Rehabilitation of the Corning Centerway Arch Bridge

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Presentation Outline

- History of Centerway Bridge
- Project Components
- Inspection Program
- Repair Recommendations
- Construction Phase
1928 Bridge Elevation
Original Construction
1972 - Agnes
1989 – Deck Modifications
Centerway as a Pedestrian Bridge

36'
Key Project Partnership

THE CITY OF CORNING, NY

Corning's GAFFER DISTRICT

CORNING
Key Project Components

- Bridge Rehabilitation
- Maintain Historic Integrity
Centerway Arch Bridge

- Constructed in 1922
- 7 – 92 ft. (clear) spans
- 720 ft. overall length
Arch Section

- Cast-in-place earth-filled reinforced concrete arch
Preliminary Engineering

- **In-depth Bridge Inspection**
  - Define repair scope & quantities to get the most accurate cost estimates

- **Testing**
  - Non-destructive testing: impact echo, GPR, LIDAR, concrete sounding
  - Concrete coring for chlorides, petrographic analysis, strength

- **Reports**
  - Inspection Condition Report
  - GPR (deck)
  - Concrete Coring and Powder testing
  - Petrographic Analysis
  - Service Life Assessment
Inspection Components

- Parapets
- Deck
- Spandrel Walls
- Arch
- Piers
In-depth Bridge Inspection

- Best way to define repair scope & quantities to get the most accurate cost estimates
Spandrel Walls
Abutments and Piers
Reflective Markings from Sounding
Assembling of Field Markings
Testing

- Impact Echo (NDT)
- Concrete Coring & Testing
Alkalai-Silica Reaction (ASR) in Petrograph
GPR on Deck

- Delaminations/Voids
Condition Summary

- Concrete in Abutments, Wingwalls, and Spandrel Walls show spalling, advanced concrete degradation due to moisture retention from coating applied in 1989 due to Alkali-Silica Reaction (ASR).
- Concrete Arches were not coated, but exhibited advanced ASR, cracking, and some delamination.
- Complete loss of integrity from ASR. Restoration/overlay is not feasible due to condition.
Recommended Repairs: Piers and Abutments

- Rehabilitation at upstream/downstream ends due to spalling/cracking of surface.
- Repair cracks and perform partial depth concrete repairs; seal surfaces.
Recommended Repairs: Spandrel Walls

- Resurface with Precast Panels and reinforce to obtain desired design life: minimum 25 years.
- Provide surface texturing in panels to evoke historic façade.
- Precast concrete parapets removed and replaced in-kind. Bump-outs removed and replaced in-line for new lighting.
Recommended Repairs: Arch

- Strengthening recommended to maintain minimum 25 yr. life expectancy.
- Undersides: Repair cracks and perform partial depth concrete repairs as necessary.
Project Costs

- TOTAL = $5,530,021
- Inspection, Investigation and Design: $521,000
- Final Construction Cost: $4,356,021
- Construction Inspection: $653,000
Construction Timeline

- Bid Advertisement – May 31, 2012
- Bid Opening – June 28, 2012
- Award – July 23, 2012
- Substantial Completion - August 1, 2013
- Final Completion - October 30, 2013
Construction Access From Approaches
Construction Access From Deck
Construction Access From Scaffolding
Construction Access From Suspended Platforms
Construction Access From Suspended Platforms
Weather Impacts: Hurricane Sandy
Pier Reconstruction
Pier Reconstruction: Match Existing Texturing
Concrete Arch Beam
Arch Reinforcement
Winter Arch Construction
Self-Consolidating Concrete
Vacuum Injection Crack Repairs
Parapet Removal
Spandrel Walls
Prep for Precast Wall Panels
Precast Panel Fabrication
Parapet Construction
Membrane, Drainage and Electrical
Deck Treatment
Center Span Maze
Finished Product
Learning Assessment Questions

- What testing methods were used to evaluate the existing condition of the bridge?
- What was determined to be the cause of most of the damage to the structure?
- What treatment was used to restore the spandrel walls?