

# Monmouth County Bridge S-17

On County Route 10, West Front Street over the Swimming River

In the Township of Middletown and the Borough of Red Bank

Monmouth County, New Jersey

## Public Information Center #4 & 5

June 17, 2008 (Middletown)

June 19, 2008 (Red Bank)

Previous Meetings:

Middletown: June 23, 2004

February 27, 2006

Red Bank: June 29, 2004





Map Reference: Hagstrom Maps, Monmouth County

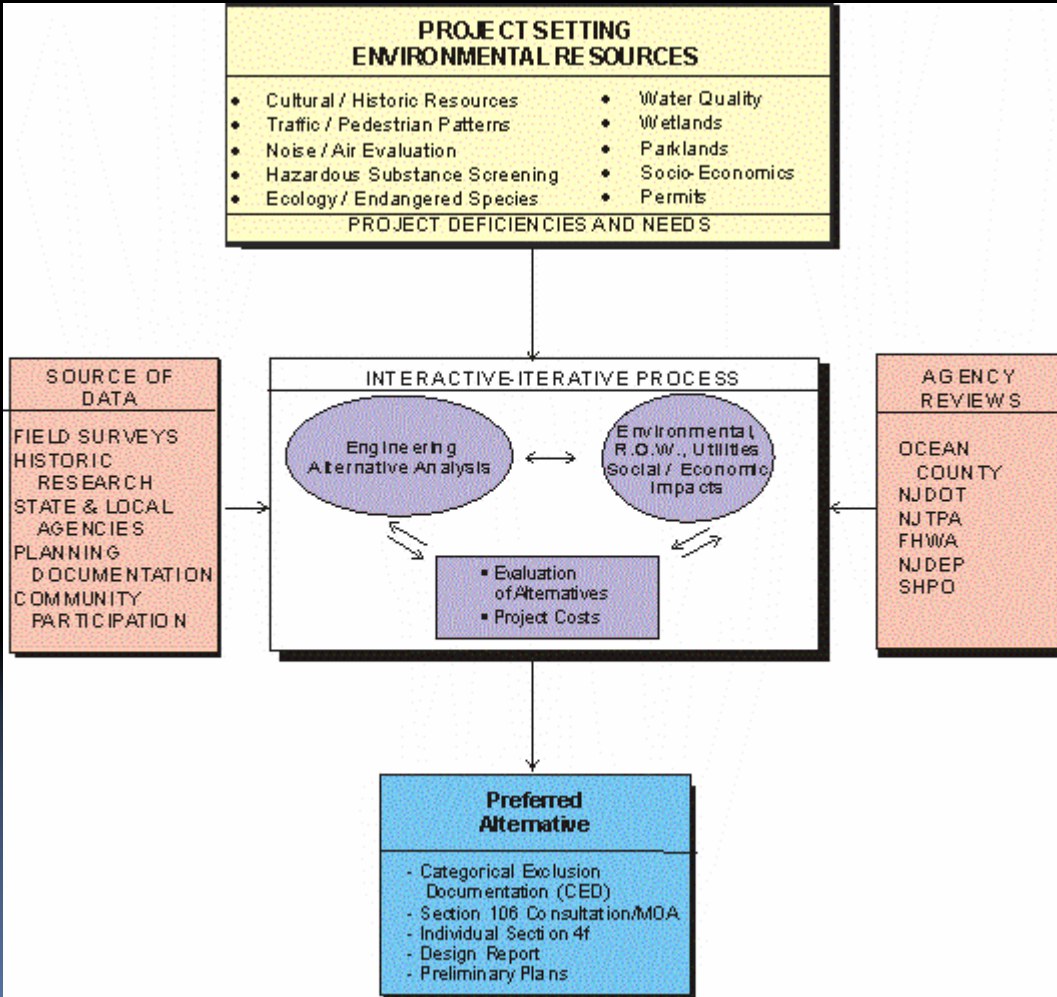
# Project Location Map

## Scoping Study for Improvements Monmouth County Bridge S-17

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey

JUNE 2008

(not to scale)

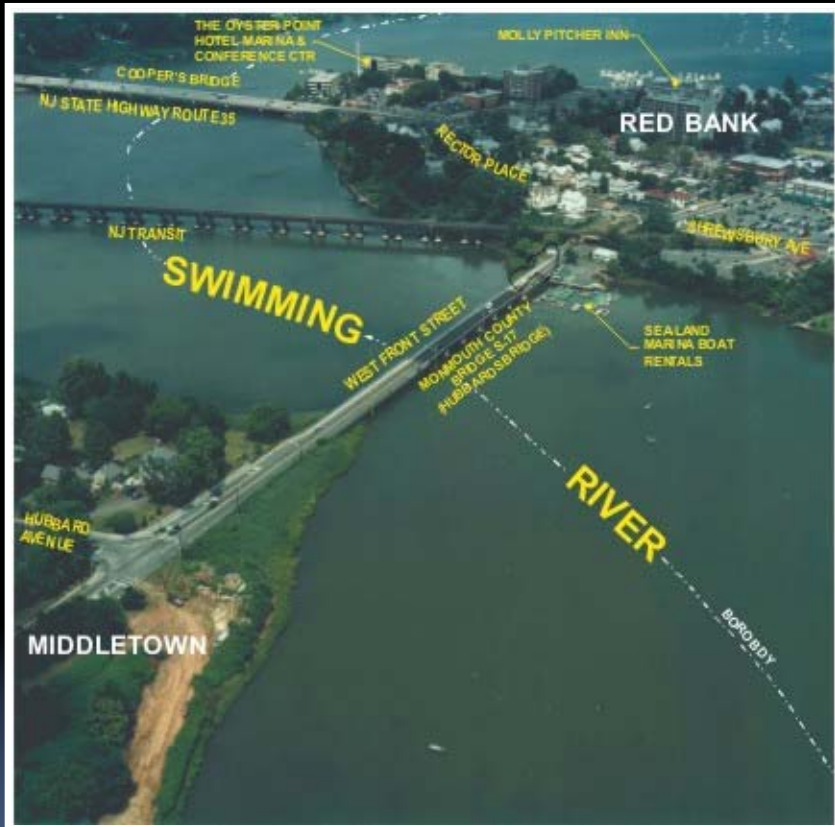


# PROJECT SCOPING PROCESS

# Project Need Statement

The statement of project need can be stated as follows:

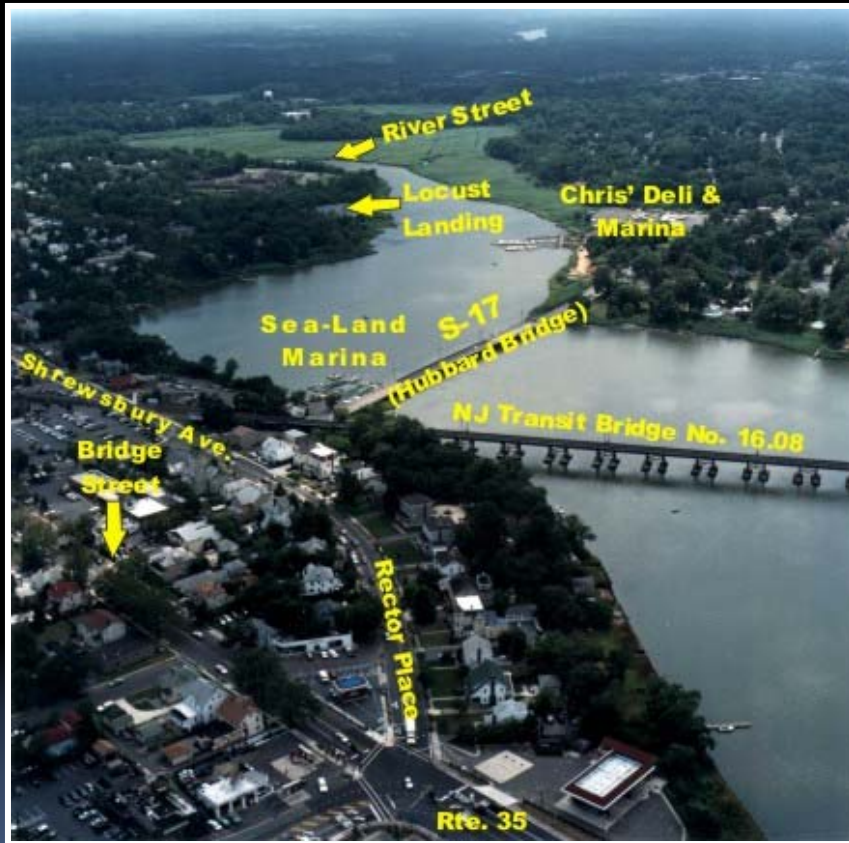
Monmouth County in conjunction with the North Jersey Transportation Planning Authority and New Jersey Department of Transportation are looking for feasible alternatives for improvements to Monmouth County Bridge S-17 and its roadway approaches. The SI&A Sheet dated July 11, 2000 indicates a structural sufficiency rating of 7.0 out of a possible 100. Since the sufficiency rating is extremely low, the bridge is classified as structurally deficient and is eligible for the NJDOT "select list". This list identifies the most deficient bridges in the state. Also, since the sufficiency rating is below 50, the bridge is eligible for federal funding for replacement. Due to the low appraisal item ratings, the bridge is also considered functionally obsolete with inadequate deck geometry. Monmouth County Bridge S-17 carries West Front Street (C.R. 10) over the Swimming River. This roadway is a primary connector from Downtown Red Bank to points west with an ADT of 21,321 vehicles and over 1200 vehicles during peak hours. The roadway network and traffic signals in the surrounding area are currently operating at or near capacity, which places an onus on traffic maintenance. The approach roadway has geometric deficiencies with limited sight distance for driveway operations. The project goal is to provide a solution that will improve the structural deficiencies, traffic operations, and safety to the traveling public and minimize impacts to the environment, as well as the surrounding community.



## PROJECT CONSTRAINTS

Photo No. 1  
Aerial Photo of project site (looking east)

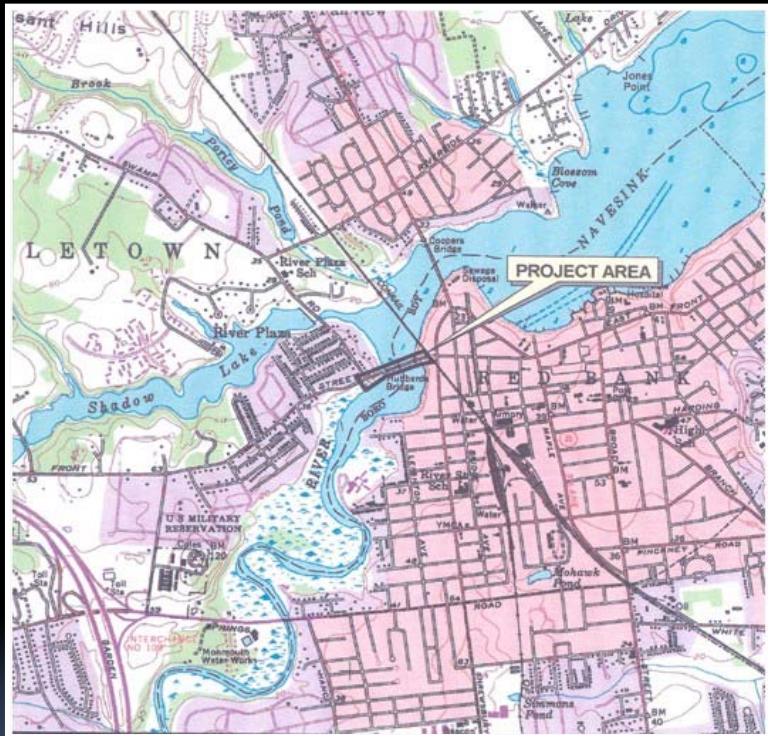
EXISTING  
CONDITONS



## PROJECT CONSTRAINTS

Photo No. 2  
Aerial Photo of project site (looking west)

EXISTING  
CONDITONS



**LEGEND:**

NJ State Plane Coordinates (NAD83 ft.)  
at the approximate center of site:

North: 552,754'  
East: 609,293'



SOURCE:  
89-Mapped 7.5 Minute Color Topographic Images of New Jersey  
United States Geological Survey (USGS), Digital Raster Graphics  
(DRG) Topographic Series Map, Long Branch N.J. Quadrangle,  
UNOS, Reston, Va., January 3, 1995.

**USGS TOPOGRAPHIC MAP**

Monmouth County Bridge S-17  
Township of Middletown &  
Borough of Red Bank  
Monmouth County, New Jersey

ASGECI Project #2032

AMY S. GREENE  
ENVIRONMENTAL CONSULTANTS, INC.

# Bridge Statistics/History

- Existing bridge was constructed in 1921 to replace an existing structure
- The overall structure measures 339'-4" from abutment face to abutment face.
- The bridge roadway width was 21.7' originally and widened to 24' as part of the temporary deck replacement.
- A walkway is attached to the north side of bridge.
- The substructure consists of seven (7) concrete, pile-supported piers with the end concrete piers identified as the east and west abutments. A major two million dollar substructure repair contract issued by the County in 1992 removed the old stone (circa 1921) and concrete (circa 1950) approach walls and installed steel sheet piling to support the approach roadway embankment. This contract also included roadway approach work and concrete repairs to the piers.
- A 1.1 million dollar emergency deck replacement was performed in 2004. The existing steel girder bridge was demolished and replaced with a temporary prefabricated modular steel truss.

# Bridge Condition

## SI&A Sheet dated July 11,2000 (prior to deck replacement)

This form indicates a structural sufficiency rating of 7.0 out of a possible 100. Since the sufficiency rating is extremely low, the bridge is classified as structurally deficient and is eligible for the NJDOT "select list". This list identifies the most deficient bridges in the state. Also, since the sufficiency rating is below 50, the bridge is eligible for federal funding for replacement. Due to the low appraisal item ratings, the bridge is also considered functionally obsolete.

## Historic Significance

Monmouth County Bridge S-17 was determined not eligible for listing on the National Register of Historical Places in the 1994 A.G. Lichtenstein & Associates' New Jersey Historic Bridge Survey. The New Jersey State Historic Preservation Officer (SPHO) concurred with the findings.

# Superstructure

## Inspection Report & Priority I Repair Memorandum (November 2001)

(Prior to deck replacement.) Indicated the bridge as in critical condition mainly due to advanced deterioration of the steel superstructure components. A priority repair memorandum was issued on November 19, 2001, subsequent to the bridge inspection in November, 2001. The memorandum addressed the most significant deficiencies, including failure of the open grid deck and piggyback stringers at the east abutment, and areas of 100% section loss on numerous floor beams, several stringers, and laterals. As a result, the County immediately retained the services of a consulting engineer and contractor to replace the severely deteriorated bridge in the winter of 2004, requiring the closure of West Front Street for two months.

# Substructure

An underwater inspection performed for the 2001 Inspection Report indicated exposure of some pier footings and undermining of two piers. A Stage 1 scour evaluation previously determined that the bridge had a low potential for scour (Priority 3) and is not considered scour critical (Coding Item #113 on the SI&A Sheet).

# New Superstructure

- Consists of six (6) 55' prefabricated steel Acrow panel truss units.
- Rehabilitation of the existing steel girders would have cost approximately the same amount as Acrow Panel truss rehabilitation.
- Benefit is the County now owns the trusses for future re-use upon replacement of existing bridge.
- The geometric inadequacies on the bridge that existed before the Acrow bridge was installed are still present – the Acrow bridge, although slightly wider than the original (deck width from 21 feet to 24 feet) does not meet geometric standard (30'). The SI&A Form for the present bridge will still define the bridge as “Functionally Obsolete” due to substandard geometry.
- The replacement trusses could not be widened to meet standard geometric widths due to limitations of the existing superstructure.
- The Acrow Panel bridge has a service life of 25+ years depending on environmental exposures and use.



HUBBARD'S BRIDGE, THE WEST FRONT STREET CROSSING OF THE NAVESINK RIVER BETWEEN RED BANK.

1935 IMAGES OF AMERICA, MIDDLE TOWNSHIP VOL. 3



BEERS, CONSTOCK & CLIVE, 1873 "ATLAS OF MONMOUTH COUNTY, NJ"

# HISTORIC MAP & PROJECT PHOTOS

## Existing Conditions & Alternative Analysis Report

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



# **PROJECT PHOTOS**

## **Recently Constructed Acrow Panel Superstructure**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

### **South Side of Bridge (prior to Superstructure Replacement in 2004)**

Note: Boating, Fishing and Crabbing Activities

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Monmouth County, New Jersey



## **PROJECT PHOTOS**

### **Sea-Land Marina at the Southeast Corner of the Bridge Approach Roadway**

Note: Existing utility poles, boat slips, newly constructed approach roadway steel sheeting bulkhead, and closeness of properties to West Front Street.

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



# **PROJECT PHOTOS**

## **River Plaza Marina West of Hubbard Avenue next to Chris Deli**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

### **Navigational channel markers South of bridge.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

### **NJ Transit trestle northeast of the bridge.**

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Monmouth County, New Jersey



## **PROJECT PHOTOS**

**Looking west, north side, Monmouth  
County Bridge S-17. Scheme A will  
construct a new bridge  
at this location.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

**Wetlands at the northwest corner of  
the bridge approach roadway.**

**Note: Existing house on Hubbard  
Avenue.**

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Monmouth County, New Jersey



## **PROJECT PHOTOS**

**Wetlands at the southwest corner of the bridge approach roadway.**

**Note: Existing utility poles and lighting adjacent to steel sheeting.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## PROJECT PHOTOS

Looking east from Sea Land Marina.  
Traffic Operations.

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

**Looking west towards Hubbard  
Avenue intersection.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

**Looking west toward Hubbard Avenue.**

**Note: Retaining wall and residential house on right.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## PROJECT PHOTOS

Looking west along West Front Street.

**Note: Shed on right.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey

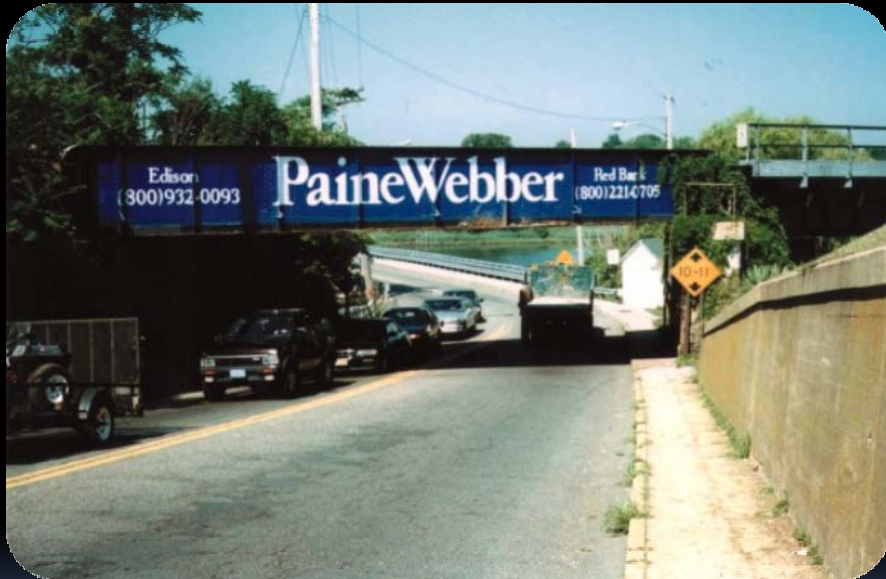


## **PROJECT PHOTOS**

**Looking west at New Jersey Transit  
Bridge.**

**Note: Opening between pier and  
retaining wall.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## PROJECT PHOTOS

**West Front Street east approach.**

**Note: 10"-11" vertical clearance at  
railroad bridge/geometrics.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey



## **PROJECT PHOTOS**

**West Front Street looking east.  
Note: Driveways to Sea-Land  
Marina properties.  
Right turn slot after railroad  
bridge abutment.**

Township of Middletown & Borough of Red Bank  
Monmouth County, New Jersey

## **Scheme Development Considerations**

The following Engineering and Environmental items were considered as the basis for scheme development assessment:

### **Engineering:**

- Assessment of the existing bridge conditions;
- Investigations into viable bridge replacement and rehabilitation solutions;
- An investigation of the roadway facility;
- An evaluation of roadway geometric deficiencies;
- An evaluation of Navigational Constraints;
- An assessment and understanding of Traffic Operations including feasible detour options;
- Consideration of pedestrian and bicycle safety;
- Meeting Community Needs and Public Safety;
- Assess Impacts to Surrounding Properties;
- Costs associated with an action or lack of action for each scheme considered;
- Constructability Concerns;

## Scheme Development Considerations (Continued)

### Environmental:

- Identification of Surrounding Environmental and Cultural Resources;
- Impacts Assessment to surrounding resources including Wetlands and State Open Water, upland vegetation, wildlife, flood hazard areas, acid producing deposits, sole source aquifers, surface water quality, noise quality, air quality, archeological resources and architectural resources.
- An assessment regarding regulatory permit requirements due to anticipated actions including: US Coast Guard, US Army Corps of Engineers, NJDEP and Soil Conservation District.

## PROPOSED SCHEMES

***Scheme A*** – Total Reconstruction of bridge on a new alignment to the north of the existing bridge. This scheme will maintain traffic on the existing bridge during construction of the new bridge and minimize roadway closure.

Three (3) alternatives were considered including:

Alternative A1 - This Alternative option will construct a new parallel bridge to the north of the existing bridge. The objective of this alignment was to minimize impacts to adjoining resources by transitioning the proposed alignment as quickly as possible to meet the existing.

Alternative A2 - This Alternative option will construct a new parallel bridge to the north of the existing bridge. The objective of this alignment was priority on constructability and meeting engineering design standards.

Alternative A3 - This Alternative option will construct a new bridge to the north of the existing bridge. The objective of this alignment was to place a priority on aesthetics, constructability and geometrics.

## **PROPOSED SCHEMES (Continued)**

***Scheme B*** – Total Reconstruction of the bridge on the existing alignment. This scheme will require the implementation of a detour during construction.

***Scheme C*** – Reconstruction In-Kind on existing footprint. This Scheme will preserve the character and defining elements of the existing bridge on the existing alignment.

***Scheme D*** – No-build. This Scheme will maintain the existing bridge with recommendations on traffic management and demand dampening.

***Scheme E*** – Remove Bridge. This scheme will eliminate the existing bridge.

***Scheme F*** – Rehabilitate Existing Bridge.

SCHEME G – Total reconstruction of bridge on a new alignment to the south of the existing bridge

Alternative G1 – NJ Transit replaced

Alternative G2 – NJ Transit bridge maintained

# Scheme A & B - Total Bridge Replacement

## Advantages

- Meets Project Need
- Improves Geometric Deficiencies (Alternative B does not improve Horizontal Geometry)
- Eliminates Structural Deficiencies
- Minimize Detour (Alternative A Only)
- Improves Navigational Clearance
- Improves Pedestrian Access
- Improves Safety to Pedestrians & Bicyclists
- Improves Roadway and Bridge Section
- Improves Long Term Costs
- Improves Bridge Aesthetics

## Disadvantages

- Impacts to Surrounding Properties
- Impacts to Environmental
- Alternative B Requires Long Term Closure of West Front Street

## Scheme C – Replace In-Kind

### Advantages

- Meets Project Need
- Minimizes Impacts to Surrounding Properties
- Minimizes Impacts to Environment
- Eliminates Structural Deficiencies
- Improves Long Term Costs
- Enhances the Local Community

### Disadvantages

- Non-Redundant Structure
- Fails to Improve Geometric Deficiencies
- Requires Long-Term Closure of West Front Street
- Maintains Existing Navigational Clearance
- Does Not Improve Safety to Pedestrians & Bicyclists
- Maintains Substandard Roadway and Bridge Section

### **Scheme D – No-Build**

**This Alternative has no advantages and numerous disadvantages include costs associated with potential repeated rehabilitations of substructures to extend the bridge service life in comparison to constructing a new bridge. Another disadvantage is the danger to public safety by continuing to operate this structurally deficient and functionally obsolete bridge.**

### **Scheme E – Remove Bridge**

**This Alternative few advantages and substantial disadvantages. Some advantages include reduced maintenance costs and unlimited navigational clearance. A major disadvantage includes substantial impacts to traffic operations and circulation of the surrounding roadway network that would result in economic hardship and impact the quality of life.**

## Scheme F – Rehabilitate Existing Bridge

### Advantages

- Minimizes Impacts to Surrounding Properties
- Minimizes Impacts to Environment
- Minimizes Closure of West Front Street
- Eliminates Structural Deficiencies
- Enhances the Local community

### Disadvantages

- Does Not Fully Meet Project Need
- Non-Redundant Structure
- Fails to Improve Geometric Deficiencies
- Maintains Existing Navigational Clearance
- Does Not Improve Safety to Pedestrians and Bicyclists
- Maintains Substandard Roadway and Bridge Section
- Long Term Life Cycle Costs

## Scheme G – Total Replacement (southerly alignment)

### Advantages

- Meets Project Needs
- Improves Geometric Deficiencies (alternative G1 only)
- Eliminates Structural Deficiencies
- Minimize Detour (alternative G1 only)
- Improves Navigational Clearance
- Improves Safety to Pedestrians & Bicyclists
- Improves Roadway and Bridge Section
- Improves Long Term Costs
- Improves Bridge Aesthetics

### Disadvantages

- Impacts to Surrounding Properties
- Alternative G1 Requires Entire Property taking and Displacement of Business and residences
- Alternative G1 has Extensive Wetlands and Environmental Impacts
- Alternative G1 Requires new NJ Transit Bridge Greater Than 5 Million Dollars
- Alternative G2 has S-curve Bridge Structure Which is More Costly
- Alternative G2 Would Require Long Term Roadway Closures
- Both Alternatives Are More Costly Relative to Other Replacement Alternatives

## Bridge Type Options

For replacement schemes (A & B), the bridge types that were considered included:

- Steel Girder with a composite concrete deck;
- Precast Prestressed AASHTO I Beam with a composite concrete deck;
- Precast Prestressed Box Beam with a composite concrete deck.

### Bridge Span Arrangement Options:

Each bridge type was investigated at two span arrangement options consisting of 6-60 foot spans (or approximately meeting existing conditions) with an overall bridge length of 360 feet and 6 - 80 foot spans for Alternatives A1, A2 and B, as well as a 7 – 80 foot span arrangement for Alternative A3. The total length of these structures was therefore 480 feet and 560 feet respectively.

## Key Structural Design Components Included:

- Structural Depth
- Constructability
- Maintenance
- Aesthetics
- Cost
- Utility Accommodation
- Meeting Navigational Improvements

**TABLE IV-3a**  
**EVALUATION OF STRUCTURE ALTERNATIVES MATRIX**

Alternative A1									
Total Span Length	Structure Type	Construction Cost	Structure Depth	Constructability	Structure Maintenance	Aesthetics	Utility Accommodation	Navigation	Total Points
	(1)	(2)	(3)	(4)	(5)		(6)	(7)	
480' (6 @ 80')	1	3	1	2	3	3	1	1	<b>14</b>
	2	3	4	2	1	3	1	4	<b>18</b>
	3	3	3	1	1	3	4	3	<b>18</b>
360' (6 @ 60')	1	2	1	2	3	3	1	1	<b>13</b>
	2	2	5	2	1	3	1	4	<b>18</b>
	3	2	3	1	1	3	4	3	<b>17</b>

Notes:

- (1) Structure Type 1 : Steel Girder  
Structure Type 2 : Prestressed AASHTO I Beam  
Structure Type 3 : Prestressed Box Beam
- (2) For Cost Estimate, see Appendix C, Lower cost is given higher rating.
- (3) The shallower structure depth is given higher rating due to it will provide higher vertical clearance for marine traffic or flatter profile for roadway.
- (4) Simpler erection, less stages and easier construction is given higher rating.
- (5) Concrete Structure is given higher rating then steel structure
- (6) Structure type provided utility bays is given higher rating then adjacent box beams
- (7) Structure Type provided higher vertical clearance and wider horizontal clearance is given higher rating.

Rating Best <==> Worst  
Points 1 5

\* Best Selection

## Vertical Geometry Considerations

**Option 1** – will meet geometric design standards for 40 MPH on the crest of the bridge. The westerly approach sag is adequate for the posted speed (35 MPH). The easterly sag curve is adequate for 20 MPH and considered substandard.

**Option 2** – will meet geometric design standards for the posted speed of 35 MPH. The easterly sag curve is adequate for 20 MPH and considered substandard.

**Option 3** – An investigation of a profile that will accommodate a vertical navigational clearance 12-foot above MHW was considered. A 12-foot vertical navigational clearance was considered to match the vertical clearance at the Route 35 Coopers Bridge downstream. This option would require substandard vertical design and subject roadway to flooding.

## Conclusions

To avoid reducing the posted speed limit, which would be undesirable, or limiting design exceptions, Profile Options 1 & 2 would be considered the most desirable solutions. Although these options do not provide 12 foot above MHW they do improve the existing navigational clearances up to 3 feet in some cases. Coordination with the US Coast Guard is anticipated to obtain their concurrence and permit approval.

# SELECTION OF THE PREFERRED SCHEME

Schemes will be rated based on the following items:

- Project Need – How the scheme ranks in terms of satisfying the Project Need Statement.
- Bridge – How the scheme ranks in terms of providing safe and functional bridge facility to the Project Stakeholders and the surrounding community.
- Geometrics – How the scheme ranks in terms of providing a safe and functional roadway facility to the Project Stakeholders and the surrounding community.
- Navigational – How the scheme ranks in terms of serving the local community and regulatory agencies in terms of marine interests and functionality.
- Traffic Operations – How the scheme ranks in terms of providing efficient traffic operations to the surrounding community. This would also include impacts resulting from short and long term closure of the roadway facilities resulting from repairs and construction activities.
- Safety – How the scheme ranks in terms of providing a safe road and bridge facility for Motorists, Pedestrians and Bicyclists.

## **SELECTION OF THE PREFERRED SCHEME**

- Right of Way – How the scheme ranks in terms of property acquisitions to the surrounding properties to conduct the improvements.
- Environmental – How the scheme ranks in terms of impacts to the overall environmental settings for the elements outlined in Section IV. The premise for this ranking was based on the summary from Table V-2.
- Historic Preservation – How the scheme ranks in terms of impacts to overall Cultural Resources within the project setting as outlined in Section IV. The premise for this ranking was based on the summary of Table V-3.
- Community Needs – How the scheme ranked in terms of satisfying the needs of the surrounding community including the Borough of Red Bank and Township of Middletown. These needs were based on comments received from municipal officials as discussed in meetings.
- Construction Cost – How the schemes rank in terms of costs for constructing the proposed improvements for the project stakeholders.
- Constructability – How the schemes rank in terms of the complexity and measures necessary to construct the proposed improvement.

**TABLE V-1 ALTERNATIVES RATING CHART**

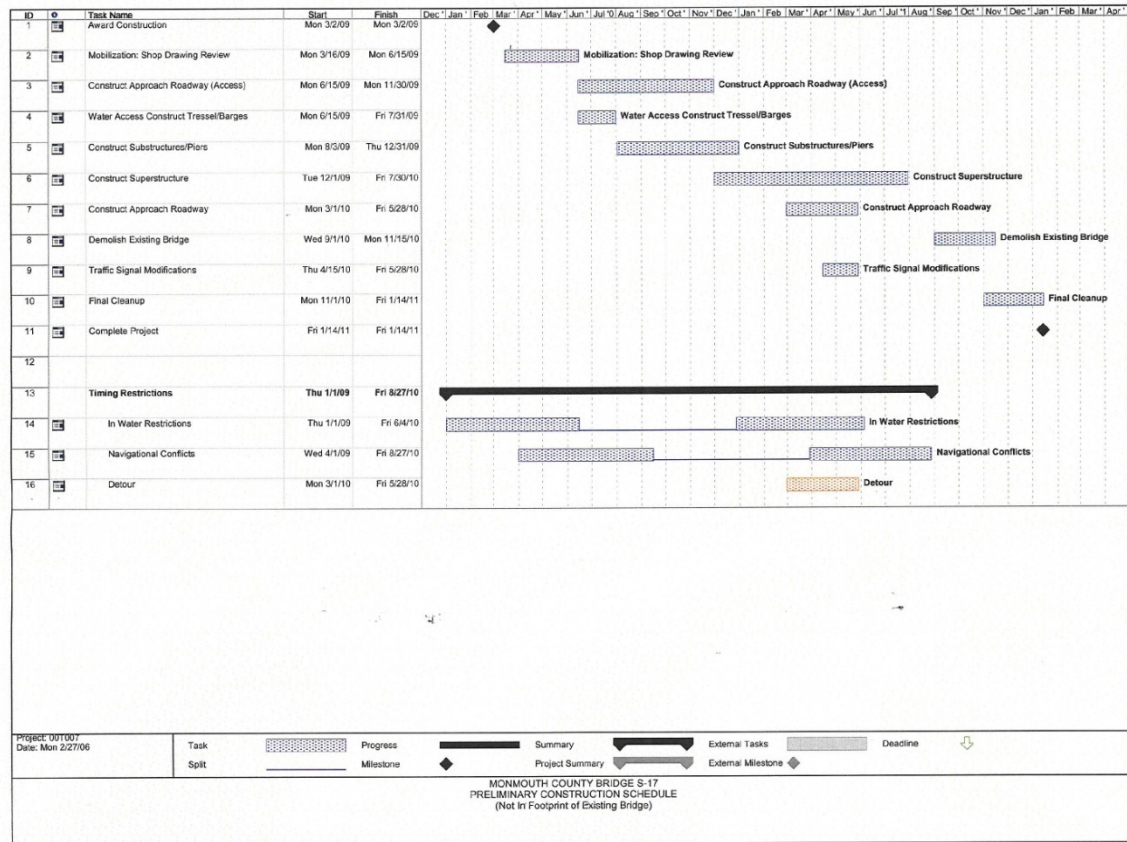
Scoping Study For Monmouth County Bridge S-17  
 West Front Street Over Swimming River  
 Township of Middletown & Borough of Red Bank, Monmouth County, New Jersey

Goal →													
Alternatives ↓	Project Need	Bridge	Geometrics	Navigational	Traffic Operations	Safety Pedestrian / Bicycle	R.O.W	Environmental Impact	Historic Preservation	Community Needs	Construction Cost	Constructability	Total
<b>Scheme A - New Bridge</b>													
<b>Alternative A1</b> Northerly Baseline Shift	1	3	2	2	2	1	2	4	4	1	3	4	29
<b>Alternative A2</b> Northerly Baseline Shift	1	2	2	2	2	1	4	4	4	1	3	4	30
<b>Alternative A3</b> Northerly Baseline Shift	1	1	1	2	2	1	3	5	4	1	4	3	28
<b>Scheme B - New Bridge</b>													
New Bridge on Existing Alignment	2	1	2	2	4	1	2	3	3	3	4	2	29
<b>Scheme C - Replace In-Kind</b>													
New Bridge In Footprint Of Existing Bridge	2	4	4	4	4	3	2	2	3	3	3	2	36
<b>Scheme D - No Build</b>													
Existing Bridge to Remain	5	5	5	5	4	4	1	4	1	4	5	1	44
<b>Scheme E - Remove Bridge</b>													
Existing Bridge to be Demolished	4	5	1	1	5	5	1	3	5	5	2	2	39
<b>Scheme F- Rehabilitate In-Kind</b>													
Existing Bridge to be Improved	4	4	4	5	3	4	2	1	3	4	2	2	38

Rating Key: 1- Most Desirable 5- Least Desirable

## General Improvements for Schemes A & B

- Typical Sections
- Aesthetics
- Mitigation
- Sidewalk/Waterfront Access
- Utilities
- Traffic Improvements





# QUESTION & ANSWER PERIOD