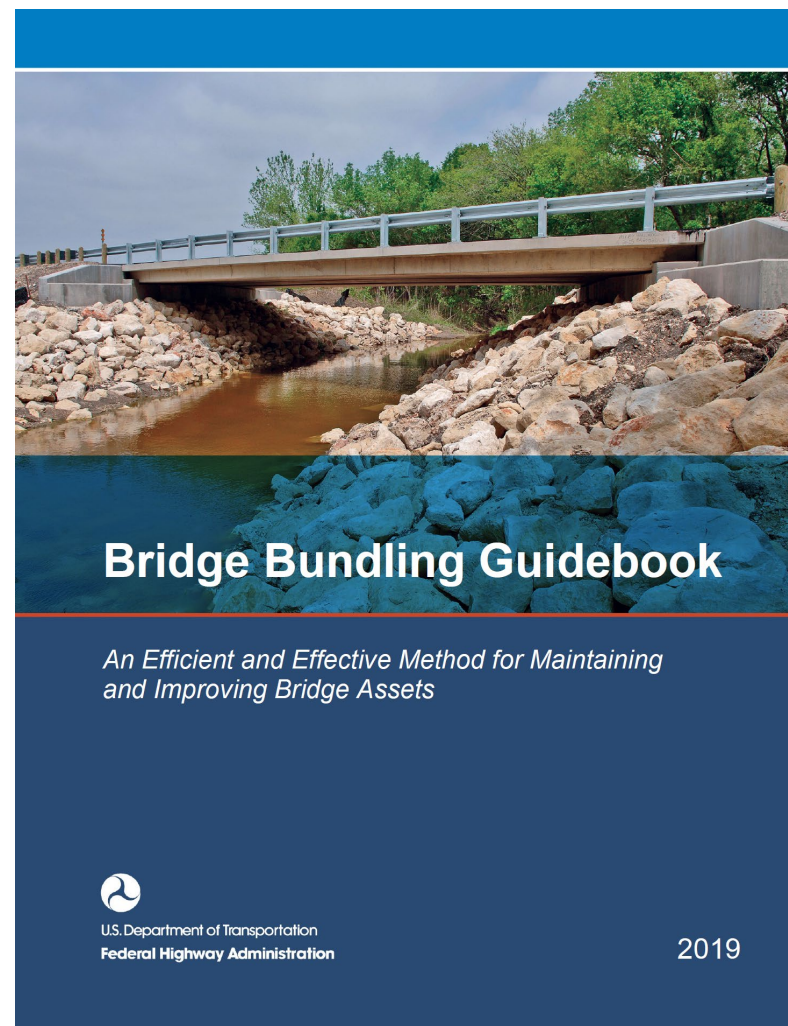
Date  
Time

Presenter Name

Title

# Outline

1. Background
2. Bridge Bundling Guidebook
3. Appendices
4. Case Studies



# 1. Background

- Bridge Bundling Implementation Team
- Technical Work Group
- Agency Visits
- Definition



# Technical Work Group (TWG)

- Justin Bruner, Pennsylvania Department of Transportation
- Aaron Butters, H.W. Lochner
- Brenda Crudele, New York State Department of Transportation
- Jon Fricker, Purdue University
- Gregg Hostetler, Infrastructure Engineers, LLC
- Travis Konda, HNTB
- Jim Kutz, McNees Wallace & Nurick, LLC
- Edward Minchin, University of Florida
- Keith Molenaar, University of Colorado
- Stan Rugis, Northampton County, Pennsylvania
- Andrea Stevenson, Ohio Department of Transportation
- Darlene Svilkos, Erie County, New York
- Mark Traynowicz, Nebraska Department of Transportation



# Agency Visits (in-person)

- County Engineers Association of Ohio
- Georgia Department of Transportation
- Hall County, Nebraska
- Missouri Department of Transportation
- Nebraska Department of Transportation
- New York State Department of Transportation
- New York State Thruway Authority
- Ohio Department of Transportation
- Oregon Department of Transportation
- Pennsylvania Department of Transportation
- Sarpy County, Nebraska
- Saunders County, Nebraska
- South Carolina Department of Transportation



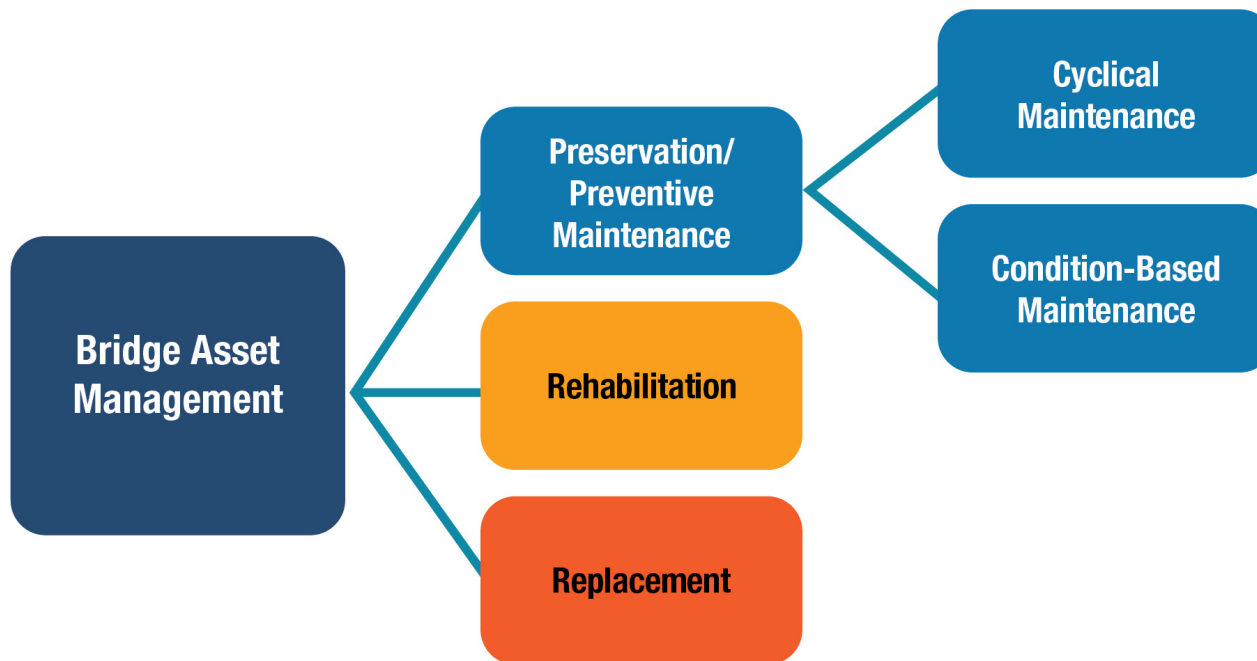
# Definition

*“A defined set (or bundle) of bridges that are planned for preservation/preventive maintenance, rehabilitation, or replacement in a timely and efficient manner through a series of bridge bundling contracts with the support of various funding options and/or partnerships that may include a program completion time frame.”*

Source: FHWA Bridge Bundling Guidebook



# 2. Bridge Bundling Guidebook



## Bridge Action Categories

Source: FHWA



# Guidebook Content includes:



Federal legislation



Noteworthy practices from agencies, including case studies



Other resources from agencies or professional organizations



Federal guidance

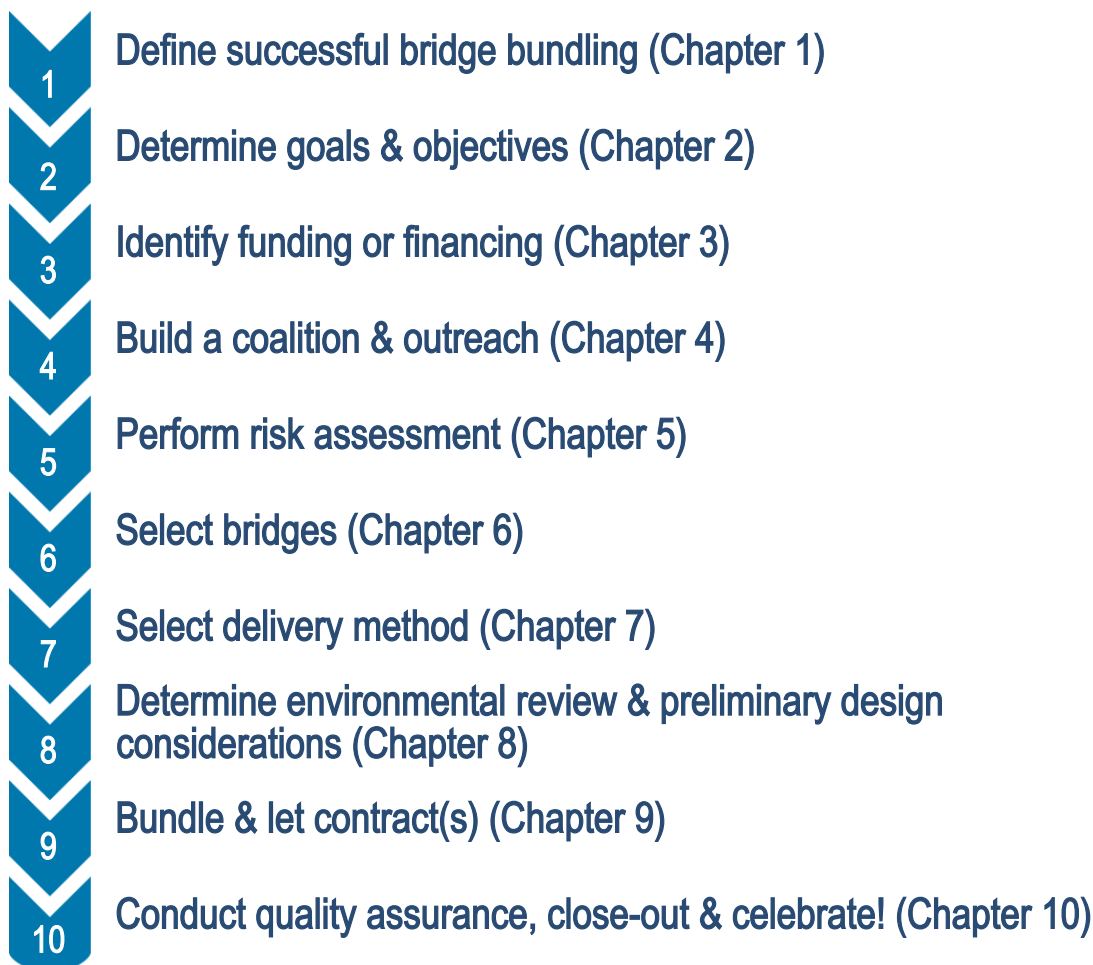


Video clip from State or local agency representative offering his or her perspective





# Bridge Bundling “How-to”



**Objective**

**Tools**

**Outcome**



# Introduction: Defining Success



## Objective:

- To be able to define a successful bridge bundling project or program

## Tools:

- Definition
- Case studies
- List of lessons learned

## Outcome:

- Improved understanding of the range of successful bridge bundling projects and programs



# Lessons Learned

Bridge bundling experiences at the State and local level have demonstrated that bridge bundling works for:

- Achieving performance targets
- Completing preservation/preventive maintenance actions
- Rehabilitating bridges
- Replacing bridges
- Achieving economies of scale
- Reducing cost
- Accelerating project schedules
- Deploying innovation



# Lessons Learned

The maximum efficiency benefits occur when bridge bundling is used for:

- Locations with no, or minimal, ROW acquisitions
- Locations with minimal environmental constraints
- Locations where hydraulic analysis is completed in advance
- Locations with sufficient advance geotechnical information



# Why Bundle Bridges? Goals and Objectives



## Objective:

- To establish goals and objectives for a bridge bundling project or program

## Tools:

- Case studies
- List of common goals, benefits, and objectives
- Research studies
- Work types, bridge asset management

## Outcome:

- Documented project goals and objectives



# Goals and Objectives

1. Achieve performance goals
2. Save time
3. Save design costs
4. Save construction costs
5. Take advantage economies of scale
6. Take advantage of available funding
7. Take advantage of financing
8. Deploy innovation
9. Expedite project delivery
10. Utilize alternative contracting methods
11. Coordinate construction staging – reduce public disruption



## Goals and Objectives (cont.)

12. Start construction of multiple bridges simultaneously
13. Maintain bridges in good and fair condition
14. Improve bridges in fair condition to good condition
15. Reduce bridges in poor condition
16. Improve locally owned bridge conditions
17. Improve surrounding land value, economic benefits
18. Partner with other agencies to achieve efficiencies
19. Create jobs in the construction industry
20. Increase pool of bridge contractors in a geographic area
21. Create opportunities for small and disadvantaged businesses
22. Create on-the-job training opportunities



# Other Considerations

- Worst first
- Limiting competition
- Bonding capacity
- Financing cost
- Mutually dependent
- State procurement restrictions
- Funding – annual program impact
- Local industry capacity
- Agency capacity
- Federal fund use





# Funding or Financing Strategies



## Objective:

- To identify funding sources or a finance strategy

## Tools:

- Table of available funding options
- Table of financing strategies
- Federal funding programs

## Outcome:

- Documented funding sources or financing strategy



# Chapter 3 Outline

- 3.1 Funding Approaches
- 3.2 Funding Challenges
- 3.3 Existing Revenue Generators
- 3.4 Federal Funding Programs
- 3.5 Federal-aid Complexities
- 3.6 Federal-aid Management Tools
- 3.7 Potential New Revenue Sources—Value Capture
- 3.8 Innovative Finance Strategies
- 3.9 Tolling and Pricing Revenue
- 3.10 Public-Private Partnership
- 3.11 Summary



## FUNDING STRATEGIES

- State and Local Funds
- Federal-aid Highway Program
  - National Highway Performance Program
  - Surface Transportation Block Grant Program
  - National Highway Freight Program
- Highway Infrastructure Program

### Potential New Revenue Sources

- Value Capture

### Federal-aid Cash Management Tools

- Advance Construction
- Partial Conversion of Advance Construction
- Tapered Match
- Soft Match

### Revenue Streams

- Federal Motor Fuel Taxes
- State Motor Fuel Taxes
- Alternative Fuel Taxes
- Fees–Tolling and Pricing
- Traditional Funding Strategies

## FINANCING STRATEGIES

- General Obligation Bonds
- Revenue Bonds
- GARVEE Bonds
- State Infrastructure Banks
- Federal Credit Assistance–TIFIA
- Private Activity Bonds Program
- Section 129 Loans
- Public-Private Partnerships (DBF, DBOM, DBFOM)
- Railroad Rehabilitation and Improvement Financing Program



# Coalition Building and Outreach



## Objective:

- To identify a project implementation team and develop an internal and external outreach plan

## Tools:

- Example communication plan
- Tables of communication topics

## Outcome:

- Communication plan



# Example Communication Plan

ORGANIZATION OR INDIVIDUAL	CONTENT	FREQUENCY	MEDIUM	SOURCE	RESPONSIBILITY
<b>Commissioner</b>	Progress Report	Weekly	E-mail	Management Team	Project Manager
<b>Construction Industry Association</b>	Project Overview	Monthly	In-person (agency meeting)	Project Manager	Project Manager
<b>Legislature</b>	Benefits, Risks	Once	In-person (committee meeting)	Project Management Plan, Risk Management Plan	Commissioner
<b>Procurement Team</b>	Risk Allocation	Bi-weekly	Risk Report on File Sharing Site	Risk Management Plan	Risk Manager



# Stakeholders

1. Internal
2. Industry
3. Control agencies
4. External/public
5. Elected officials
6. Financial market



# Risk Assessment



## Objective:

- To formally identify initial project risks (threats and opportunities)

## Tools:

- Risk process overview
- List of potential threats and opportunities
- List of potential risk responses

## Outcome:

- Project risk management plan
- Project risk register



# Threats and Opportunities

POTENTIAL BRIDGE BUNDLING RISKS (THREATS AND OPPORTUNITIES)	
THREAT (T) OR OPPORTUNITY (O)	POTENTIAL RESPONSE
<b>Unclear goals and objectives (T)</b>	<ul style="list-style-type: none"> <li>• Get stakeholder input.</li> <li>• Document.</li> </ul>
<b>Project delivery method not clear (T)</b>	<ul style="list-style-type: none"> <li>• Utilize project delivery selection tool (risk-based).</li> </ul>
<b>Accelerated delivery/schedule constraints (T)</b>	<ul style="list-style-type: none"> <li>• Use CM/GC delivery method.</li> <li>• Use D-B delivery method.</li> <li>• Use ATC process.</li> <li>• Use incentives/disincentive clauses.</li> <li>• Use A+B bidding (D-B-B).</li> <li>• Use schedule as a selection criterion (best value procurement).</li> </ul>
<b>Utility/Third-Party conflicts (T)</b>	<ul style="list-style-type: none"> <li>• Owner assumes risks.</li> <li>• Clearly assign responsibility in procurement/contract documents.</li> <li>• Utilize the 3 Cs (coordination, cooperation, and communication).</li> <li>• Relocate utilities in advance of procurement.</li> <li>• Avoid locations with unknown utility information.</li> </ul>





# Bridge Selection



## Objective:

- To identify bridge selection criteria and candidate bridges

## Tools:

- Bridge selection matrix
- Table of contract sizes
- Table of contract durations

## Outcome:

- List of candidate bridges for bundling



# Number of Bridges per Contract Bundle

AGENCY	FUNDING SOURCE	D-B-B	IDIQ <sup>1</sup>	CM/GC	D-B	P3
Delaware DOT	Federal – State	2-20	22	-	28	-
Erie County, NY	Federal – Local	3-25	-	-	-	-
Georgia DOT	State	-	-	-	5-7	-
Missouri DOT	Federal reimbursement bonds	2-10	-	-	554	-
Nebraska DOT	SIB – Local	2-7	-	-	-	-
New York State DOT	Federal – State	2-19	6-200	-	6-16	-
Northampton County, PA	Private – Local	-	-	-	-	33
Ohio DOT	GARVEE bonds	2-3	-	-	2-6	-
Oregon DOT	State	-	-	3	-	-
Osceola County, FL <sup>2</sup>	Local	-	-	13	-	-
Pennsylvania DOT	State, Private – Federal	7-18	-	-	-	558
South Carolina DOT	Federal – State	3-5	-	-	3-13	-
<b>RANGE</b>	-	<b>2-25</b>	<b>6-200</b>	<b>3-13</b>	<b>2-554</b>	<b>33-558</b>



# Bridge Bundling Contract Durations (years)

AGENCY	D-B-B	IDIQ	CM/GC	D-B	P3
Delaware DOT	-	3, 5	-	-	-
Erie County, NY	2	-	-	-	-
Georgia DOT	-	-	-	3	-
Missouri DOT	3	-	-	5	-
Nebraska DOT	1-2	-	-	-	-
New York State DOT	1, 2	1, 2, 3	-	2	-
Northampton County, PA	-	-	-	-	12+10
Ohio DOT	-	-	-	3	-
Oregon DOT	-	-	7	-	-
Osceola County, FL	-	-	7	-	-
Pennsylvania DOT	2	-	-	-	25
South Carolina DOT	-	-	-	varies	-
<b>RANGE</b>	<b>1-3</b>	<b>1-5</b>	<b>7</b>	<b>2-5</b>	<b>10-25</b>



# Bridge Selection/Screening Criteria

- 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/Third parties
- Right-of-Way
- Railroads



# Select Delivery Method



## Objective:

- To identify the most appropriate project delivery and procurement method

## Tools:

- Comparison tables of project delivery & procurement methods
- Project Delivery Selection Tool

## Outcome:

- Selected project delivery & procurement method

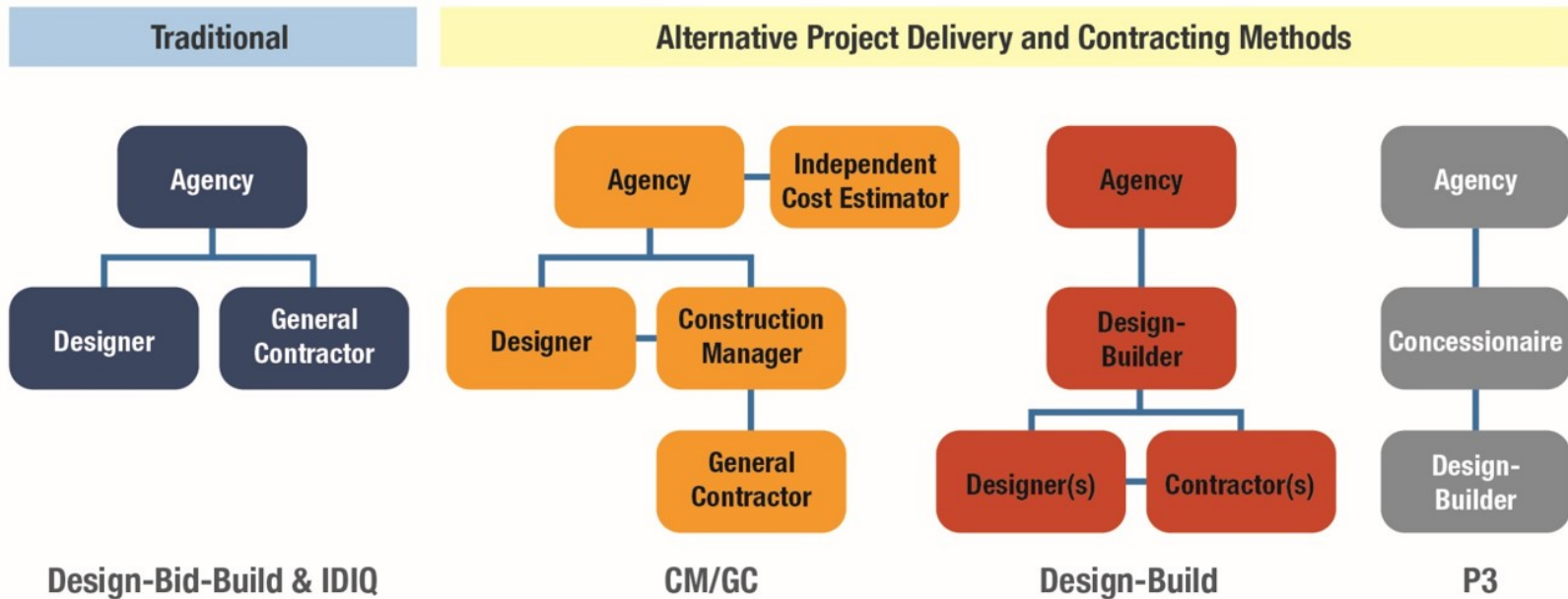


# Chapter 7 Outline

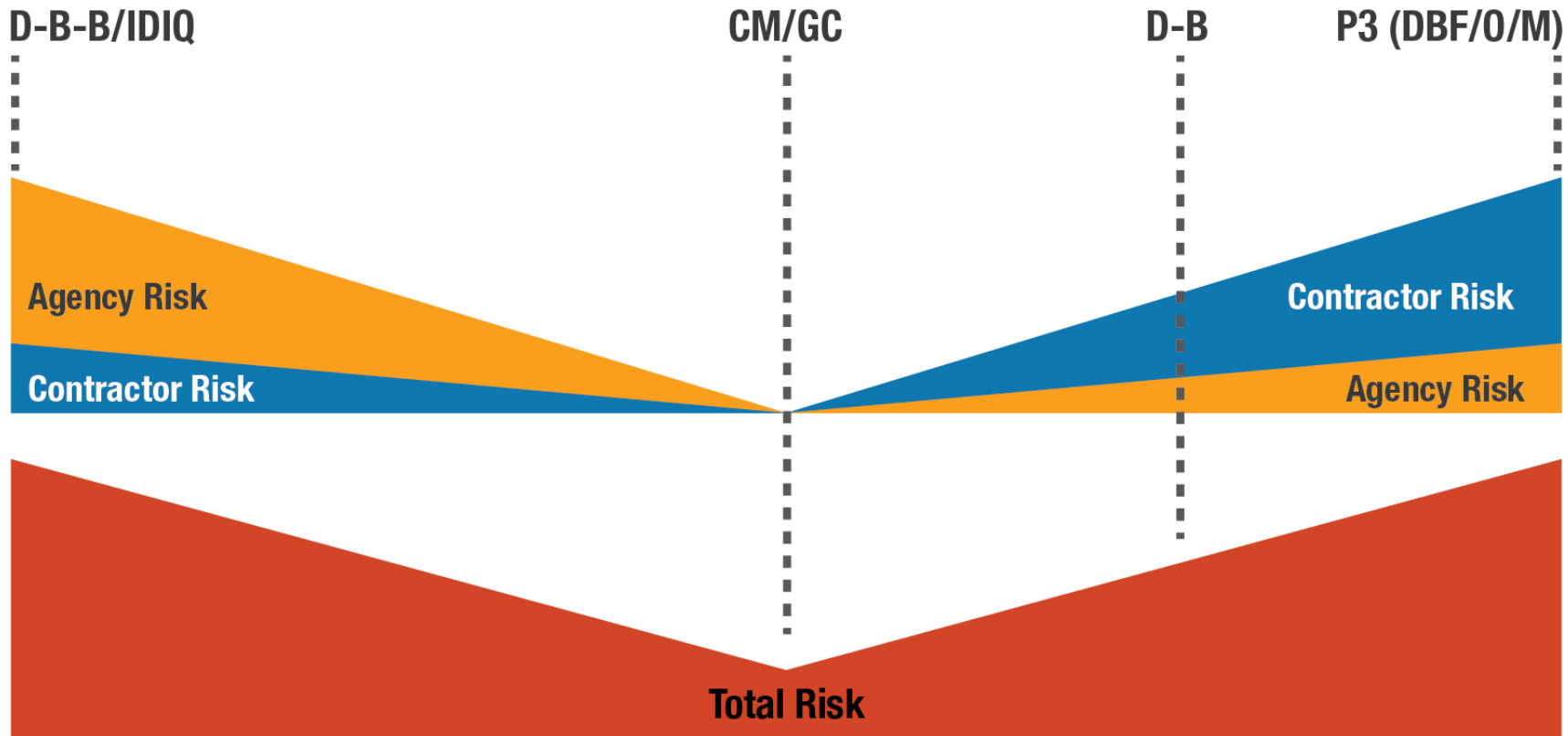
- 7.1 Project Delivery Methods
- 7.2 Risk-Based Project Delivery Method Selection
- 7.3 Design-Bid-Build (D-B-B)
- 7.4 Indefinite Delivery/Indefinite Quantity (IDIQ)
- 7.5 Construction Manager/General Contractor (CM/GC)
- 7.6 Design-Build (D-B)
- 7.7 Public-Private Partnership (P3)
- 7.8 Procurement Methods
- 7.9 Summary



# Project Delivery Methods



# Risk Allocation by Project Delivery Method





# Summary of Project Delivery Methods

CATEGORIES	D-B-B	IDIQ	CM/GC	D-B	P3
<b>Program Goals</b>	<ul style="list-style-type: none"> <li>•Agency retains design risks</li> <li>•Traditional delivery</li> <li>•Maintain control of final product</li> </ul>	<ul style="list-style-type: none"> <li>•Quick response for unknown needs</li> <li>•Improve asset management</li> </ul>	<ul style="list-style-type: none"> <li>•Risk allocation to party best to handle</li> <li>•Contractor innovation</li> <li>•Bundle bridges with complex components</li> </ul>	<ul style="list-style-type: none"> <li>•Transfer risks to contractor</li> <li>•Increase capacity of bridge program</li> <li>•Contractor Innovation</li> </ul>	<ul style="list-style-type: none"> <li>•Transfer risk to concessionaire</li> <li>•Operations, long-term maintenance</li> <li>•Contractor Innovation</li> </ul>
<b>Project Characteristics</b>	<ul style="list-style-type: none"> <li>•Similar bridge types</li> <li>•Simple designs</li> <li>•Third-party Issues resolved before advertisement</li> </ul>	<ul style="list-style-type: none"> <li>•Preservations</li> <li>•Preventative maintenance</li> <li>•Culvert replacements</li> <li>•Predictable but not yet determined work</li> </ul>	<ul style="list-style-type: none"> <li>•Bridges that owners might avoid in a bridge bundle due to complexities</li> <li>•Significant third-party involvement</li> <li>•“Out of the box” thinking required</li> </ul>	<ul style="list-style-type: none"> <li>•Simple bridges for time savings</li> <li>•Complex bridges for innovation</li> <li>•Limited third-party involvement (ROW, Environmental, Utilities, Railroads, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>•Simple bridges for time savings</li> <li>•Complex bridges for innovation</li> <li>•Limited third-party involvement (ROW, Utilities, Environmental, Railroads, etc.)</li> <li>•Bridge maintenance</li> <li>•Variety of work types</li> </ul>
<b>Procurement Methods</b>	<ul style="list-style-type: none"> <li>•Low Bid</li> <li>•Best Value</li> </ul>	<ul style="list-style-type: none"> <li>•Low Bid</li> </ul>	<ul style="list-style-type: none"> <li>•QBS</li> <li>•GMP</li> </ul>	<ul style="list-style-type: none"> <li>•Best Value</li> <li>•QBS</li> <li>•Low Bid</li> </ul>	<ul style="list-style-type: none"> <li>•Best Value</li> <li>•QBS</li> </ul>



# Environmental Review & Preliminary Design



## Objective:

- To identify environmental clearance & permitting issues and preliminary design issues

## Tools:

- Lists of potential issues
- Case studies
- Noteworthy practices

## Outcome:

- Identification of environmental & preliminary design issues to address



# Environmental Review and Clearance

- Threatened or endangered species (and their habitats)
- Migratory birds
- USACE Section 408 authorizations
- Cultural resources (archeological or historic)
- Public parklands
- Floodplains and wetlands
- Noise levels, water quality, and air quality
- Human health and safety
- Social and economic impacts on communities
- Federal aid: CE, EA, EIS



# Environmental Permitting

- Communicate early with other agencies.
- Have open communication with other agencies.
- Be flexible within the constructs of existing laws and regulations.



# Preliminary Design

- Right-of-Way
- Utilities – Third Parties
- Hydrology & Hydraulics
- Geotechnical Conditions
- Railroads



# Bundle and Let Contracts



## Objective:

- To identify roles & responsibilities for contract creation & management

## Tools:

- Responsibility matrix
- Civil Rights & DBE table
- Sample contract documents

## Outcome:

- Project management plan



# Chapter 9 Outline

- 9.1 Roles & Responsibilities
- 9.2 Project Delivery Methods
- 9.3 Project Management Plan
- 9.4 Civil Rights & Disadvantaged Business Enterprise (DBE) Considerations
- 9.5 Design and Construction Considerations
- 9.6 Summary



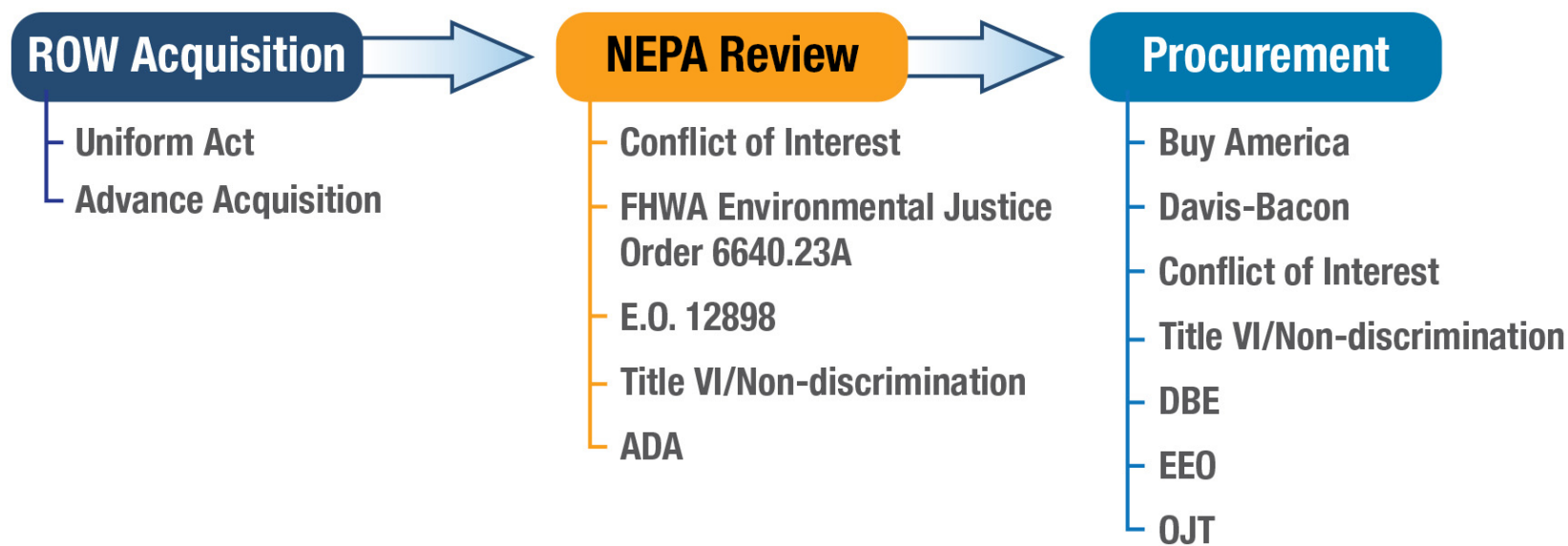
# Responsible, Accountable, Consulted, and Informed (RACI) Matrix

SAMPLE BRIDGE BUNDLING PROJECT RACI MATRIX							
CATEGORIES	EXECUTIVE SPONSOR	PROJECT MANAGER	RISK MANAGER	BRIDGE ASSET ENGINEER	PROGRAM PLANNING DIRECTOR	DESIGN ENGINEER	CONSTRUCTION ENGINEER
Establish Goals & Objectives	Responsible	Accountable	Consulted	Informed	-	-	-
Funding	Accountable	Accountable	-	Informed	Responsible	-	-
Project Management Plan	Informed	Responsible	Consulted	Consulted	Consulted	Consulted	Consulted
Risk Management Plan	Informed	Accountable	Responsible	Consulted	Consulted	Consulted	Consulted
Communication Management Plan	Informed	Responsible	Consulted	-	-	-	-
Bridge Selection Criteria	-	Accountable	Informed	Responsible	-	Informed	Informed
Procurement Management	-	Accountable	Consulted	-	-	-	-
Stakeholder Engagement	Informed	Accountable	Consulted	-	Consulted	-	Consulted





# Key Civil Rights & Other Applicable Federal Requirements by Phase



# QA, Close-out, and Celebration



## Objective:

- To understand the issues to consider & options available for quality assurance

## Tools:

- List of items to consider
- Comparison tables of quality assurance options

## Outcomes:

- Quality assurance plan



# QA: Control and Acceptance



*Image source: FHWA*



# Bridge Bundling Quality Assurance Options

BRIDGE BUNDLING QUALITY ASSURANCE OPTIONS		
PROJECT DELIVERY METHOD	QUALITY OVERSIGHT & ACCEPTANCE OPTIONS	QUALITY CONTROL OPTIONS
<b>D-B-B &amp; IDIQ</b>	<ul style="list-style-type: none"> <li>• By agency in-house staff.</li> <li>• By agency representative (outsourced to consultant).</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor QC staff are independent of construction staff.</li> </ul>
<b>CM/GC</b>	<ul style="list-style-type: none"> <li>• By agency in-house staff.</li> <li>• By agency representative (outsourced to consultant).</li> </ul>	<ul style="list-style-type: none"> <li>• Same as D-B-B.</li> </ul>
<b>D-B &amp; P3</b>	<ul style="list-style-type: none"> <li>• By agency in-house staff.</li> <li>• By agency representative (outsourced to consultant).</li> </ul>	<ul style="list-style-type: none"> <li>• D-B QC staff are independent of construction staff.</li> <li>• Design-builder employs an independent testing firm.</li> <li>• Agency responsible for verification testing.</li> </ul>



# Close-out & Celebrate!

- Marketing
- Bridge Asset Management
- Risk Management
- Lessons Learned
- Share
- Plan



# Summary – “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)



# 3. Appendices

- A. Bridge Bundling Process Flow Chart
- B. Bridge Bundling Implementation Checklist
- C. Case Studies
- D. National Bridge Condition and Bridge Asset Management
- E. Finance Mechanisms
- F. Risk Management Process Overview
- G. Bridge Selection Matrix
- H. Alternative Contracting Methods
- I. Alternative Technical Concepts
- J. Sample Contract Documents
- K. Other Bridge-Related Innovation
- L-1. Research: Capital Program Cost Optimization through Contract Aggregation Process
- L-2. Research: Quantification of Cost, Benefits, and Risks associated with ACMs and Accelerated Performance Specifications



# 4. Case Studies

Bundling scope of work for

- Preservation/Preventive maintenance
- Rehabilitation
- Replacement/New

Funding and financing by

- Federal funds
- State funds
- Local funds
- Private sector

Bundled bridges by

- State owners
- Local owners
- Combined owners  
(State & Local)





# Case Studies

## Project Delivery by

- Design-Bid-Build
- Indefinite Delivery/Indefinite Quantity
- Construction Manager/General Contractor
- Design-Build
- Public-Private Partnerships (Design-Build-Finance)

## Procurement by

- Low Bid
- Best Value
- Qualifications-Based Selection



# Bridge Bundling Guidebook

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