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
ARCH^2, 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

Project Scoping Process

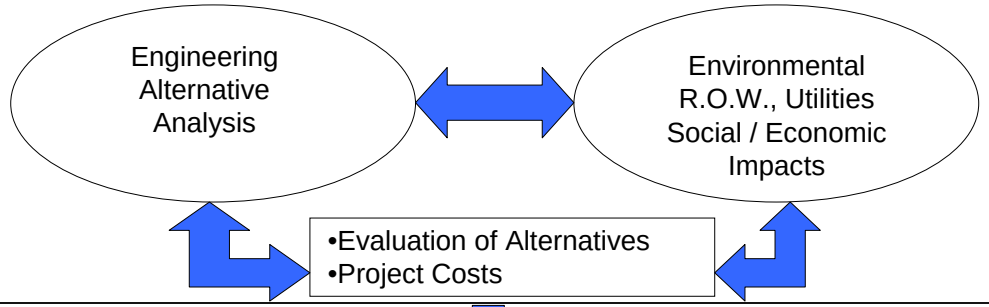
ENVIRONMENTAL RESOURCES

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

SOURCE OF DATA

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

INTERACTIVE-ITERATIVE PROCESS



AGENCY REVIEWS

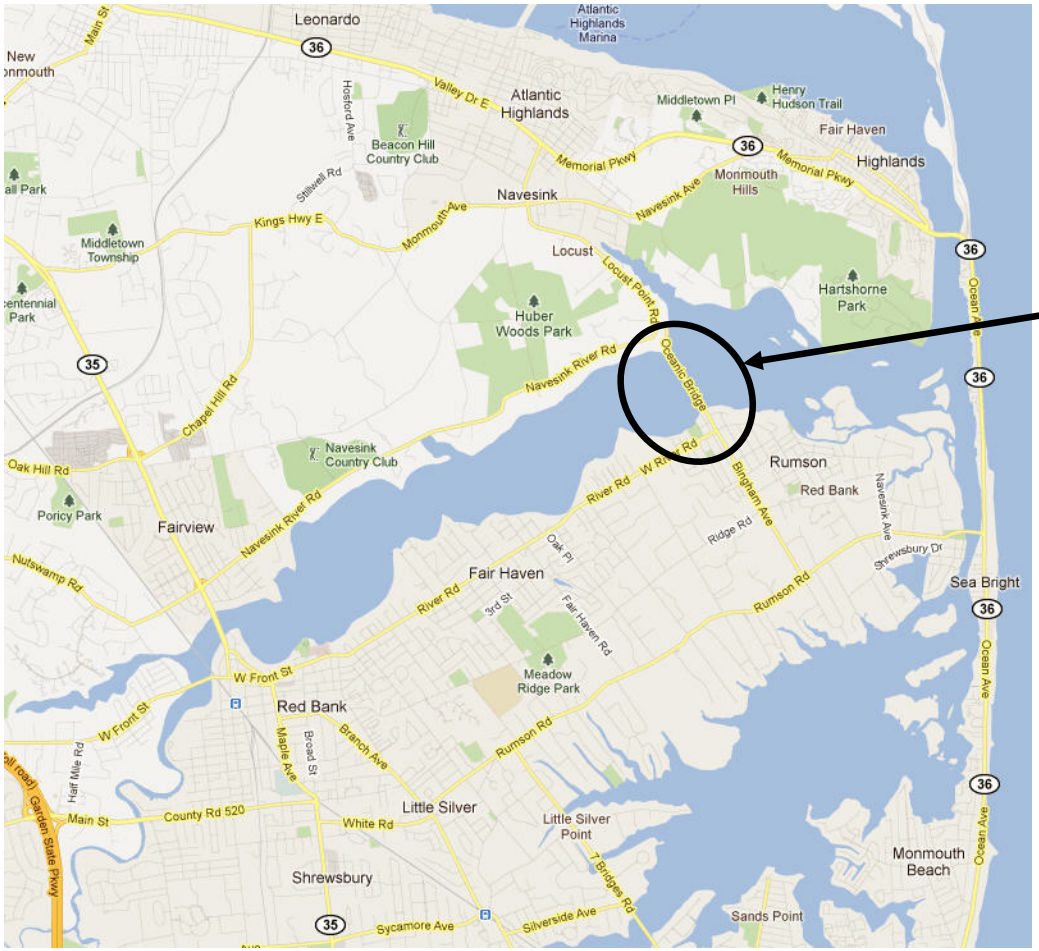
- Monmouth County
- NJ Dept. Of Transportation
- North Jersey Transportation Planning Authority
- Federal Highway Administration
- NJ Dept. of Environmental Protection
- NJ State Historic Preservation Office

PREFERRED ALTERNATIVE

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

Project Location & Function

Project Location



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)

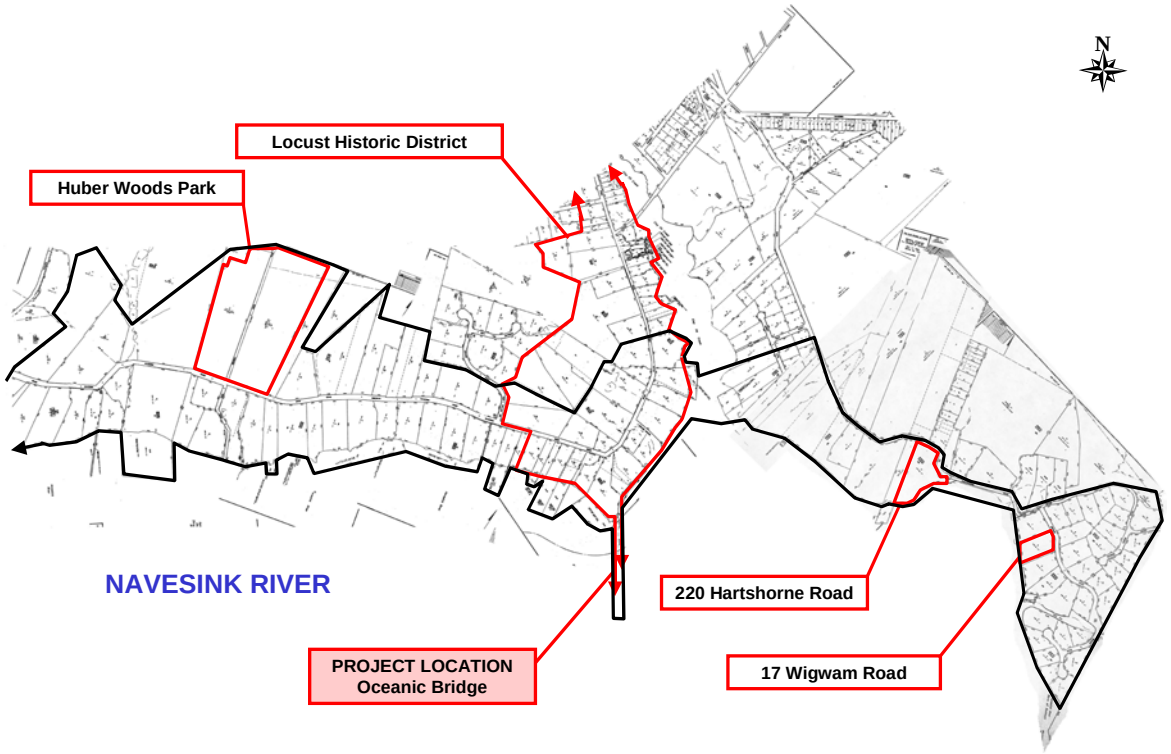
NAVIGATIONAL CHANNEL
(25’ Vertical Clearance)

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

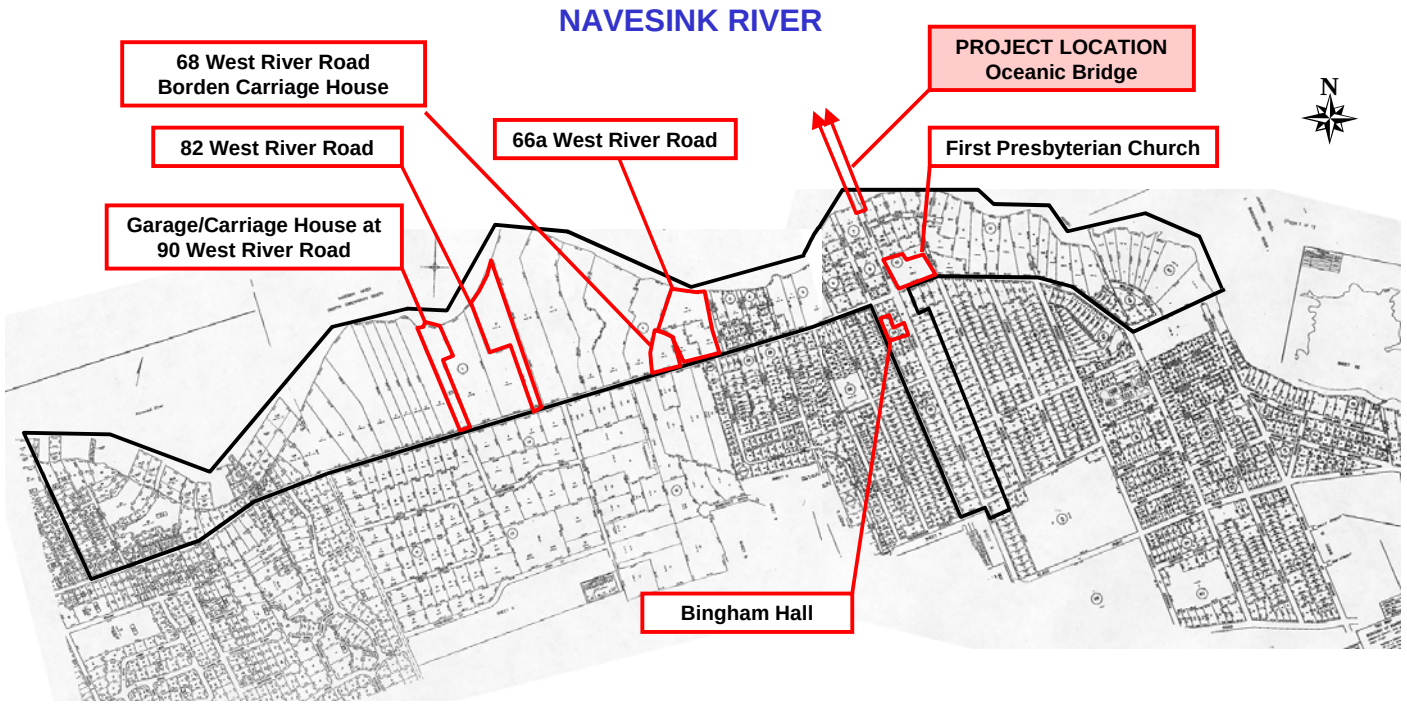
OCEANIC BRIDGE OVER THE NAVESINK RIVER

Historic Resources



Area of Potential Effects - Middletown

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.

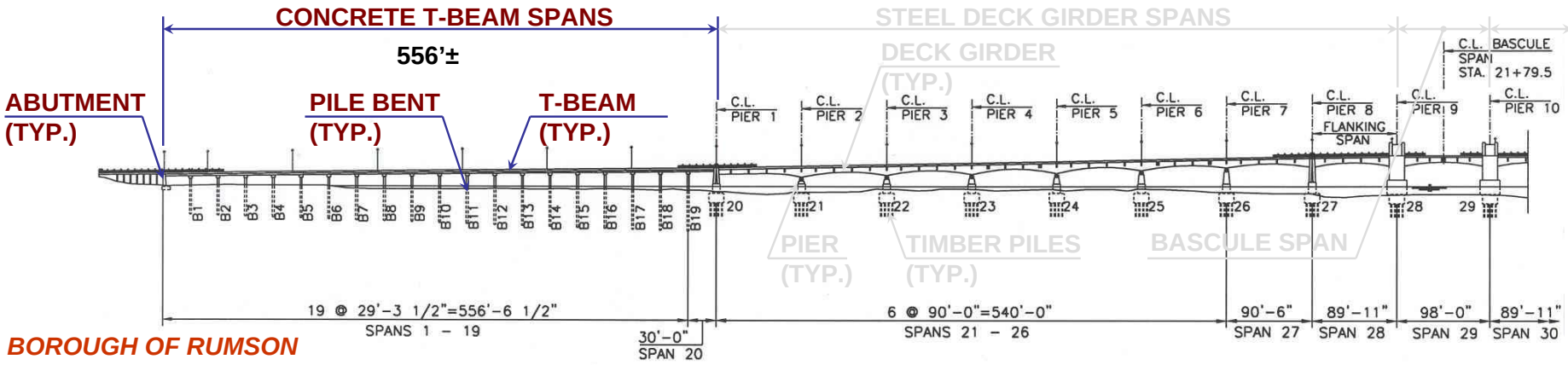
Existing Physical Condition and Capacity

- Structural Components
  - Substructure
  - Superstructure
  - Deck
- Mechanical System
- Electrical System
- Safety Features

Overall Physical Condition
Serious

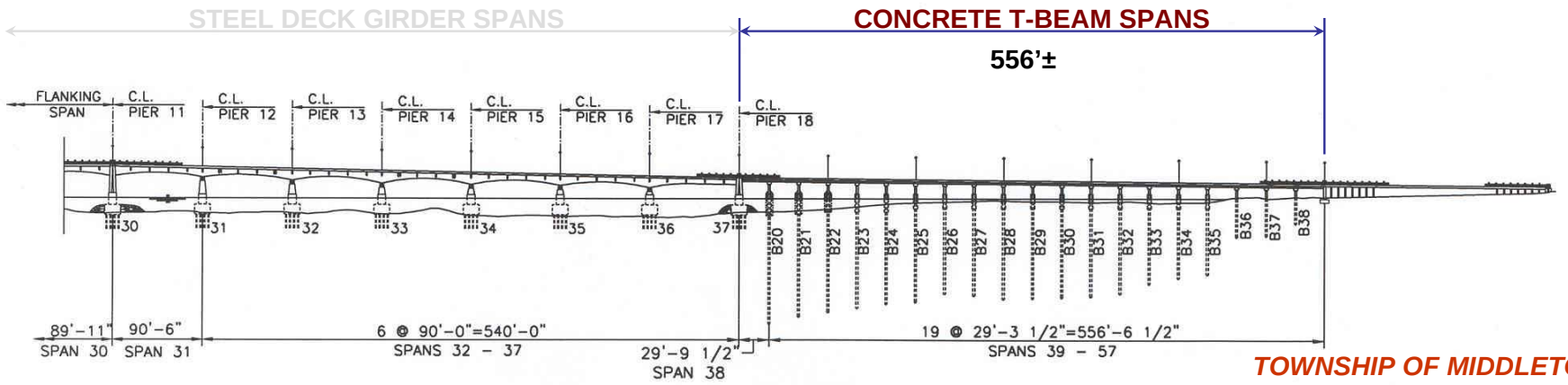
OCEANIC BRIDGE OVER THE NAVESINK RIVER

Existing Bridge Configuration



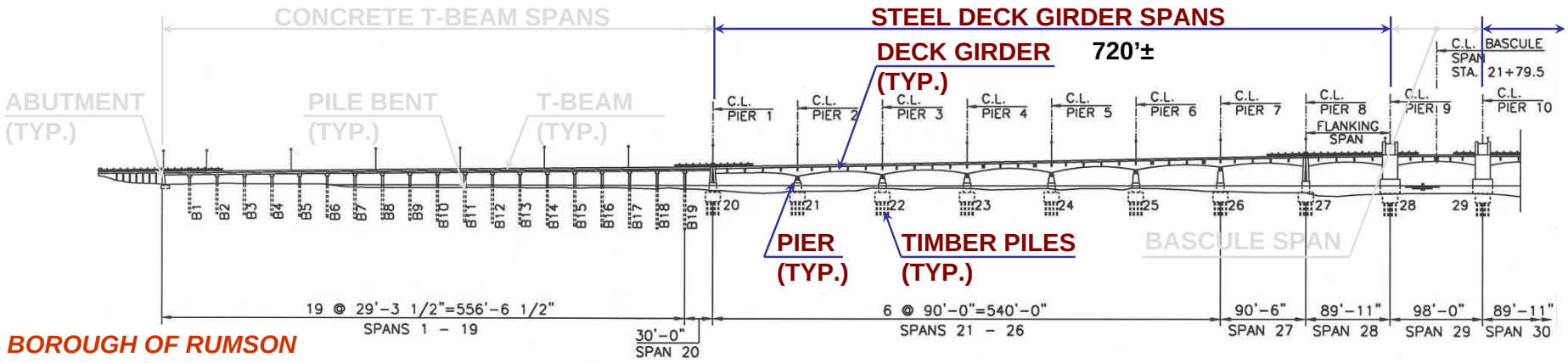
BOROUGH OF RUMSON

ELEVATION



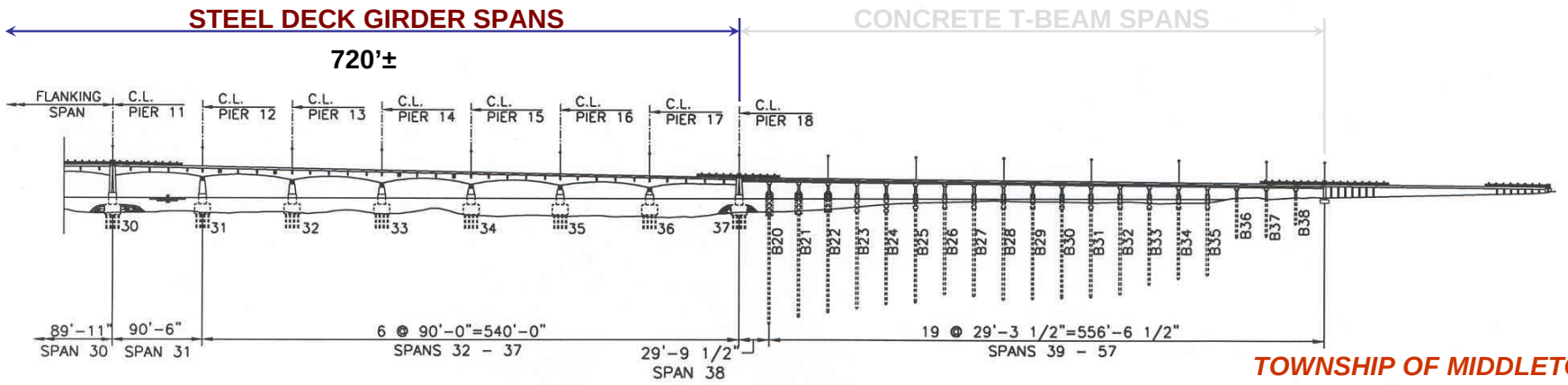
TOWNSHIP OF MIDDLETOWN

Existing Bridge Configuration



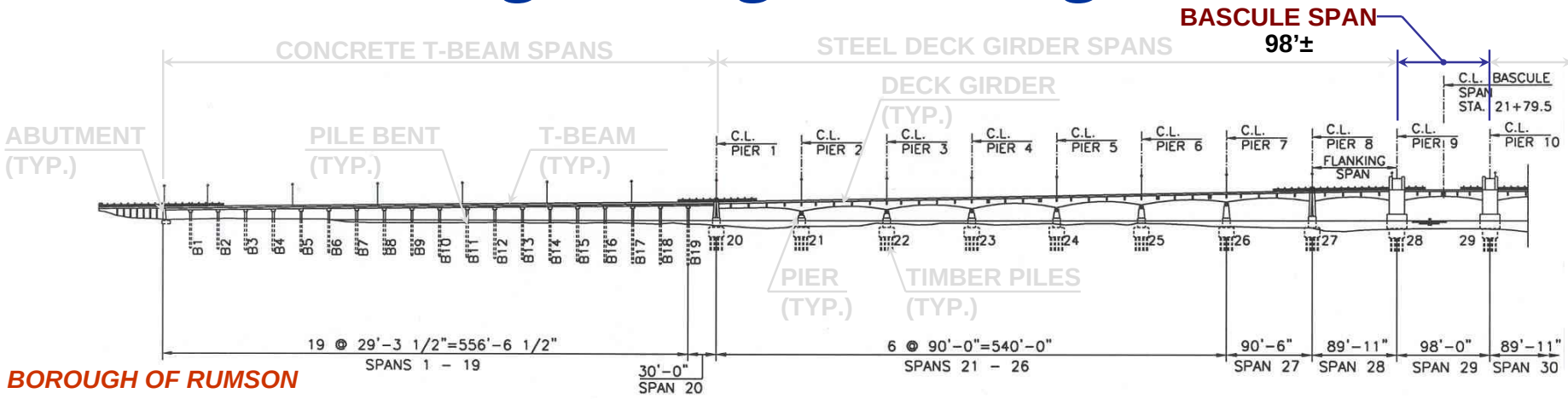
BOROUGH OF RUMSON

ELEVATION



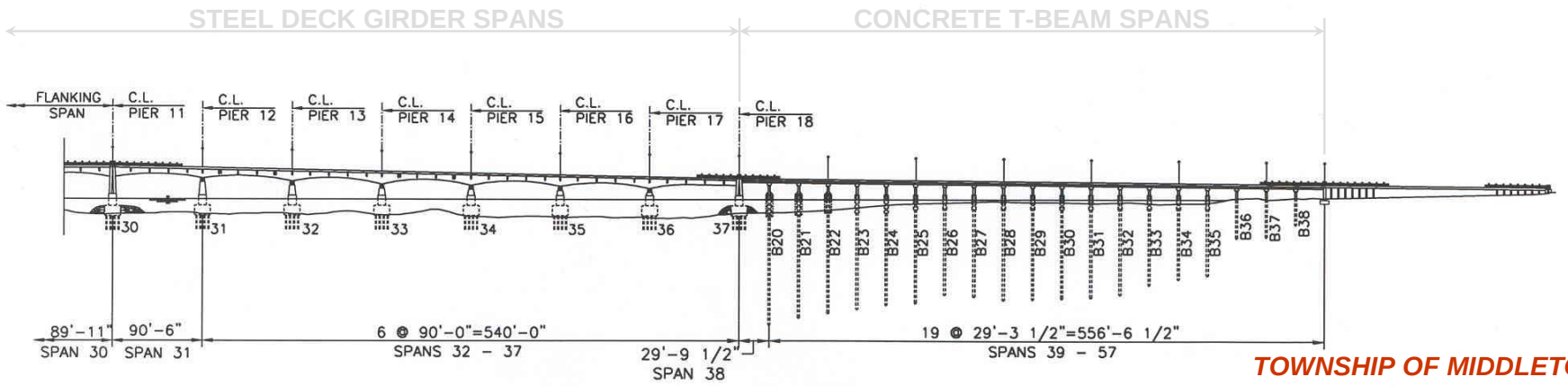
TOWNSHIP OF MIDDLETOWN

Existing Bridge Configuration



BOROUGH OF RUMSON

ELEVATION



TOWNSHIP OF MIDDLETOWN

OCEANIC BRIDGE OVER THE NAVESINK 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

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

- 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

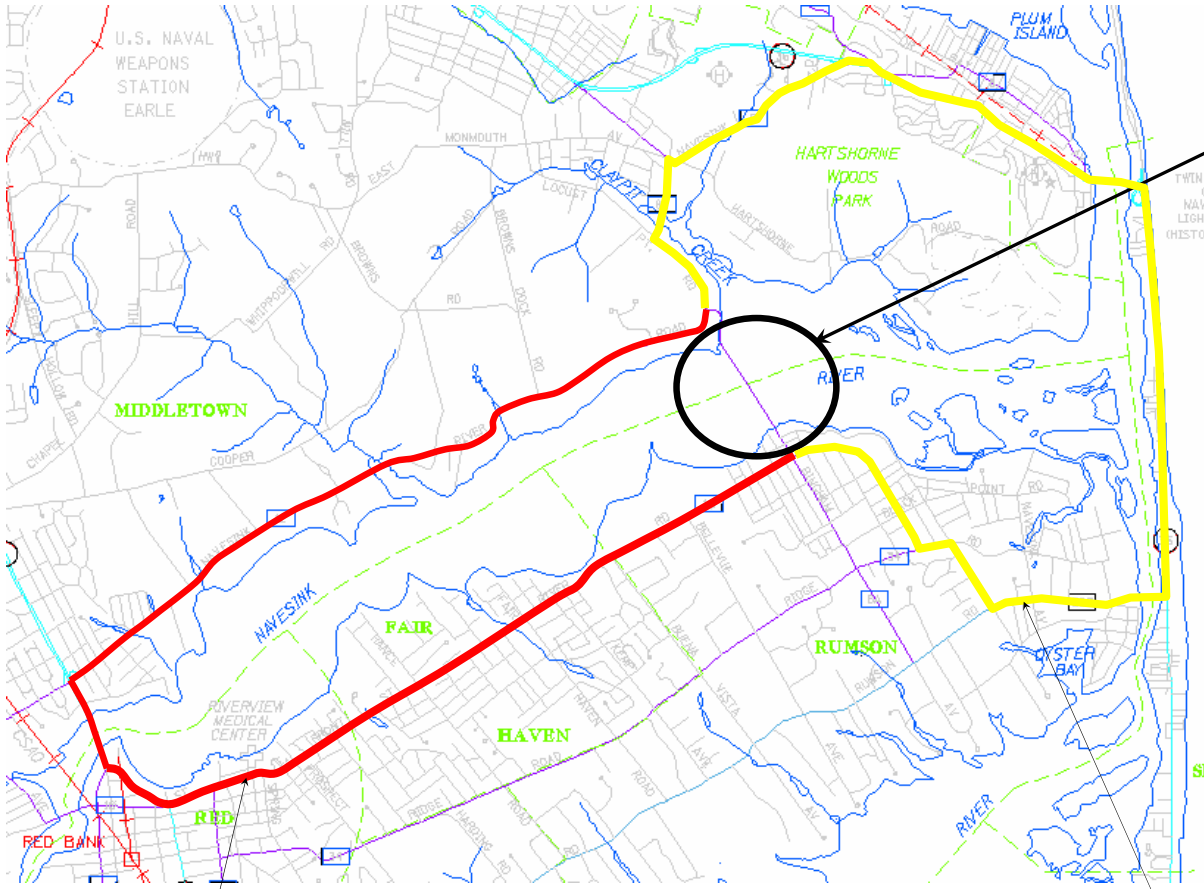
Project Need

- 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

Bridge Repair Log

Date of Repair	Description of Repair	Contractor	Cost
4/18/2008	Repairs to Concrete Deck and Curb Spalls	Monmouth County Highway Department	$7,678.00
7/15/2008	Replacement of Tide Boards, Removal of Protruding Hardware, and replacement of Navigational Lights	IEW Construction Group	$12,000.00
9/9/2008	Repairs to Deck Spalls, Deck Joints and Curbs. Includes Removal of Deteriorated Concrete/Rebar and Form/Pour Concrete	H&G Contractors	$652,947.00
12/8/2008	Snooper: Inspection Work & Miscellaneous Repairs	IEW Construction Group	$23,282.65
4/14/2009	Gusset Plate and Diagonal Work	IEW Construction Group	$5,504.00
5/13/2009	Snooper: Inspection Work – Removal of Catwalk	IEW Construction Group/Bridge Department	$18,537.50
5/13/2009	Replacement of Tide Boards, Removal of Protruding Hardware, and replacement of Navigational Lights	IEW Construction Group	$8,186.00
6/12/2009	Bascule Span Balancing – Plate Installation on Toe Floor Beam	IEW Construction Group	$27,761.81
7/1/2009	Gusset Plate and Angle Repairs	IEW Construction Group	$22,846.51
9/9/2009	South Approach Void - Sinkhole	Monmouth County Highway Department	$15,000.00
9/21/2009	Snooper: Inspection Work	IEW Construction Group	$9,763.18
10/13/2009	North Bascule Leaf Binding – Buckled Stringer – Grinding Repair	Monmouth County Bridge Department	$10,000.00
10/27/2009	Snooper: Inspection Work	IEW Construction Group	$2,316.00
11/3/2009	North Bascule Leaf Binding – Buckled Stringer – Grinding Repair	Monmouth County Bridge Department	$6,500.00
12/18/2009	H&H Design Repair	H&H	$54,350.00
12/7/20	IIS: Monitoring and Design	IIS	$143,100.00
12/18/2009	Snooper: Inspection Work/Monitoring Devices	IEW Construction Group	$54,797.31
12/27/2009	Bus Arm Repair-Over Amperage Problem	Monmouth County Bridge Department	$7,500.00
1/5/2010	Timber Blocking – Bascule Span Stringers and Shim Live Load Anchors – IIS Testing	IEW Construction Group	$32,824.11
1/25/2010	Snooper: Inspection Work/Span Locks/ H&H - IIS Testing	IEW Construction Group	$3,361.00
6/25/2010	Steel Plate Repair to Bascule Span Girders & Counter Weight Balancing	IEW Construction Group	$191,217.17
7/27/2010	Snooper: Inspection Work/ Span Locks H&H – IIS Testing	IEW Construction Group	$4,206.00
9/17/2010	Concrete T-Beam Repair – Middletown Approach Slabs	IEW Construction Group	$9,983.81
10/18/2010	Snooper: Inspection Work/Span Locks/H&H – IIS Testing	IEW Construction Group	$4,419.32
		Total	**$1,328,081.37**

Construction Detour



Project Location

Detour A = 8.3 Miles

Detour B = 9.1 Miles

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

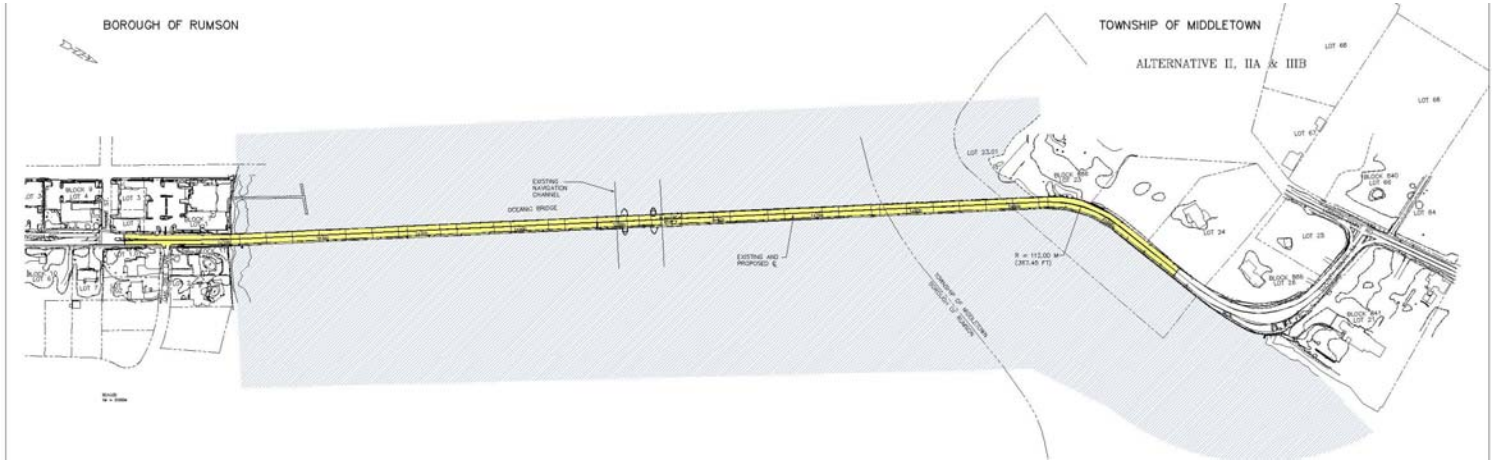
Replacement on New Alignment

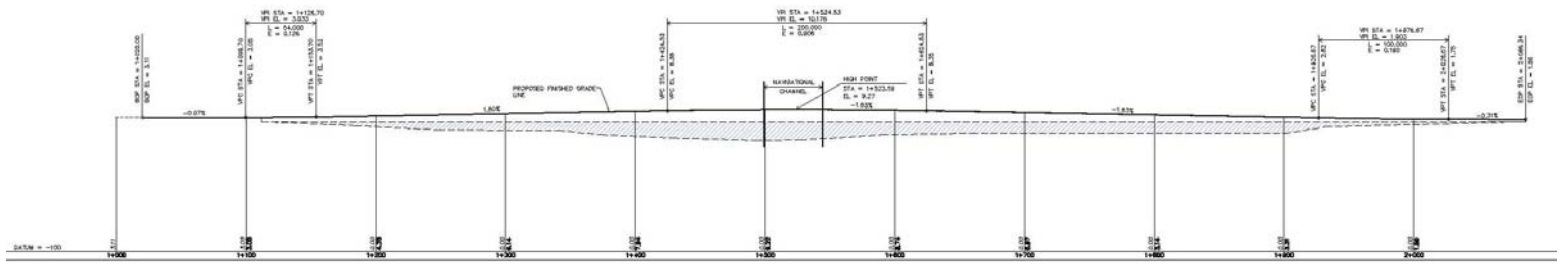
- IVA - High Level – Fixed
- IVB - Low Level – Movable

V - Remove Bridge

Alternative II, IIA & IIIB

(Rehabilitation or Replacement alternatives on Existing Alignment) Low Level Movable Bridge



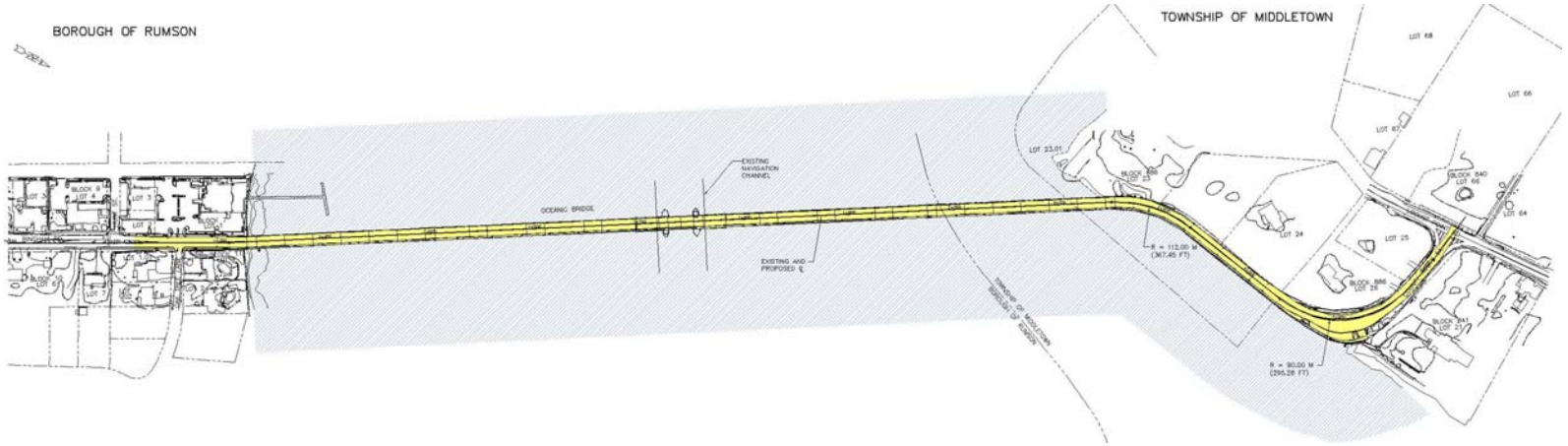


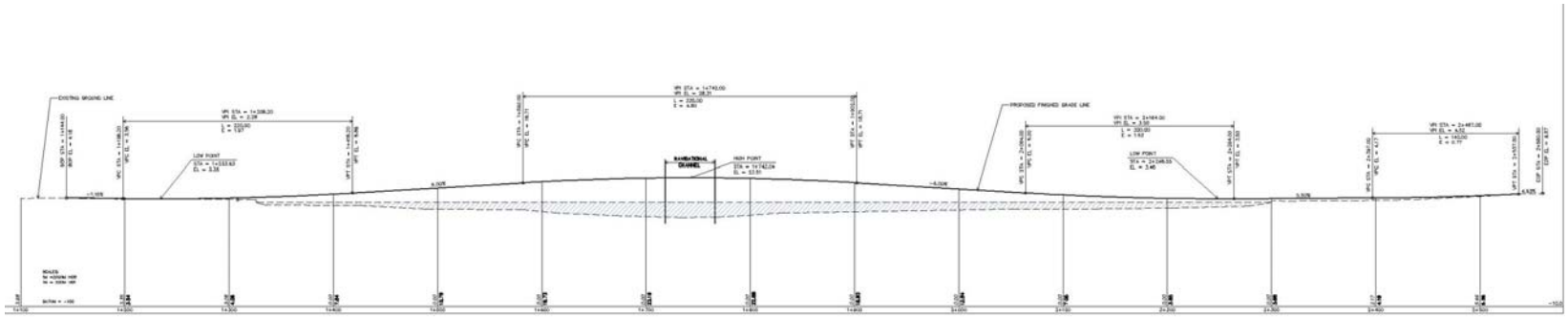
OCEANIC BRIDGE OVER THE NAVESINK RIVER

Alternative IIIA

(Replacement Alternative on Existing Alignment)

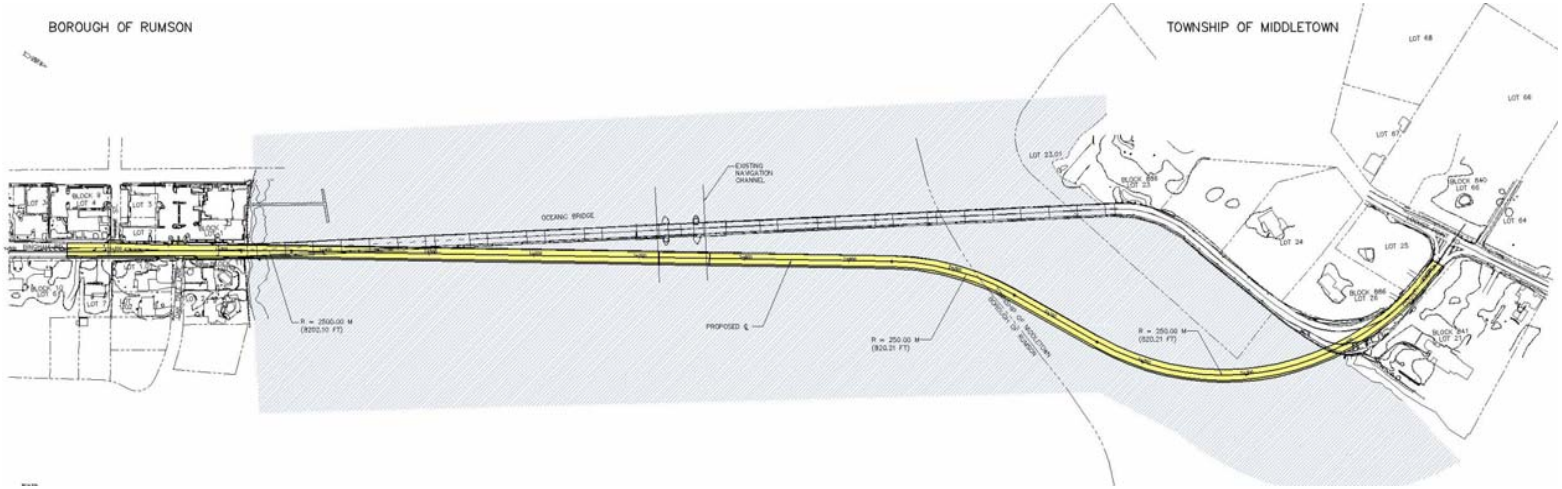
High Level Fixed Span Bridge

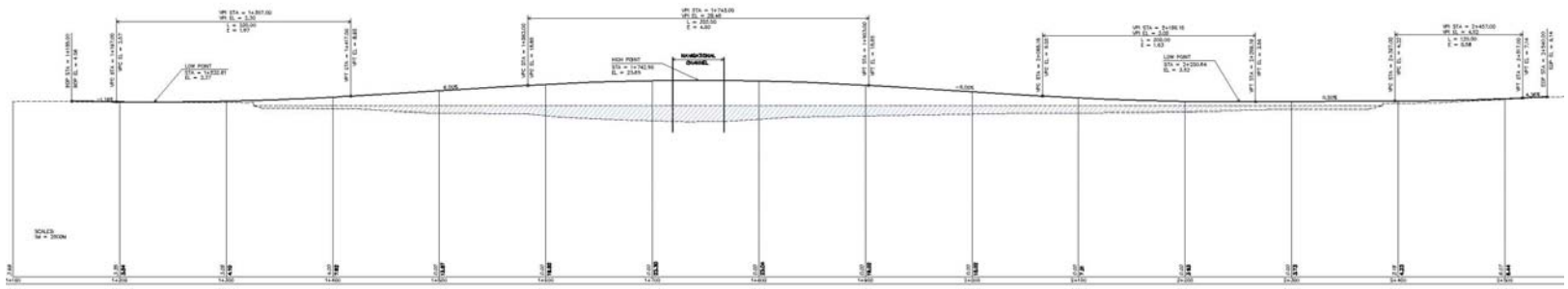




OCEANIC BRIDGE OVER THE NAVESINK RIVER

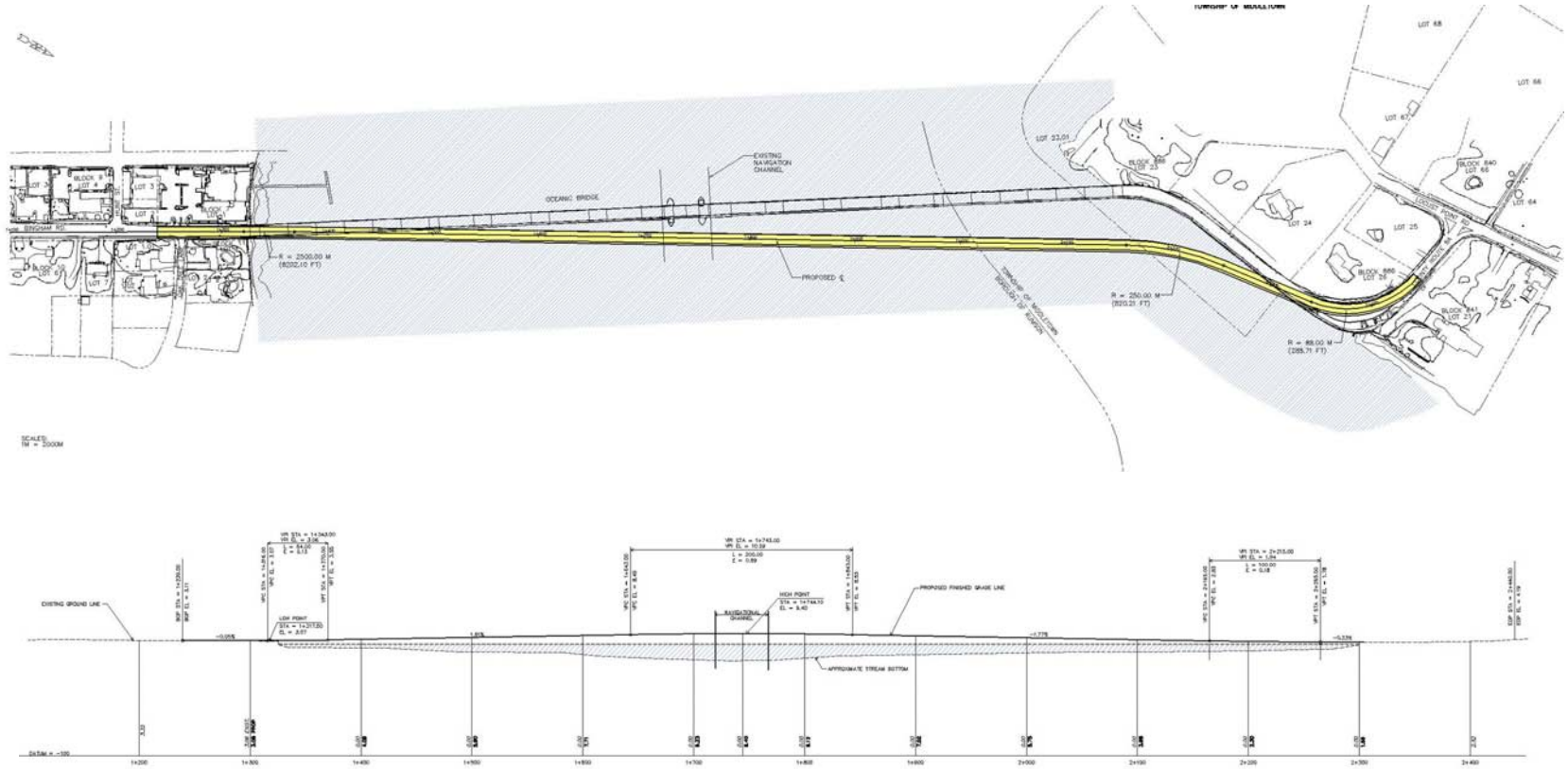
Alternative IVA
(Replacement Alternative on New Alignment)
High Level Fixed Span Bridge





OCEANIC BRIDGE OVER THE NAVESINK RIVER

Alternative IVB
(Replacement Alternative on New Alignment)
Low Level Movable Bridge



OCEANIC BRIDGE OVER THE NAVESINK RIVER

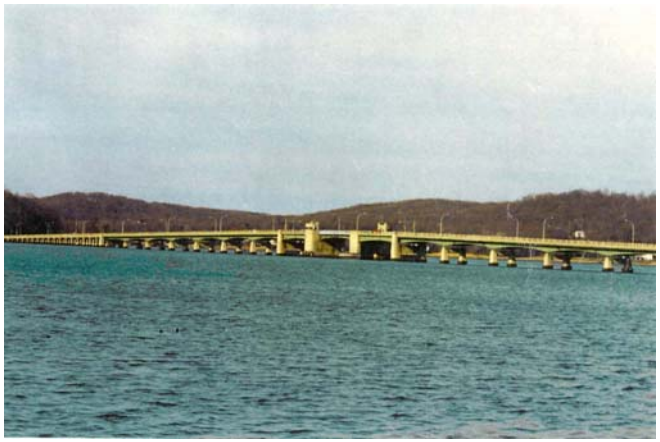
Alternatives shaded in yellow are not feasible

DRAFT SUMMARY MATRIX

Alternative	I No Build	II Rehabilitation	IIA Rehabilitation (Replace Bascule Span)	IIIA Replace Bridge Existing Alignment (High Level Fixed)	IIIB Replace Bridge on Existing Alignment (Low Level Movable)	IVA Replace Bridge New Alignment (High Level Fixed)	IVB Replace Bridge New Alignment (Low Level Movable)	V Remove Bridge
Meets Project Need	No	No	No	No	No	Yes	Yes	No
Historic Impact	None	No Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect
Architectural Design Mitigation	N/A	Good	Good	Poor	Good	Poor	Good	N/A
Environmental Impacts	None	Minimal (Temporary)	Minimal (Temporary)	Minor	Minor	Minor	Minor	Minimal (Temporary)
Right-of-Way Takings	None	None	None	None	None	None	None	None
Construction Cost	$0	$37,500,000	$38,800,000	$34,500,000	$37,000,000	$41,500,000	$37,000,000	$8,000,000
Life Cycle Cost	$46,800,000	$29,550,000	$27,550,000	$8,000,000	$10,000,000	$8,000,000	$10,000,000	$0
Operating Costs	$10,650,000	$10,650,000	$10,650,000	$0	$10,650,000	$0	$10,650,000	$0
TOTAL COST	*$57,450,000*	*$77,700,000*	*$77,000,000*	*$42,500,000*	*$57,650,000*	*$49,500,000*	*$57,650,000*	*$8,000,000*
Detour (Months)	N/A	12: Closed 18: 1-Way	12: Closed 18: 1-Way	30: Closed	30: Closed	6: Closed	6: Closed	Indefinite
Construction Duration	NA	2 ½ years	2 ½ years	2 ½ years	2 ½ years	2 years	2 ½ years	N/A

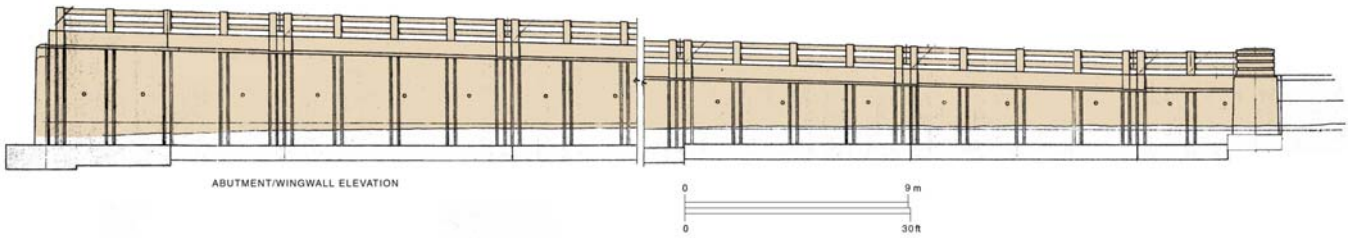
Bridge Architecture

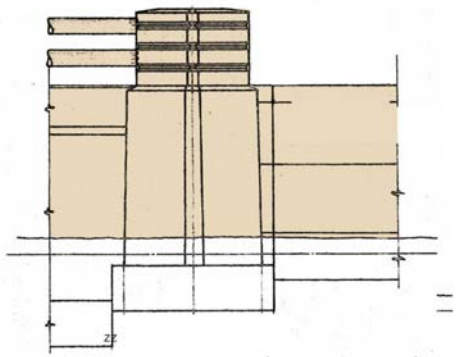
Photos of Existing Bridge

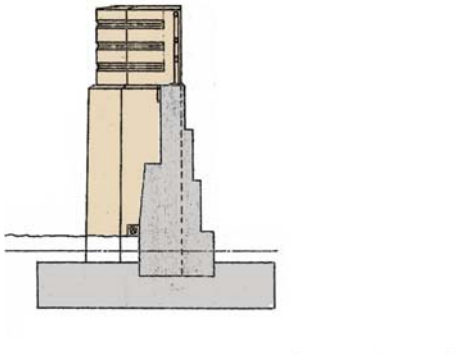


Bridge Architecture – Low Alternatives

Retaining Wall

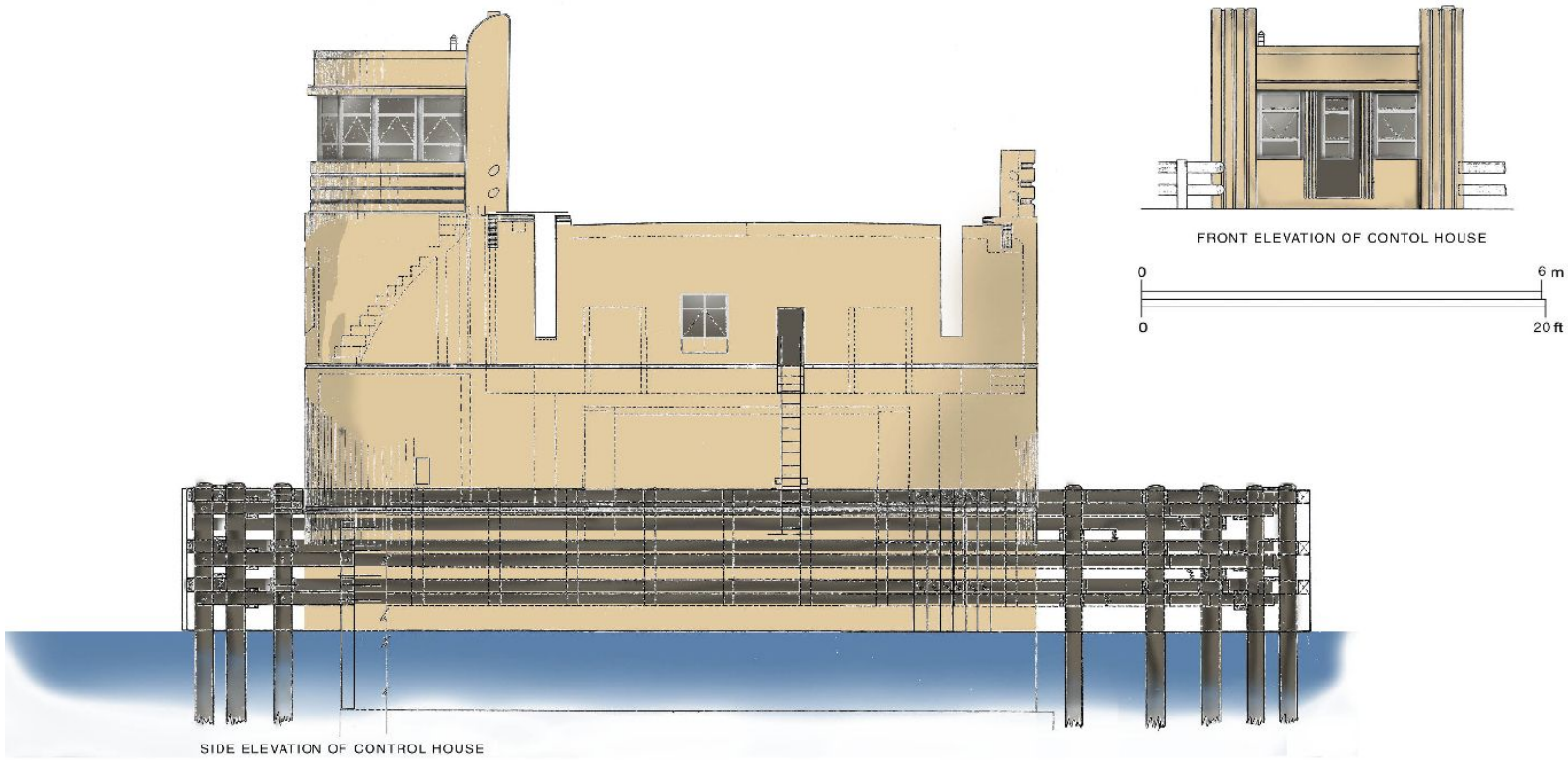






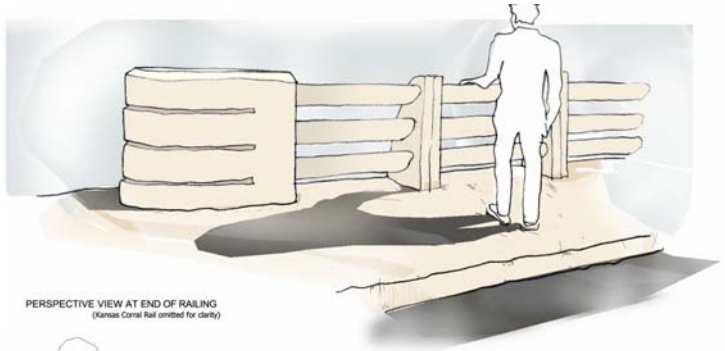
Bridge Architecture – Low Alternatives

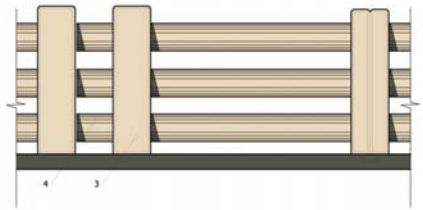
Control House



Bridge Architecture – Low Alternatives

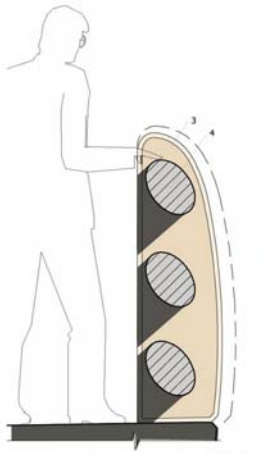
Alternative Railing



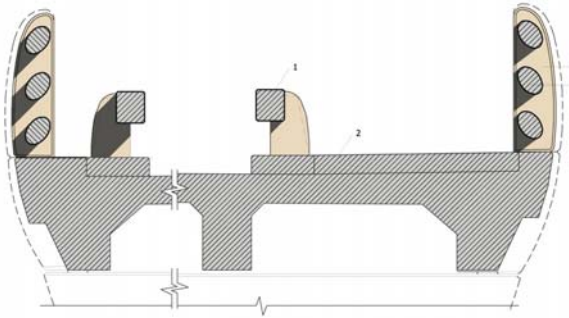


ELEVATION at WALKWAY

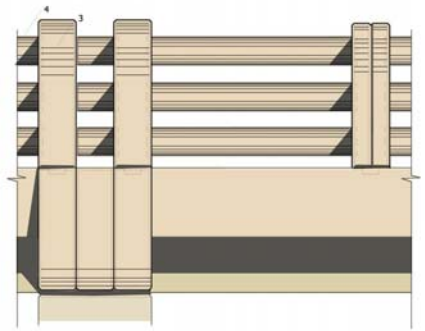
1 Modified Kansas Corral Rail
2 6' - Wide Concrete Pedestrian Walkway
3 Replicated Reinforced Concrete Post
4 Replicated Reinforced Concrete Rail



POST at BENT



SECTION at INTERMEDIATE POST



EXTERIOR ELEVATION

Bridge Architecture – Low Alternatives

Architectural Rendering

OCEANIC BRIDGE OVER THE NAVESINK RIVER

Bridge Architecture – High Alternatives

Architectural Rendering

OCEANIC BRIDGE OVER THE NAVESINK RIVER

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