Cumberland Viaduct Rehabilitation Project
Contract No. AL4095180R
Presenter - Bob Bofinger
MDSHA - Office of Structures
Project Justification & Improvements

• **Condition State** – The deck, superstructure and substructure was rated a 5 and repairs completed improved the rating to 7 for sub and superstructure.

• **System Preservation** – Proposed work to address substructure and superstructure. The concrete deck will be replaced on the MD 51 bridge in the next 3 years and a concrete overlay or deck replacement in the future for the I-68 bridge.

• **Costs** – The costs would be too high for a complete replacement, the I-68 traffic would need to be detoured through the City of Cumberland. The repairs needed are so extensive and the structure is so large. MDSHA choose the most economical option for a complete rehabilitation to substructure, steel girders and beams and repairs to curbs, roadway joints and replace lighting.

• **Safety** – There are also several municipal roads, two railways, a waterfront development, and a significant amount parking beneath the bridge. Numerous areas in need of repair are directly over vehicles and pedestrians, with the possibility of falling from overhead.
Project Description

• This project, located in Allegany County, is for the cleaning, painting, and rehabilitation of Bridge Nos. 0109200 MD 51 over CSX RR and Canal Parkway, 0109600 I-68 over Wills Creek, CSX RR and Municipal Streets, 0110700 I-68 Ramp A over Mechanic Street, 0110800 I-68 Ramp B over Howard Street, 0110900 I-68 Ramp C over Mechanic Street, 0111000 I-68 Ramp D over Centre Street, 0111100 I-68 Ramp E over Centre Street & Queen City Dr and 0111200 I-68 Ramp F over Centre Street & Queen City Dr in the City of Cumberland, Maryland.
Background

• The structures is on the Interstate MD 51 and Route 68 and was built in 1965 & 1968. The MD 51 bridge had a numerous HMA overlays and concrete median replaced with a jersey wall. The I-68 bridge had its concrete deck overlayed and median barrier replaced in 1976.
• These well traveled structures has had many construction maintenance and remedial repairs over the years
• Major Repairs – I-68 Bridge
  ▫ 1988 – Substructure Repairs
  ▫ 1992, 1998 – Bearing Pedestal Repairs
  ▫ 1999 – Drainage troughs added at all piers
Contract Facts

- Contract bid - $14 M  790 calendar days
- Bid Date – 08/30/2012
- NTP – 11/27/2012
- End Date – 06/30/2015 142 CD extension
- 3 Redlines - $425,000
- 42 RFI’s
- 10 Change orders – $3 M
- 100 sheets of contract plans
The Team

- Engineer – Office of Structures – Structures Remedial – Robert G. Bofinger, P.E – Lead Engineer - In-house design
- Consultant Engineer: Tuhin, Basu & Associates – Details
- Contract Administrator – District 6, La Vale Stephen Bucy – ADE Construction & PE’s Derick Winfield & David Bittner
- Paint Inspection – Tony Wotten
- Contractor – Titan Industrial Services Michael Forakis & William Rothman
Bridge Facts - MD 51 Bridge over CSX

- 5 span steel beam and steel girder bridge
- Built in 1965 prior to the Viaduct bridge
- Span 5 is over Canal Parkway, MD 61
- Major arterial road to industrial companies
As-built framing plan
Contract plan
Scope of Work - MD 51 Bridge

- Repair all pier caps and crash walls with Mix No. 6 Concrete.
- Repair concrete end diaphragms at all piers with pneumatically applied mortar (P.A.M.), and repair both abutments with cast in place concrete.
- Epoxy coat all pier caps, crash walls and abutments.
- Carbon Fiber wrap all columns at piers.
- Retrofit girder 12 at Pier 3, Span 3.
- Replace gusset and diaphragm connection plates and lateral bracing with section loss/holes at various locations as shown on the plans.
- Grind, or grind and re-weld cracks in diaphragm connection welds as shown on the plans.
Plank entire Span 4 over Canal Parkway and replace deteriorated planks in Span Nos. 2 and 3, in Bay 6.

Replace pier roadway joints 1 and 3 with pourable seal and backer rods. Replace Pier 4 roadway joint with a 3 in. compression seal.

Repair concrete roadway joint header at pier 3 and south abutment with Modified Mix No. 9 concrete.

Install pourable seal in longitudinal joint at median barrier (Pier only).

Zone painting

Mill 2 inches existing HMA and overlay at South Abutment.
Zone Painting
Concrete repair - Substructure
Column & Pier repairs
Deck & roadway joint repairs
Steel repairs
Timber planking
Bridge Facts - I-68 EB & WB

• Bridge Nos. 0109600, 0110700 – 0111200
• 44 Span Steel Girder / Beam Bridge
• 6 total entrance/exit ramps.
• Total mainline structure length is 3,121 linear feet
• The AADT for I-68 EB/WB was 45,252 vehicles as of December 2008
• There are 1308 beam/girder ends through out the structure
• Spans 10 through 12 are fracture critical
Special Features

- Replace finger roadway joints at Piers 9 and 12
- Dry hydrants added at Piers 21, 33 and 42 as request City of Cumberland Fire Dept.
- Rehabilitation of substructure and superstructure steel beam/girders and bearing areas.
I-68 Bridge - Cumberland Viaduct
West End / Willis Creek
Willis Creek / Interchange
Interchange / CSX R.R.
CSX R.R. / East End
Contract plans - Sectioning
Typical cross sections
General and Framing Plan
Scope of Work - I-68 Bridge

- Repair spalls in columns, pier caps, pedestals and abutments with Mix No. 6 Concrete.
- Replace concrete pedestals, jacking required.
- Epoxy coat all pier caps, crash walls and abutments.
- Retrofit Stringer Ends at Piers 9, 10, 11 and 12.
- Retrofit Floorbeam top and lower chord support beam and corbels in cross girder at Piers 9, 10, 11 and 12.
- Replace steel bearing pedestal No. 6 at Pier 28, steel bent.
Scope of Work – I-68 Bridge – Con’d

- Replace bearing plates at stringer 12, Pier 9, Span 10, and at stringer 10 and 12, Pier 10.

- Shim bearing plates at various locations.

- Replace both broken shoulder bolts at Pier 9, Span 9 and girder bearing 1 at pier 12.

- Clean and repair drainage troughs.

- Repair soffit at pier 10 and 11 with pneumatically applied mortar.

- Install drainage troughs at piers 10 and 11.
Scope of Work - I-68 Bridge Con’d

- Repair all drainage systems and clean out all scuppers.
- Drill and grind smooth diaphragm connection weld cracks.
- Fiber wrap all concrete columns.
- Repair deck headers and deck spalls, replace compression seals in roadway joints.
Scope of Work - I-68 Bridge Con’d

- Repair concrete parapet, railing and safety curbs as indicated on plans.

- Repair assembly joint at Pier 9, Eastbound I-68.

- Install pourable seals at armor roadway joint and longitudinal opening in median.

- Remove and replace pigeon netting in Span 35, Ramp E Span 8 and Ramp F Span 9.

- Install new highway lighting.

- Complete clean and paint the entire structure.
Complete Clean & Paint
Steel defects
Steel Repairs
Concrete defects
Concrete defects
Drainage - troughs & scuppers
Concrete repair
Roadway compression seals
2016 Award of Excellence
MDQI Partnering
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