The Pennsylvania Rapid Bridge Replacement Project
The Pennsylvania Rapid Bridge Replacement Project

The rebuilding of 558 structurally deficient bridges in the Commonwealth of Pennsylvania over a 3+ year span

April 2017

Charles Zugell

The Plenary Walsh Keystone Partners believe engaging local community and DBE resources benefits our projects and the communities in which we do business. We seek to establish relationships with local DBE firms, encourage and assist potential DBEs to obtain necessary certification and prequalification, and aid development of DBEs through their active involvement.
The Pennsylvania Rapid Bridge Replacement Project

This is the 1st P3 Construction Project for PennDOT
- Approved by Commonwealth’s Public Private Transportation Partnership Board in September 2013

Project includes the:
- Design
- Demolition
- Construction
- Financing
- Routine / lifecycle maintenance, of

558 structurally deficient bridges geographically spread across the Commonwealth of PA
The Pennsylvania Rapid Bridge Replacement Project

TEAM ORGANIZATION

- Development Entity (DE) – Plenary Walsh Keystone Partners (PWKP)
  - Plenary Group (80%)
  - Walsh Investors, LLC (20%)

- Lead Contractor – Walsh / Granite JV
  - Walsh Construction (60%)
  - Granite Construction (40%)

- Lead Engineer – HDR – hired by Lead Contractor

- Lead Maintenance Contractor – Walsh Infrastructure Management (WIM)

- Construction Quality Acceptance Firm - TRC
PennDOT provided a traffic control scope for each bridge site based on local needs (confirmed through NEPA and public involvement)

- Conventional detours:
  - Single Span bridges – 75 day max detours
  - Multi Span Bridges – 110 day max detours

- Accelerated detours:
  - 14 day maximum detour
  - 35 day maximum detour

- Required staged bridges
*All detoured bridges could be changed to staged
The Pennsylvania Rapid Bridge Replacement Project

INDIVIDUAL BRIDGE RESULTS

- 345 Single Span Bridges*
- 33 Multi-span Bridges*
- 170 Precast Box Culverts
- 10 Others
- *311 Total Bridges are designed with integral abutments
- *Average New Bridge Length = 75’
The Pennsylvania Rapid Bridge Replacement Project

ACCELERATED BRIDGE CONSTRUCTION

• Design Results and Construction Requirements determined need for ABC

• ABC uses:
  • Precast Substructures used on 6 bridges
  • Precast Superstructures used on 13 bridges
  • Precast Superstructure included JV-78
The Pennsylvania Rapid Bridge Replacement Project

JV 78

- Mifflin County, PA
- SR 4013 over Strodes Run
- 35 Day Maximum Detour
- New Bridge Span = 50’
- Integral Abutments
- Folded Steel Plate Girder Superstructure
The Pennsylvania Rapid Bridge Replacement Project

Folded Steel Plate Girder System – Supplied by CDR Bridge Systems

- Given a 35 day maximum detour for an integral abutment bridge, a precast superstructure was desired due to minimizing cure times

- FSPG chosen due to constructability
  - Post Tensioning not required
  - Lightweight
  - Simple setup – complex fit-up not needed
  - No field welding or cross-frame installation

- Precast parapets installed on deck

- System limited to maximum span lengths 55-60’ (skew dependent)
The Pennsylvania Rapid Bridge Replacement Project

Folded Steel Plate Girder Project Standard Developed
The Pennsylvania Rapid Bridge Replacement Project

Folded Steel Plate Girder System – Project Specific Design

• HDR (EOR) and CDR (Supplier) designers worked together through design process

• Cast in Place components consisted of end diaphragms and longitudinal closure joints
  • Locally available AAA Accelerated concrete
  • Polyester Polymer Overlay on deck

• Requirements to allow traffic after 3 day cure

• Longitudinal Closure Joint width was designed to allow rebar development based on mix
The Pennsylvania Rapid Bridge Replacement Project

Folded Steel Plate Girder System – Project Specific Design

- Lightweight removable bird screens provided for maintenance concern
- Galvanized Coating on all components
- Approach Slabs not needed on this project
The Pennsylvania Rapid Bridge Replacement Project

SUPERSTRUCTURE SECTION

31'-7" OUT-TO-OUT
29'-7" CURB-TO-CURB
1'-0" BARRIER

4" LANE
12'-0" LANE
12'-0" LANE

7'/2" PRECAST CONCRETE DECK WITH 3/4" PPC WEARING SURFACE

CONSTR. B
SR 0413

6.65% PGL 6.65%

BEAM 1 BEAM 2 BEAM 3 BEAM 4

3 EQUAL SPACES = 25'-7"

CLASS AAA CEMENT CONCRETE, ACCELERATED CLOSURE POUR (TYP)
The Pennsylvania Rapid Bridge Replacement Project

- CAST IN PLACE LOCATIONS (AAA ACCELERATED 4000 PSI)
The Pennsylvania Rapid Bridge Replacement Project

CLOSURE POUR DESIGN

1’ - 3” AAA CEMENT CONCRETE, ACCELERATED CLOSURE POUR (TYP.)

"A"* (TYP.)

MATCH WITH S1

S1

S2

2” CLR.*
The Pennsylvania Rapid Bridge Replacement Project

BIRD SCREEN

• Galvanized Coating Used

• Bird Screen removable for inspection

GALVANIZED OR PLASTIC BIRD SCREEN OR SPIKES, IF REQUIRED (TYP.). ANCHORS SHALL BE GALVANIZED OR OTHER NON-CORROSIVE MATERIAL.