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New Jersey Turnpike Authority Bridge Coating Assessment and Repainting Capital Program

Presented by: Mark Nyerges, PE

New Jersey Turnpike Authority

What exit are you from??

Responsible for the New Jersey Turnpike and the Garden State Parkway



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PRACTICES WE CAN NOT AFFORD TO DEFER

History of the New Jersey Turnpike Authority



- Opened in 1951
- First toll road in NJ
- 148 miles in length
- 28 interchanges
- Largest inventory of weathering steel (WS) bridges in the country



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History of the New Jersey Turnpike Authority



- Opened in 1954
- 173 miles in length
- 365 exits and entrances
- Passes through 50 municipalities in 10 counties



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New Jersey Turnpike Authority Bridge Inventory

Total Number of Major Bridges





8



11

Number of Steel Major Bridges

Turnpike 	Parkway 
Painted Steel (Trusses, Tied Arch, G/F/S, or Plate Girders) 2	Painted Steel (G/F/S or Plate Girder) 4
Weathering Steel (G/F/S or Plate Girders) 3	Weathering Steel (G/F/S or Plate Girders) 1
Combination of Painted Steel (primary) and Weathering Steel (widening) 3	Combination of Painted Steel (primary) and Weathering Steel (widening) 1

New Jersey Turnpike Authority Bridge Inventory

Total Number of Routine Bridges





582



505

Number of Steel Routine Bridges

Turnpike		Parkway	
Painted Steel (Rolled Beams or Plate Girders)	138	Painted Steel (Rolled Beams or Plate Girders)	319
Weathering Steel (Rolled Beams or Plate Girders)	317	Weathering Steel (Rolled Beams or Plate Girders)	32
Combination of Painted Steel (primary) and Weathering Steel (widening)	62	Combination of Painted Steel (primary) and Weathering Steel (widening)	15



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GPI and New Jersey Turnpike Authority Working Together for Over 20 Years!



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- Bridge Engineering
- Civil and Site Engineering
- Construction Management
- Protective Coatings
- Highway Engineering
- Traffic Engineering
- Environmental / Sustainability
- GIS / Asset Management
- Surveying / Mapping



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Program Overview - Major and Routine Bridges



- Assess Conditions
- Prioritize and Schedule
- Develop the Capital Programs
- Proceed with Design

Program Overview - Major and Routine Bridges



- Focus on Major Bridges
- Address Routine Bridges with Fracture Critical Members (FCMs)
- Develop Routine Bridge Contracts



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Prioritization Process - Major Bridges

- Initially prioritized with latest Biennial Inspection Reports
- Performed field visits to identify:
 - Condition of existing coating system
 - Sample acquisition for testing
 - Extent / severity of corrosion
 - Containment requirements
 - Environmental / other constraints
 - Traffic impacts
 - Outside agency coordination
 - “Limited Access” areas



Prioritization Process - Major Bridges



- Results indicated:
 - All had original coatings; latest overcoat >20 years old
 - DFT was 15-30 mils with 6-8 coats of paint
 - Generally poor condition
 - Failing, brittle, poor adhesion (mill scale)
 - Tested positive for heavy metals
 - Areas of laminar corrosion present
 - All WS members had laminar corrosion at ends (not painted)



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Prioritization Process - Major Bridges

- Prioritization Decision Matrix
 - Utilized a Scoring System:
 - Corrosion (“Degree” x “Extent”)
 - Deck Condition and Scheduled Reconstruction
 - MPT and Staging Complexity
 - Environmental and Containment Complexity
- Coordinated with Capital Program Needs and Award Schedules
- Formulated design options per SSPC Guidelines

Prioritization Matrix Scoring System

Item #1 - Corrosion (maximum score of 20)			
Total Score Obtained by Factoring Two (2) Conditions, Degree and Extent			
<u>Degree</u>		<u>Extent</u>	
<u>Score</u>	<u>Description</u>	<u>Multiplier</u>	<u>Description</u>
1	Light Corrosion (Surface Only)	1	Isolated Locations
5	Moderate Corrosion	2	Widespread
10	Heavy Corrosion		
Total Score is obtained by multiplying the Degree by the Extent			
Item #2 - Deck Condition and Scheduled Reconstruction (maximum score of 13)			
Total Score Obtained by Adding Two (2) Components, Deck Slab and Deck Joints			
<u>Deck Slab</u>		<u>Deck Joints</u>	
<u>Score</u>	<u>Description</u>	<u>Score</u>	<u>Description</u>
10	Recently Replaced or Good Condition	0	Poor Condition
7	Redecking within 5 years	3	Good Condition
4	Redecking within 5 to Ten Years		
0	Redecking after Ten Years		

Prioritization Process - Routine Bridges



- Fracture Critical Members (FCMs)
 - Queried Authority's BMS to identify potential bridges
 - Predominantly WS box girder pier caps
 - One (1) previously painted G/F/S bridge

Prioritization Process - Routine Bridges



- Balance of Inventory
 - Utilized Authority's BMS Reporting
 - Quickly identified all bridges with "poor" or "fair" coatings (25% Turnpike; 35% Parkway)
 - Geographically sorted bridges
 - Further delineated lists by "North", "Central", and "South" regions
 - Coordinated MPT / access demands
- Performed same field assessments and coating system tests as Major Bridges
- Formulated design options per SSPC Guidelines



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Coatings Alternatives - Approach

- Complete Removal and Replacement
 - Best for failed coatings / corrosion present
 - Not applicable to weathering steel
- Spot Repairs with a Full Overcoat
 - Common “Maintenance Painting” method
 - Can extend life of existing system
 - Lowest initial cost (relies on integrity)
 - Not applicable to weathering steel



Coatings Alternatives - Approach

- Zone Painting
 - Viable option for painted and WS members
 - Generally reserved for steelwork beneath deck joints and within splash zones
 - Limits = $1.5 \times$ beam depth from deck joints
 - Preferred method for weathering steel

Coatings Alternatives - Selected Approach



- Painted Bridges - Complete Removal and Replacement
 - Existing number of coats / layers of paint with generally poor adhesion
 - Widespread presence of mill scale
 - All coatings contained heavy metals
- WS Bridges - Zone Painting
 - Deterioration was generally localized at the beam ends only



Coatings Alternatives - Selected Approach

- Special Provisions - Containment:
 - Class 1A containment required
 - Rigid platform specified

- Special Provisions - Steelwork:
 - Painted steel surface preparation
 - WS surface preparation
 - Removal of pack rust



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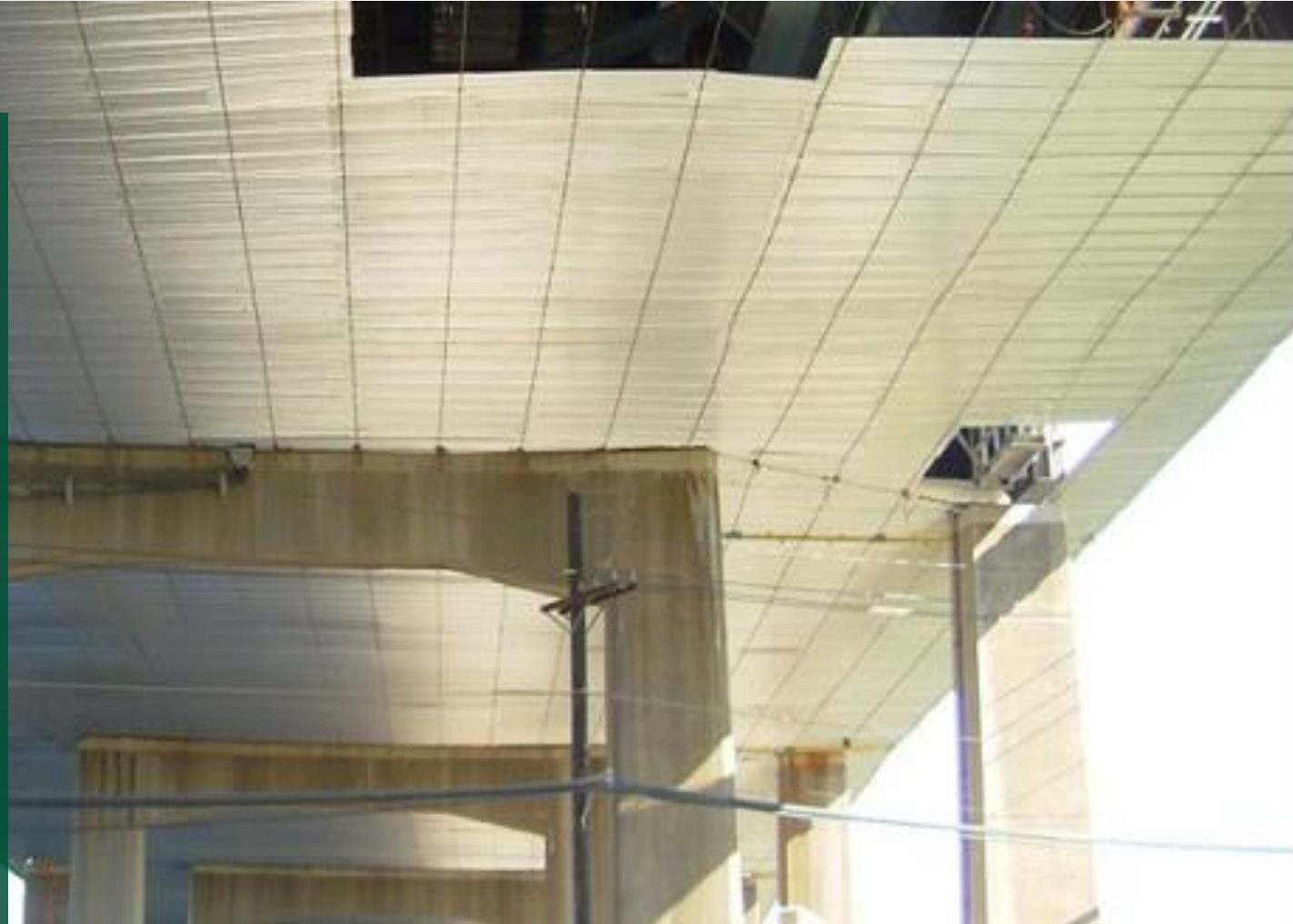


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Coatings Alternatives - System

- Traditional 3-Coat Z/E/U
 - NEPCOAT-approved
 - Standard for most Greater Northeast Region bridge agencies
- 2-Coat, High-Build Polyaspartic
 - NEPCOAT-approved
 - Fewer coats and faster dry times
 - Untested on similar bridge / environmental types for desired >15 years of exposure



Coatings Alternatives - System

- 2-Coat Epoxy Mastic
 - Popular due to environmental regulation compliance
 - Comparatively low cost per gallon
 - Agency testing revealed poor performance against chlorides
- Other (Calcium Sulfonate, Waterborne, and Acrylics)
 - Mostly utilized in chloride-free states
 - Systems are “soft” and susceptible to entrapping atmospheric dirt



Coatings Alternatives - Selected System



- Painted and WS - Traditional 3-Coat Z/E/U System
 - NEPCOAT approved
 - Proven track record in Greater Northeast Region
- Special Provisions:
 - Penetrating sealer - after prime
 - Stripe Coat - after prime and seal
 - Caulking - before finish
 - Two full intermediate coats on WS

Project Status - Major Bridges



- Five (5) bridges completed by four (4) Repainting-Specific Contracts
- Four (4) bridges completed by Rehab / Replacement Contracts
- Three (3) bridges to be completed by Rehab Contracts (under design)
- One (1) steel bridge <10 years old
- One (1) steel bridge outstanding
- Total Painting-Related Construction Value >\$250M

Project Status - Routine Bridges



- All with FCMs repainted under a single Contract
 - Predominantly Zone Painting at box girder pier caps (17 bridges)
 - One (1) fully painted G/F/S bridge
- 18 highest priority Parkway bridges repainted by a single Contract
- Six (6) prioritized Contracts are planned (≈ 2 per year; 120 bridges)
- Total Painting-Related Construction Value >\$100M



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Thank you!
Questions?

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