MONMOUTH COUNTY S-31 BRIDGE
OCEANIC BRIDGE
COUNTY ROUTE 8A OVER THE NAVESINK RIVER
TOWNSHIP OF MIDDLETOWN
BOROUGH OF RUMSON

Scoping Study
September 2011

Consultants:
Maguire Group Inc.
Lichtenstein Consulting Engineers
H2L2 Architects/Planners
ARCH², Inc.
Hunter Research, Inc.

Sponsor:
Monmouth County

In Association with:
North Jersey Transportation Planning Authority
New Jersey Department of Transportation
Federal Highway Administration (FHWA)
Local Scoping Program

• Federally Funded through
  – North Jersey Transportation Planning Authority
  – New Jersey Department of Transportation

• Advances the project through
  – Preliminary Engineering
  – National Environmental Policy Act (NEPA) process

• Final Product is the Preferred Alternative
  – NJDOT and FHWA Approval
  – NEPA Clearance
OCEANIC BRIDGE OVER THE NAVESINK RIVER

Project Scoping Process

ENVIRONMENTAL RESOURCES

- Cultural / Historic Resources
- Traffic / Pedestrian Planning
- Noise / Air Evaluation
- Hazardous Substance Screening
- Ecology / Endangered Species
- Water Quality
- Wetlands
- Parklands
- Socio-Economics
- Permits

INTERACTIVE-ITERATIVE PROCESS

Engineering Alternative Analysis

Environmental R.O.W., Utilities Social / Economic Impacts

- Evaluation of Alternatives
- Project Costs

PREFERRED ALTERNATIVE

- Categorical Exclusion Document (CED)
- Section 106 Consultation / MOA
- Section 4f

SOURCE OF DATA

- Field Surveys
- Historic Research
- State & Local Agencies
- Planning Documentation
- Community Participation

AGENCY REVIEWS

- Monmouth County
- NJ Dept. Of Transportation
- North Jersey Transportation Planning Authority
- Federal Highway Administration
- NJ Dept. of Environmental Protection
- NJ State Historic Preservation Office
Project Location & Function

Project Location

- 2,752 L.F.
- Largest Bridge in Monmouth County
- Movable Span at Center
Project Location & Function

Project Function

- 2 TRAVEL LANES (16’ each)
- SIDEWALK (5’ wide)
- NAVIGATIONAL CHANNEL (25’ Vertical Clearance)
Historic Bridge Significance

- Constructed 1939
- Modern Architectural detailing
- Double-leaf bascule span
- Concrete operator’s houses
- Rounded railings with Streamline profiles
- Representative example of prominent design firm’s work (Ash-Howard-Needles & Tammen) the most prolific designers of movable span bridges in the late 1920’s and 1930’s in New Jersey
Historic Resources

Area of Potential Effects - Middletown

OCEANIC BRIDGE OVER THE NAVESINK RIVER
Historic Resources

Area of Potential Effects - Rumson
Historic Summary

• 8 resources eligible for listing in the National Register of Historic Places.
• Alternatives to avoid, minimize or mitigate adverse effects to historic resources.
Existing Physical Condition and Capacity

- Structural Components
  - Substructure
  - Superstructure
  - Deck

- Mechanical System

- Electrical System

- Safety Features

Overall Physical Condition: Serious
Existing Bridge Configuration

BOROUGH OF RUMSON

ELEVATION

TOWNSHIP OF MIDDLETOWN

OCEANIC BRIDGE OVER THE NAIVESINK RIVER
Existing Bridge Configuration

BOROUGH OF RUMSON

TOWNSHIP OF MIDDLETOWN

OCEANIC BRIDGE OVER THE NAVESSINK RIVER
Existing Bridge Configuration

BOROUGH OF RUMSON

ELEVATION

TOWNSHIP OF MIDDLETOWN

OCEANIC BRIDGE OVER THE NAIVESINK RIVER
Substructure

- **Abutments - Poor Condition**
  - Widespread Fine to Medium Horizontal Cracks W/ Efflorescence and Hollow Sounding Concrete (Incipient Spalling and De-lamination)

- **Concrete Pile Bents - Serious Condition**
  - Advanced Column Spalling
  - Widespread Spalls and Cracks in Cap Beams
  - Cap Beams Do Not Rate for HS-25 Design Loading

- **Concrete Piers - Serious Condition**
  - Footing Seal Slab Deterioration at Piers 14 to 18 Found in 1991
  - Many Supporting Timber Piles Subjected to Marine Borer Damage
  - 50% Reduction in Original Pile Diameter
  - Anticipate Pile Capacity Exceeded for HS-25 Design Loading
  - Footing Voids Filled With Tremie Concrete in 1993

OCEANIC BRIDGE OVER THE NAVESINK RIVER
Superstructure

• Concrete T-Beam Spans – Poor Condition
  – Several Large Spalls and Debonded Reinforcing
  – T-Beams Do Not Rate for HS-25 Design Loading
• Steel Deck Girder Spans - Poor Condition
  – Paint System Generally Failed on All Members
  – Many Bearings Leaning and Frozen
  – Widespread Material Losses, Connection Losses and Impacted Rust
  – Suspended Girders, Floorbeams and Flanking Span Stringers Do Not Rate for HS-25 Design Loading
• Bascule Span - Serious Condition
  – Paint System Generally Failed on All Members
  – Extensive severe section loss with holes in all Bascule Span Structural Steel Components Jeopardize the Structural Integrity
  – Girders and Stringers Do Not Rate for HS-25 Design Loading
Deck Evaluation By SWK Pavement Engineering, Inc.

- *Fair* Condition
- Overall Test Results
  - 84% Contamination in Northbound Lane
  - 94% Contamination in Southbound Lane
- NJDOT Bridge Design Manual - Deck Classified as “Category 1 – Extensive Active Corrosion”
Mechanical System

- **Bearings**
  - Extensive Corrosion
  - Web Holes at Bearing Housing Supports

- **Couplings**
  - Obsolete Design

- **Open Gearing**
  - Light to Heavy Corrosion at Racks and Pinions

- **Speed Reducers**
  - Significant Corrosion at Interface of Structural Supports and Concrete

- **Span Motors**
  - Significantly Undersized Per AASHTO Power Requirements
  - Major Mechanical Components Do Not Meet Standards with a Motor Sized to Present AASHTO Requirements

- **Trunnion Assemblies**
  - Corrosion Adjacent to Bascule Girders
  - Trunnions and Trunnion Bearings Significantly Overstressed
Electrical System

• Electric Service
  – Liquid Filled Transformers Exhibit Signs of Leakage and Aging (Possible PCBs)

• Power Distribution and Control
  – Original to Bridge
  – “Live” Front – Danger to Operators and Maintainers

• Control Desk
  – Obsolete, Inoperable and Unreliable Components

• Span Motors
  – Obsolete, Inefficient Design
  – Design Lives Exceeded

• Brakes
  – Obsolete, Replacement Parts No Longer Available

• Lock Motor and Brake
  – Extensive Signs of Aging and Physical Distress

• Limit Switches and Transmitters
  – Original to Bridge, Exhibit Device Failure and/or Have Been Defeated
Safety Features

• Bridge Railings
  – Inadequate as Vehicular Railings
    • Geometrically and Structurally Insufficient
  – Inadequate as Pedestrian and Bicycle Railings
    • Insufficient Height and Rail Openings Larger Than Permitted

• Traffic Gates and Lights
  – Operational, But in Poor Physical Condition

• Resistance Barriers
  – Manually Operated – Requires Second Person for Operation of Bridge
Project Need

• Based on the Above Conditions, the Project is Driven by Three (3) Basic Needs:
  – Improve the Physical Condition of the Bridge to Provide a Reliable Crossing
  – Provide Adequate Structural Capacity
  – Improve Safety Features in Accordance with Present Standards
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<tr>
<th>Date of Repair</th>
<th>Description of Repair</th>
<th>Contractor</th>
<th>Cost</th>
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<td>4/18/2008</td>
<td>Repairs to Concrete Deck and Curb Spalls</td>
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<td>7/15/2008</td>
<td>Replacement of Tide Boards, Removal of Protruding Hardware, and replacement of Navigational Lights</td>
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<td>9/9/2008</td>
<td>Repairs to Deck Spalls, Deck Joints and Curbs. Includes Removal of Deteriorated Concrete/Rebar and Form/Pour Concrete</td>
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<td>Bus Arm Repair-Over Amperage Problem</td>
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<td>Steel Plate Repair to Bascule Span Girders &amp; Counter Weight Balancing</td>
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<td>Concrete T-Beam Repair – Middletown Approach Slabs</td>
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Total $1,328,081.37
Construction Detour

Detour A = 8.3 Miles
Detour B = 9.1 Miles

Oceanic Bridge Over the Navesink River
Upcoming Bascule Span Repairs

1) Purpose
   • Continuing Deterioration of the Steel Members on the Bascule. Analytical Modeling and State of the Art Technology to Assess the Actual Remaining Capacity of Similar Bridge Structures.

2) Scope Of Work
   • Rehabilitation of Bascule Span – Includes Removal of Existing Grid Deck, Roadway Purlins, Stringers, Designated Floor Beams, Catwalk and Span Lock Machinery
   • Construct New Grid Deck, Stringers, Floor Beams, Supporting Steelwork, Catwalk, Structural Steel Strengthening Repairs, Mechanical/Electrical Repairs, Hand/Power Tool Cleaning, and Painting Existing Bascule Pan Steel.
Upcoming Bascule Span Repairs

• Bridge Closed: October 17, 2011
  – Detour in place.

Bridge Re-opened: May 20, 2012
Project Completion: June 10, 2012

Navigational Requirements
• One Leaf Operation @ all times

Monmouth County
• Sign and Implement Detour
• October 17 thru May 20, 2012

Result –
• Repairs will Allow Load Posting to be Increased.
Alternatives Development

I - No Build
Rehabilitation
• II - Rehabilitation
• IIA - Rehabilitation & Replace Bascule Span Replacement on Existing Alignment
• IIIA - High Level – Fixed
• IIIB - Low Level – Movable Replacement on New Alignment
• IVA - High Level – Fixed
• IVB - Low Level – Movable
V - Remove Bridge
Alternative II, IIA & IIIB
(Rehabilitation or Replacement alternatives on Existing Alignment) Low Level Movable Bridge
Alternative IIIA
(Replacement Alternative on Existing Alignment)
High Level Fixed Span Bridge
Alternative IVA
(Replacement Alternative on New Alignment)
High Level Fixed Span Bridge
Alternative IVB
(Replacement Alternative on New Alignment)
Low Level Movable Bridge
### DRAFT SUMMARY MATRIX

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<tr>
<th>Alternative</th>
<th>I No Build</th>
<th>II Rehabilitation</th>
<th>IIA Rehabilitation (Replace Bascule Span)</th>
<th>IIIA Replace Bridge Existing Alignment (High Level Fixed)</th>
<th>IIIB Replace Bridge on Existing Alignment (Low Level Movable)</th>
<th>IVA Replace Bridge New Alignment (High Level Fixed)</th>
<th>IVB Replace Bridge New Alignment (Low Level Movable)</th>
<th>V Remove Bridge</th>
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<tr>
<td>Meets Project Need</td>
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<td>Architectural Design Mitigation</td>
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<td>Minimal (Temporary)</td>
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<td>Operating Costs</td>
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**OCEANIC BRIDGE OVER THE NAVESINK RIVER**
Bridge Architecture

Photos of Existing Bridge
Bridge Architecture – Low Alternatives

Retaining Wall

OCEANIC BRIDGE OVER THE NAVESINK RIVER
Bridge Architecture – Low Alternatives

Control House
Bridge Architecture – Low Alternatives

Alternative Railing
Bridge Architecture – Low Alternatives

Architectural Rendering
Bridge Architecture – High Alternatives

Architectural Rendering
Summary

1. Rehabilitation or Replacement
2. Horizontal Alignment
   a. Existing – 30 month detour
   b. New – 6 month detour
3. Vertical Alignment
   a. Low Level Movable
   b. High Level Fixed
4. Project Costs
5. Mitigate Historic Impacts
6. Public Input
7. Develop Initially Preferred Alternative
   Municipal Resolutions