Bridge Bundling Guidebook

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

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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

Source: FHWA Bridge Bundling Guidebook
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)
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

1. Define successful bridge bundling
2. Determine goals & objectives
3. **Identify funding or financing**
4. Build a coalition & outreach
5. Perform risk assessment
6. Select bridges
7. Select delivery method
8. Determine environmental review & preliminary design considerations
9. Bundle & let contract(s)
10. Conduct quality assurance, close-out & celebrate!
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
<table>
<thead>
<tr>
<th>FUNDING STRATEGIES</th>
<th>FINANCING STRATEGIES</th>
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<tr>
<td>• State and Local Funds</td>
<td>• General Obligation Bonds</td>
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<td>• Federal-aid Highway Program</td>
<td>• Revenue Bonds</td>
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<td>o National Highway Performance Program</td>
<td>• GARVEE Bonds</td>
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<td>o Surface Transportation Block Grant Program</td>
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<td>• Highway Infrastructure Program</td>
<td>• Private Activity Bonds Program</td>
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<td><strong>Potential New Revenue Sources</strong></td>
<td>• Section 129 Loans</td>
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<td>• Value Capture</td>
<td>• Public-Private Partnerships (DBF, DBOM, DBFOM)</td>
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<td><strong>Federal-aid Cash Management Tools</strong></td>
<td>• Railroad Rehabilitation and Improvement Financing Program</td>
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<td>• Advance Construction</td>
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<td>• Partial Conversion of Advance Construction</td>
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<td><strong>Revenue Streams</strong></td>
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<td>• Federal Motor Fuel Taxes</td>
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<td>• Fees—Tolling and Pricing</td>
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<td>• Traditional Funding Strategies</td>
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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

Coalition Building and Outreach

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

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

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

## POTENTIAL BRIDGE BUNDLING RISKS (THREATS AND OPPORTUNITIES)

<table>
<thead>
<tr>
<th>THREAT (T) OR OPPORTUNITY (O)</th>
<th>POTENTIAL RESPONSE</th>
</tr>
</thead>
</table>
| Unclear goals and objectives (T) | • Get stakeholder input.  
• Document. |
| Project delivery method not clear (T) | • Utilize project delivery selection tool (risk-based). |
| Accelerated delivery/schedule constraints (T) | • Use CM/GC delivery method.  
• Use D-B delivery method.  
• Use ATC process.  
• Use incentives/disincentive clauses.  
• Use A+B bidding (D-B-B).  
• Use schedule as a selection criterion (best value procurement). |
| Utility/Third-Party conflicts (T) | • Owner assumes risks.  
• Clearly assign responsibility in procurement/contract documents.  
• Utilize the 3 Cs (coordination, cooperation, and communication).  
• Relocate utilities in advance of procurement.  
• Avoid locations with unknown utility information. |
Bridge Selection

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

**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

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>FUNDING SOURCE</th>
<th>D-B-B</th>
<th>IDIQ¹</th>
<th>CM/GC</th>
<th>D-B</th>
<th>P3</th>
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<td>22</td>
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<tr>
<td>Georgia DOT</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Northampton County, PA</td>
<td>Private – Local</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>33</td>
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<td>Ohio DOT</td>
<td>GARVEE bonds</td>
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<td>-</td>
<td>13</td>
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<td>-</td>
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<td>558</td>
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<tr>
<td>South Carolina DOT</td>
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<td>3-5</td>
<td>-</td>
<td>-</td>
<td>3-13</td>
<td>-</td>
</tr>
<tr>
<td>RANGE</td>
<td></td>
<td>-</td>
<td>2-25</td>
<td>6-200</td>
<td>3-13</td>
<td>2-554</td>
</tr>
</tbody>
</table>

¹ IDIQ: Indefinite Delivery Order

RANGE: 2-25, 6-200, 3-13, 2-554, 33-558
## Bridge Bundling Contract Durations (years)

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>D-B-B</th>
<th>IDIQ</th>
<th>CM/GC</th>
<th>D-B</th>
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<tr>
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<tr>
<td>Missouri DOT</td>
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<td>1, 2, 3</td>
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<td>2</td>
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<td>Northampton County, PA</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
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<tr>
<td>Oregon DOT</td>
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<td>-</td>
<td>7</td>
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<tr>
<td>Osceola County, FL</td>
<td>-</td>
<td>-</td>
<td>7</td>
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</tr>
<tr>
<td>Pennsylvania DOT</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>South Carolina DOT</td>
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<td>-</td>
<td>varies</td>
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<tr>
<td><strong>RANGE</strong></td>
<td><strong>1-3</strong></td>
<td><strong>1-5</strong></td>
<td><strong>7</strong></td>
<td><strong>2-5</strong></td>
<td><strong>10-25</strong></td>
</tr>
</tbody>
</table>
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

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

U.S. Department of Transportation
Federal Highway Administration
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

Traditional

Agency

Designer

General Contractor

Design-Bid-Build & IDIQ

Alternative Project Delivery and Contracting Methods

Agency

Independent Cost Estimator

Design-Builder

Design-Build

Agency

Concessionaire

Agency

Design-Builder

Contractor(s)

P3

CM/GC

General Contractor

Designer(s)

U.S. Department of Transportation
Federal Highway Administration
Risk Allocation by Project Delivery Method

D-B-B/IDIQ

- Agency Risk
- Contractor Risk

CM/GC

Contractor Risk

D-B

Agency Risk

P3 (DBF/O/M)

Total Risk
## Summary of Project Delivery Methods

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>D-B-B</th>
<th>IDIQ</th>
<th>CM/GC</th>
<th>D-B</th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Goals</td>
<td>• Agency retains design risks • Traditional delivery • Maintain control of final product</td>
<td>• Quick response for unknown needs • Improve asset management</td>
<td>• Risk allocation to party best to handle • Contractor innovation • Bundle bridges with complex components</td>
<td>• Transfer risks to contractor • Increase capacity of bridge program • Contractor Innovation</td>
<td>• Transfer risk to concessionaire • Operations, long-term maintenance • Contractor Innovation</td>
</tr>
<tr>
<td>Project Characteristics</td>
<td>• Similar bridge types • Simple designs • Third-party Issues resolved before advertisement</td>
<td>• Preservations • Preventative maintenance • Culvert replacements • Predictable but not yet determined work</td>
<td>• Bridges that owners might avoid in a bridge bundle due to complexities • Significant third-party involvement • “Out of the box” thinking required</td>
<td>• Simple bridges for time savings • Complex bridges for innovation</td>
<td>• Simple bridges for time savings • Complex bridges for innovation (ROW, Utilities, Environmental, Railroads, etc.) • Limited third-party involvement • Bridge maintenance • Variety of work types</td>
</tr>
<tr>
<td>Procurement Methods</td>
<td>• Low Bid • Best Value</td>
<td>• Low Bid</td>
<td>• QBS • GMP</td>
<td>• Best Value • QBS • Low Bid</td>
<td>• Best Value • QBS</td>
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</tbody>
</table>
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

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

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

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>EXECUTIVE SPONSOR</th>
<th>PROJECT MANAGER</th>
<th>RISK MANAGER</th>
<th>BRIDGE ASSET ENGINEER</th>
<th>PROGRAM PLANNING DIRECTOR</th>
<th>DESIGN ENGINEER</th>
<th>CONSTRUCTION ENGINEER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish Goals &amp; Objectives</td>
<td>Responsible</td>
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<td>-</td>
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<tr>
<td>Stakeholder Engagement</td>
<td>Informed</td>
<td>Accountable</td>
<td>Consulted</td>
<td>-</td>
<td>Consulted</td>
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<td>Consulted</td>
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</tbody>
</table>

*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, -

*Procurement Management:* - Accountable, Consulted, -

*Stakeholder Engagement:* Informed, Accountable, Consulted, -

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*U.S. Department of Transportation*

*Federal Highway Administration*
Key Civil Rights & Other Applicable Federal Requirements by Phase

**ROW Acquisition**
- Uniform Act
- Advance Acquisition

**NEPA Review**
- Conflict of Interest
- FHWA Environmental Justice Order 6640.23A
- E.O. 12898
- Title VI/Non-discrimination
- ADA

**Procurement**
- Buy America
- Davis-Bacon
- Conflict of Interest
- Title VI/Non-discrimination
- DBE
- EEO
- OJT
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

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

Image source: FHWA
## Bridge Bundling Quality Assurance Options

<table>
<thead>
<tr>
<th>PROJECT DELIVERY METHOD</th>
<th>QUALITY ASSURANCE OPTIONS</th>
<th>QUALITY CONTROL OPTIONS</th>
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</thead>
</table>
| D-B-B & IDIQ            | • By agency in-house staff.  
                         | • By agency representative (outsourced to consultant). | • Contractor QC staff are independent of construction staff. |
| CM/GC                   | • By agency in-house staff.  
                         | • By agency representative (outsourced to consultant). | • Same as D-B-B. |
| D-B & P3                | • By agency in-house staff.  
                         | • By agency representative (outsourced to consultant).  
                         | • By design-builder (independent consultant). | • D-B QC staff are independent of construction staff.  
                         |                                           | • Design-builder employs an independent testing firm.  
                         |                                           | • Agency responsible for verification testing. |
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