Challenges

• 25,000+ bridges statewide

• Currently at 3,200 structurally deficient bridges

• Approximately 300 bridges become structurally deficient annually
PENNDOT’S BRIDGE PROGRAM

Solutions
✓ Accelerated Bridge Program
✓ Standard Designs
✓ Innovative Delivery Methods
  Design-Build
  Bridge Bundling
  Bundling Design-Build
✓ Value Engineering
☐ Public-Private Partnership (P3)
Why Utilize a P3 Delivery Model?

- Accelerate replacement of structurally deficient bridges
- Accelerate delivery over traditional methods
- Maximize efficiencies to deliver more projects
- Minimize the impact to traveling public
- Allocate risks to party best able to manage them
**Transaction Highlights**

- 1 Design, Build, Finance, Maintain (DBFM) Contract
- PennDOT maintains ownership
- Development Entity responsible for maintenance for 25 years after replacement
RAPID BRIDGE REPLACEMENT
PROJECT OVERVIEW

- Federally Funded Project
- FHWA – Major Project
  - Risk Assessment
  - Project Management Plan
  - Financial Plan
- SEP -15
# RAPID BRIDGE REPLACEMENT

## PROJECT OVERVIEW

<table>
<thead>
<tr>
<th>Authority</th>
<th>Pennsylvania Department of Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consortium</td>
<td>Plenary Walsh Keystone Partners (PWKP)</td>
</tr>
<tr>
<td>Financial Close</td>
<td>March 2015</td>
</tr>
<tr>
<td>Substantial Completion</td>
<td>December 2018</td>
</tr>
<tr>
<td>Status</td>
<td>Construction</td>
</tr>
<tr>
<td>Total D&amp;C Cost</td>
<td>US $899 million</td>
</tr>
<tr>
<td>Design-Builder</td>
<td>A joint venture of Walsh Construction Company and Granite Construction Company</td>
</tr>
<tr>
<td>O&amp;M Provider</td>
<td>Walsh Infrastructure Management</td>
</tr>
<tr>
<td>Equity Provider</td>
<td>Plenary Group (80%), Walsh Group (20%)</td>
</tr>
</tbody>
</table>
RBR PROJECT TEAM

Pennsylvania Department of Transportation

Equity Members:
- Plenary Group/Walsh Construction

Senior Debt Providers

Public Information

Lead Engineering Firm:
- HDR Engineering

Subconsultants

Lead Contractor:
- Walsh Construction/Granite

Subcontractors

Legend:
1. Public-Private Partnership Agreement
2. Joint Reporting
3. Shareholder’s Agreement
4. CQAF Agreement
5. Senior Debt Agreement
6. Design-Build Contract
7. Maintenance Contract
8. Design Agreement
9. Subconsultant Agreement
10. Subcontractor Agreement
Interface Agreement between Development Entity, C/J, and Lead Maintenance Contractor
Bridge Screening and Selection

- Programmatic database screening
- Single spans and some multi-spans
- Full replacements
- Statewide distribution
- Minimal alignment changes
- Limited impacts to utilities, right of way, environmental resources
87 Early Completion Bridges

- Construction started in 2015
- PennDOT provided (similar to Design/Build)
  - Type, Size and Location (TS&L)
  - H&H
  - NEPA
  - Right of Way (ROW)
  - Utility Clearance
  - Permits
- Development Entity performs final design
471 Remaining Eligible Bridges

**PennDOT provides:**
- Scoping Documents
- Minimum Bridge Width
- Detour or Staged
- 2 Borings per Bridge
- Right-of-Way acquisition
- Utility relocation costs

**Development Entity performs:**
- NEPA
- Type, Size and Location (TS&L)
- H&H
- Survey
- Right-of-Way Plan
- Permits
- Final Design
• Quality Control – DE
  (as is typically the contractor’s responsibility)

• Quality Assurance – DE
  to ensure that their Quality Processes are followed
  (which must include Department requirements)

• Quality Acceptance – Independent Construction
  Quality Acceptance Firm (CQAF)
  Reports to PennDOT and the DE
  Certifies to both that requirements were met
  Reports and data entry – our systems
  PennDOT acceptance based on these outputs

• Independent Assurance – Department
  Random visits, sampling, testing, auditing, analysis, QA
  the CQAF, etc.

• Additional FHWA and Finance Team roles
RBR PROJECT STATUS

Project Highlights

- October 2014: Preferred Proposal
- September 2015: Maintenance Begins
- June 2018: 417 Bridges Open to Traffic
- May 2021: Early Handbacks Begin
- September 2040: Bridge Handback Begins

- 2014
  - March 2015: Financial Close
  - June 2015: Construction Begins
- 2015
- 2018
  - December 2018: Construction Substantially Complete
- 2021
- 2040
- 2042
  - September 2042: Project Handback Complete
HANDBACK PROCESS: SUBSTANTIAL COMPLETION REQUIREMENTS
NBIS Condition Assessments

At Substantial Completion:
• Rated eight (8) or higher (per bridge)

At End of Term:
• Rated seven (7) or higher for 98% of all bridges
• Rated at least six (6) or higher for the remaining 2%
• Superstructure meet or exceed rating of seven (7)
General Inspection Requirements

• Visual inspections (emergency, severe weather)

• Department audits inspections

• Biannual NBIS inspections and condition assessments

• Inspection activities in Maintenance Management Information System
RBR PROJECT - BY THE #’S

441 are SINGLE-SPAN BRIDGES
(they cross from one side to the other, without needing a pier in the middle)

120 are CULVERTS

2,291 bridges will be constructed using PRE-STRESSED CONCRETE BEAMS

558 BRIDGES included for replacement

Laid end-to-end, the beams would stretch 27 Miles

6.1 Million LINEAR FEET OF STEEL STRAND, or 1,155 Miles

417 bridges will use 62 BRIDGES WILL BE MORE THAN 100ft long

62 BRIDGES WILL BE MORE THAN 100ft long

AVERAGE BRIDGE is about 60ft long
RBR PROJECT OBSERVATIONS
• Proper Risk Allocation is critical

• Ensure sufficient time and effort for management systems

• Early discussions on expectations and agreed-upon responsibilities
• Centralized control, decentralized execution

• In lieu of 16 project management plans, develop one comprehensive bridge operations plan

• Economics – Supply and Demand

• Co-location

• Document control and communication
• Streamlined review process needed to be established
  • Over 25,000 design submissions to date

• Document management

• Similar coordination activities with stakeholders
• Streamlined field escalation process must be established

• Coordination with standard program

• Use of CQAF beneficial to ensure quality
  • Performance based specifications in P3s provide owner assurance
• Alternative technical concepts (ATCs) – consider industry knowledge

• Change is slow

• Lessons Learned need to be communicated quickly
• Team identifies an Technical Concept that are not currently allowed by DOT standards

• Proposing team submits a Preliminary or Formal request granting use of the Alternate Technical Concept to be incorporated into project

• DOT responds Yes / No or with conditions

• On this specific project PWKP submitted 23 Formal ATC’s and 14 were approved for use

• Should be noted in a P3 vs. Design Build ATC has to be vetted by Developer and Maintenance Provider prior to inclusion

• Also P3 delivery fosters alternatives that would not be considered in Design Build (example PPC) with higher initial cost but lower lifecycle cost
**Offsite Prefabrication**

- Beams
- Wings
- Deck panels
- Substructure
- Etc.

Allows for expedited construction sequencing
LIFE-CYCLE ATC
EXAMPLES – PPC OVERLAY

Polyester Polymer Concrete (PPC) Overlay

More expensive initial construction – BUT lower life-cycle cost
  ➢ Instead of multiple epoxy seal applications
  ➢ 30-year proven technology

30-year bridge deck solution
  ➢ Extremely low permeability – preserving riding surface AND superstructure
  ➢ Much less susceptible to roadway salting operations

Less Impact to Traveling Public

• Can be used by traffic in 2 Hours
• Reducing impacts to public from future deck repairs
LESSONS LEARNED - GOVERNANCE STRUCTURE

EXECUTIVE LEVEL STEERING COMMITTEE

D&C WORKS COMMITTEE

QUALITY SUB-COMMITTEE

SCHEDULE SUB-COMMITTEE

COMMERCIAL SUB-COMMITTEE

Operational Management Team/Working Groups

Construction Coordination Meeting
Quality Meeting
ROW Meeting
NEPA/Permitting Meeting
Utility Meeting
Public Involvement
Design Review Over the Shoulder

West Region Representatives
Central Region Representatives
East Region Representatives
LESSONS LEARNED - GOVERNANCE STRUCTURE

Operation Management Team - Working Groups Expansion

- Quality Sub-Committee
  - Quality Meeting
  - Design Meeting (Over the Shoulder)
  - Construction Coordination Meeting

- Schedule Sub-Committee
  - ROW Meeting
  - NEPA/Permitting Meeting
  - Utility Meeting
  - Design Meeting (Over the Shoulder)
  - Construction Coordination Meeting
  - Public Involvement Meeting

- Commercial Sub-Committee
  - ROW Meeting
  - NEPA/Permitting Meeting
  - Utility Meeting
  - Design Meeting (Over the Shoulder)
  - Construction Coordination Meeting
Questions and Discussion