NJDOT Bridge Preservation and Asset Management Strategies

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Bridge preservation is defined as actions or strategies that prevent, delay or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good condition, and extend their life. Preservation actions may be preventive or condition-driven.
New Jersey: Background & Demographics

- Population: 8.8 Million (2012)
- Area: 7,300 Square Miles
- Population density: 1,205 inhabitants per square mile
- 690 vehicles per 1,000 people (2007)
- 39,000 miles of public roadways
- 3,000 miles of State and US Highways
- 500 miles of Interstate Highways
- 6,542 Highway carrying bridges
- 2,545 State maintained highway carrying bridges
- 117 Orphan Bridges
- 17 Operational Drawbridges
NJDOT Bridge Preservation and Asset Management Strategies

- NJDOT Bureau of Operations Support has several measures in place to preserve and extend the service life of bridges
- All NJDOT bridge repair work is competitively bid and performed with outside contractors through annually issued contracts
Seven State funded “If & Where Directed” contracts
State bridge maintenance funding totals $47 million
Six Federally funded site specific contracts
Federal bridge maintenance funding totals $32 million
NJDOT State Funded Contracts

- Concrete Repair – North: $9 Million
- Concrete Repair – South: $5.5 Million
- Drawbridge & Tunnel Repair: $15 Mil.
- Timber & Underwater Repair: $6.5 Mil.
- Structural Steel Repair: $4 Million
- Orphan Bridge Repair: $1.5 Million
- Job Order Contract Repairs: $5.5 Mil.

Total State Funds: $47 Million
NJDOT Federally Funded Contracts

- Bridge Preventive Maintenance Contracts: $5 Million each (two per year)
- Bridge Painting Contracts: $8 Million each (two per year)
- Job Order Contracts: $3 Million each (two per year)
- Total Federal Funds: $32 Million
Bridge Preventive Maintenance Program

- Repairs bridges with National Bridge Inventory Deck, Superstructure, and Substructure Ratings of “5” or higher on a scale of “0” to “9”
- Created in 2007 using State funds, expanded in 2009 to be Federally funded
Two Bridge Preventive Maintenance Contracts (BPMC) are put out to bid each year.

Each contract repairs roughly forty bridges along a single corridor or geographical area.
NJDOT Bridge Preventive Maintenance Contracts
Structure selection is based on inspection reports from Structural Evaluation.

Inspection reports note deficiencies and generate “Work Orders” for maintenance repairs.

Clusters of Work Orders trigger selection of a corridor for repairs.
Outlying structures with deficiencies noted in Work Orders are handled by Job Order Contracts (JOC)

JOC utilizes federal funds for “If & Where Directed” preventive maintenance repairs

JOC follows modified FHWA approval process for construction
NJDOT Work Order System
**Example Work Order**

**Operations - Capital Program - Work Orders**

**Work Order Listing**

- **Select Work Order Type**: Bridge
- **Filter by WO Status**: All WOs
- **Quick Search Within Filter**: WO Number or WO Description

**Current Filter**: Work Order Type = "Bridge"  Current Search within Filter: Work Order No = '8804' WO Count: (1)

**Structural Evaluation Priority Repairs (BRIDGE)**

- **Writer**: Meriam Michael
- **Project Engineer**: Robert Flanagan
- **Supervisor**: Mujhid Khan
- **Group No**: T15F

**Defects Description**: The engineers were performing the routine field inspection of the subject bridge on June 10, 2015 and they observed the following defect: There is a heavy accumulation of loose concrete debris resting on the bridge seat of the center pier (Photos P1-01 and P1-02). Please note the center pier pavement for the Southwest Boulevard roadway.

**Recommendation Description**: We recommend the following repairs be carried out on a Priority: 1 basis: Remove the loose concrete debris from the pier bridge seat.

**General Work Order Information**

- **Date Initiated**: 6/16/2015
- **WO Type**: BRIDGE
- **WO Number**: 8804

**Initiator**: Denise Marshall
- **Project Manager**: Anthony Emans
- **Assigned To**: Gerald Okwelo
- **Resident Engineer**: County Summary
- **Location Description**: Municipality Summary
- **South**: Vineland City

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**Work Order Classification (BRIDGE)**

- **Project Classification**: WO Scope
- **Structural Evaluation**: Structure Name
- **Structure No**: Structure Type
- **Structure Route**: Stucture Route

**Work Order Progress Details**

- **Estimated Start Date**: 9/10/2015
- **Estimated Completion Date**: 9/23/2015
- **Estimated Cost**: $40,000
- **Estimated Crew Days**: 80
- **Overtime Authority No**: 00355
Bridge Preventive Maintenance Program
Work Orders

- Work Orders created by Structural Evaluation fall into three categories:
  - Type E: Emergency Repair. Address deficiency immediately
  - Type 1: Priority 1 Repair. Address deficiency within 30 days
  - Type 2: Priority 2 Repair. Address deficiency within six months
If structure has no associated work order, one is created upon completion of Preventive Maintenance work

Manual entry of work performed on a structure creates a history of preservation actions

Work Orders accessible internally to all NJDOT employees through website login, in both office and field
Bridge Preventive Maintenance Program
Work Orders & Asset Management

- Work Orders are closed out as repairs are made to a structure
- Closeout of Work Order sends necessary information back to Structural Evaluation for re-evaluation of super/sub structure and deck
- Type of repairs made, materials used, cost of repair, and completion photos all noted in Work Order closeout
Preventive Maintenance – Scope of Work

- Comprehensive scope of work allows for many repairs to be made to keep bridges in good standing
- All structures on a contract are treated equally from top to bottom
- Scope of allowable work outlined in a joint NJDOT/FHWA Guideline document
Preventive Maintenance
Header Repair

BEFORE

AFTER

NJ Route 33 Westbound over US Route 9 Southbound; BPMC 2012
Preventive Maintenance
Curb Repair

BEFORE
NJ Route 79 over NJ Route 18; BPMC 2010

AFTER
Preventive Maintenance
Deck Repair

BEFORE

AFTER

Dunns Mill Road over Interstate 295; BPMC 2014-2
Preventive Maintenance
Joint Re-Seal

BEFORE

AFTER

Old York Road over Interstate 295; BPMC 2014-2
Preventive Maintenance
Sidewalk Installation

BEFORE

AFTER

Gordon’s Corner Road over NJ Route 18; BPMC 2010
Preventive Maintenance
Deck Crack Sealing
Preventive Maintenance
Deck Corrosion Inhibitor

APPLICATION PHOTOS

Brighton Avenue over NJ Route 18; BPMC 2010
Preventive Maintenance Approach Slab Repairs

BEFORE

NJ Route 31 over Interstate 95; BPMC 2013-1

AFTER
Preventive Maintenance
Hot Mix Asphalt Patch

BEFORE

AFTER

NJ Route 35 Southbound over Matawan Creek; BPMC 2012
Preventive Maintenance Fence Installation

BEFORE

AFTER

NJ Route 34 Southbound over NJ Route 18; BPMC 2010
Preventive Maintenance
Traffic Line Re-Striping

BEFORE

AFTER

Klockner Road over Interstate 295; BPMC 2013-1
Preventive Maintenance
Installation of Reflective Delineators

BEFORE

AFTER

NJ Route 55 Northbound over Mays Landing Road; BPMC 2014-1
Preventive Maintenance
Substructure Concrete Repair

BEFORE

AFTER

Squankum Road under NJ Route 18; BPMC 2012
Preventive Maintenance
Waterproofing Epoxy

BEFORE

AFTER

Deal Road over NJ Route 18; BPMC 2010
Preventive Maintenance
Substructure Crack Sealing

Arena Drive under Interstate 295; BPMC 2013-1
Preventive Maintenance
Lubrication of Bearings
Preventive Maintenance – Scope of Work

- Bridge deck sweeping
- Cleaning of scuppers and pipes
- Raised Pavement Marker replacement
- Repair of damaged bridge guide rail and guide rail bridge attachments
- Repair erosion, scour
Average cost per bridge for full preventive maintenance treatment: $125,000
Preventive Maintenance Contracts
Public Communication

- NJDOT Traffic Operations Division consulted for allowable lane closure hours prior to contract advertisement to minimize traffic impacts
- NJDOT Communications and NJDOT Community Relations Divisions consulted prior to construction
NJDOT Communications Office issues a Press Release and notifies media outlets of upcoming contract and construction.

NJDOT Community Relations notifies individual affected townships (mayor, police chief, EMS) of upcoming work.
Press Release
BPMC 2014-2

Work to repair dozens of bridges along I-295 in Camden and Burlington counties to begin
Twenty-seven bridges will receive preventive maintenance

(Trenton) - NJDOT officials today announced the start of a bridge maintenance project that will make repairs to 27 bridges along stretches of I-295 in Camden and Burlington counties.

"The Department is committed to keeping New Jersey’s bridges in a state of good repair," said Acting Commissioner Joseph Bertoni. “Investing in existing assets by doing preventive maintenance promotes safety and extends the useful life of infrastructure before more costly repair or replacement projects are needed.”

To help extend the service life of these bridges, NJDOT will be performing different levels of bridge maintenance work at each location including deck patching, curb repair, expansion joint reconstruction, header reconstruction, sidewalk repair, deck crack repairs, cleaning of drainage systems, power washing, and application of a corrosion inhibitor.

Work also will be performed below each structure, including repairs to abutment walls and piers, epoxy waterproofing, and lubrication of bearings.

NJDOT’s contractor, Nagi Construction, is scheduled to begin work Monday, July 28, starting on structures in Bordentown, with operations progressing southward. Some of the structures carry I-295 over local roads, while some carry local roads over I-295.

To minimize inconvenience for motorists traveling on Route 295 during the busy summer vacation season, there will be no lane closures on I-295 through Labor Day.

Work on Monday through Thursday will be restricted to off-peak hours, mid-morning to mid-afternoon, or overnight hours.
Preventive Maintenance Contracts
Public Communication

- Weekly Traffic Interference Reports sent to NJDOT Traffic Operations Division prior to construction
- Active lane closures are posted on NJDOT 511 System
- Variable Message Boards in area of construction are activated when work zone is active
NJDOT 511 Website
Preventive Maintenance
Bridge Painting

- Allowable painting procedures include:
  - SSPC SP-3 Power Tool Cleaning; Beam Ends
  - SSPC SP-3 Power Tool Cleaning; Entire Bridge
  - SSPC SP-10 Near White Blast; Entire Bridge
Preventive Maintenance
Bridge Painting – Scope of Work

- Substructure concrete repair
- Structural steel repair
- Reset bearings
- Lubricate bearings
- Epoxy Waterproofing
Bridge Painting – Cost

- Average cost per bridge for full bridge painting treatment:

$350,000
Preventive Maintenance
Bridge Painting

- Structure selection based on inspection reports from Structural Evaluation noting paint condition
- Painting contracts coordinated with Preventive Maintenance contracts to avoid duplicate work and fully treat structures
Preventive Maintenance
Bridge Painting

Monmouth Road over NJ Route 18; BPMC 2010, BPC 2013-3
Preventive Maintenance Bridge Painting

Sylvania Ave over Memorial Dr, NJ Transit; BPMC 2012, BPC 2010-3
Bridge Painting
SSPC SP-10 Near White Blast; Full Bridge

BEFORE

AFTER

I-295 over Jacksonville Road
Bridge Painting
SSPC SP-10 Near White Blast; Full Bridge

BEFORE

AFTER

Thomas Street over Columbia Trail
Bridge Painting
SSPC SP-3 Power Tool Cleaning; Full Bridge

BEFORE

AFTER

Lower Ferry Road over I-95
Preventive Maintenance
Bridge Painting

- Upon completion of painting contract, Work Orders are created for each structure noting painting treatment applied.
- Structural Evaluation notified of contract completion for re-evaluation of paint condition and updating of SI&A sheets.
First contract to be introduced in 2016
Joint effort between NJDOT and FHWA to amend NJDOT’s Bridge Preventive Program to include drawbridge repairs
Seventeen operational highway drawbridges under NJDOT jurisdiction
Drawbridge Preventive Maintenance
Scope of Work

- Cleaning & Lubrication of Drawbridge Lift Cables
- Cleaning & Lubrication of Drawbridge Sheave Assembly & Lift Cables
- Drawbridge Pest Control Brush Replacement
- Steel Surface Preparation & Spot Painting
Drawbridge Preventive Maintenance
Scope of Work

- Service Warning Gongs
- Service Junction Boxes
- Service Warning/Barrier Gate
- Mechanical Equipment
- Lubricate Span Lock
- Service Span Lock
- Mechanical & Electrical Equipment
Drawbridge Preventive Maintenance
Scope of Work

- Service Machinery/Motor Brake
- Mechanical & Electrical Equipment
- Service Span Motor
- Service Control System Cabinetry
- Service Louver Assembly
- Service Power Distribution
- Transformers
Preventive Maintenance Increasing Scope of Work

- Scope of work for the Bridge Preventive Maintenance Program increases each year with approval from FHWA.
- Consultation with Structural Evaluation, surrounding states, and product manufacturers for new repair procedures and improved technology.
Preventive Maintenance Considerations for 2016

- New Items for 2016?:
  - Bridge deck diamond grinding
  - Approach slab diamond grinding
  - Thin overlay of bridge decks
  - Carbon wrapping concrete columns
  - Carbon wrapping concrete beams
NJDOT Bridge Preservation and Asset Management Strategies

- Continuous maintenance keeps the bridges of New Jersey in a state of good standing
- Close relationship between NJDOT and FHWA maximizes federal funding
- Coordination between maintenance programs greatly extends the service life of bridges
Develop system to directly input work performed on a structure into the Combis Asset Management System
Develop software to model deterioration and predict preventive maintenance treatment cycles
Secure funding and implement contracts based on model predictions
Thank you!

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