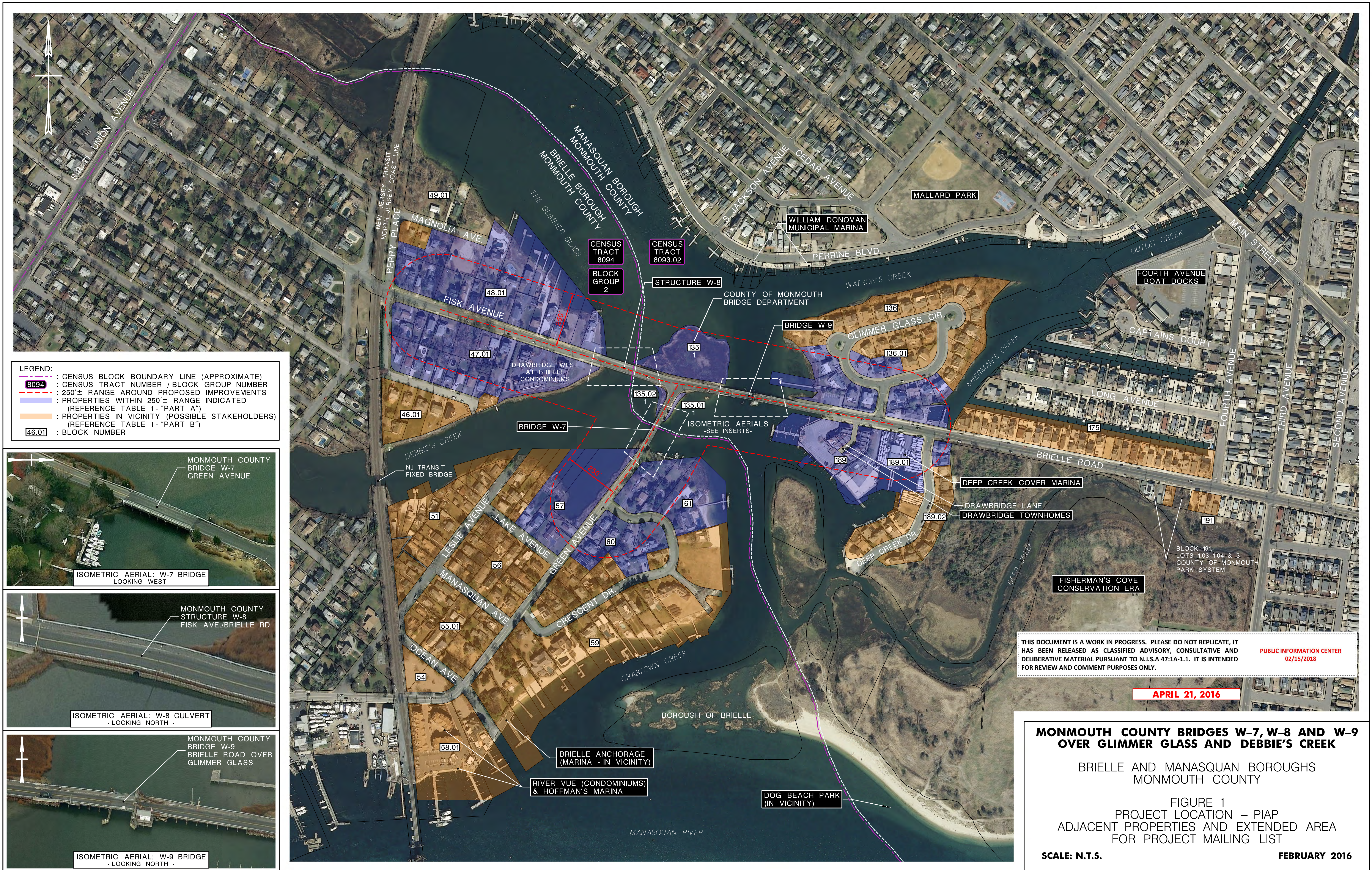
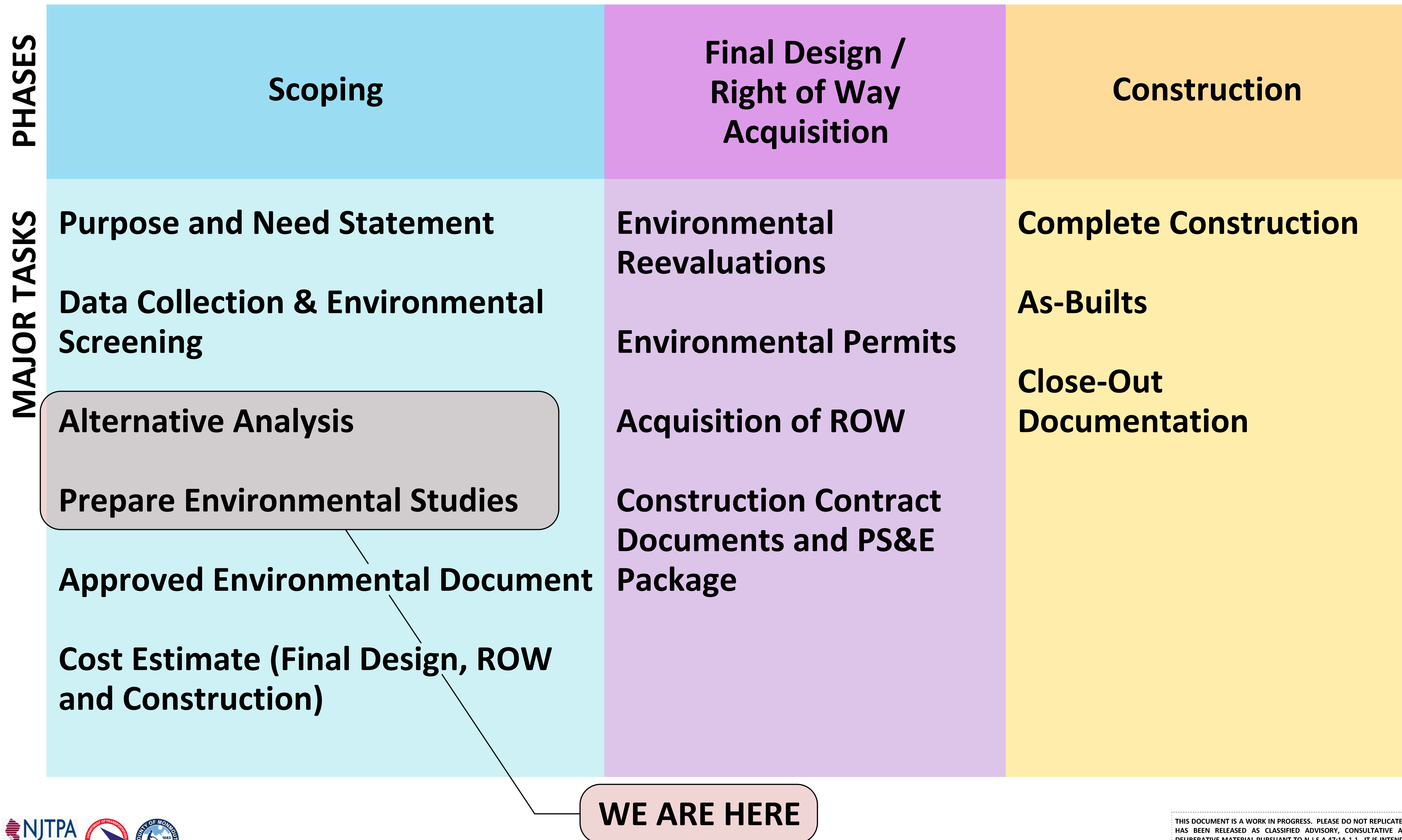




Project Delivery Process



MONMOUTH COUNTY BRIDGES W-7, W-8 AND W-9 **BOROUGHES OF BRIELLE AND MANASQUAN**

PROJECT PURPOSE AND NEED

PROJECT PURPOSE AND NEED *(DEFINITION)*

- PROJECT PURPOSE IDENTIFIES THE INTENT OF THE PROJECT UNDERTAKING
- PROJECT NEEDS IDENTIFY SPECIFIC DEFICIENCIES AND CRITICAL CONCERNS TO BE ADDRESSED BY THE PROJECT
- PROJECTS TYPICALLY ALSO HAVE GOALS AND OBJECTIVES THAT ARE STRIVED FOR AS PART OF THE PROJECT; NOT ALL MAY BE ACHIEVED BY THE FINAL SELECTED ALTERNATIVE

PROJECT PURPOSE

THE PURPOSE OF THE PROJECT IS TO PROVIDE SAFE AND EFFICIENT CROSSING FOR ALL MODES OF TRAVEL WITHIN THE PROJECT LIMITS BY ADDRESSING THE GEOMETRIC, STRUCTURAL AND OPERATIONAL AND MAINTENANCE DEFICIENCIES OF BRIDGE W-7 (GREEN AVENUE OVER DEBBIE'S CREEK), STRUCTURE W-8 (FISK AVENUE CULVERT), AND BRIDGE W-9 (BRIELLE ROAD OVER THE GLIMMER GLASS).

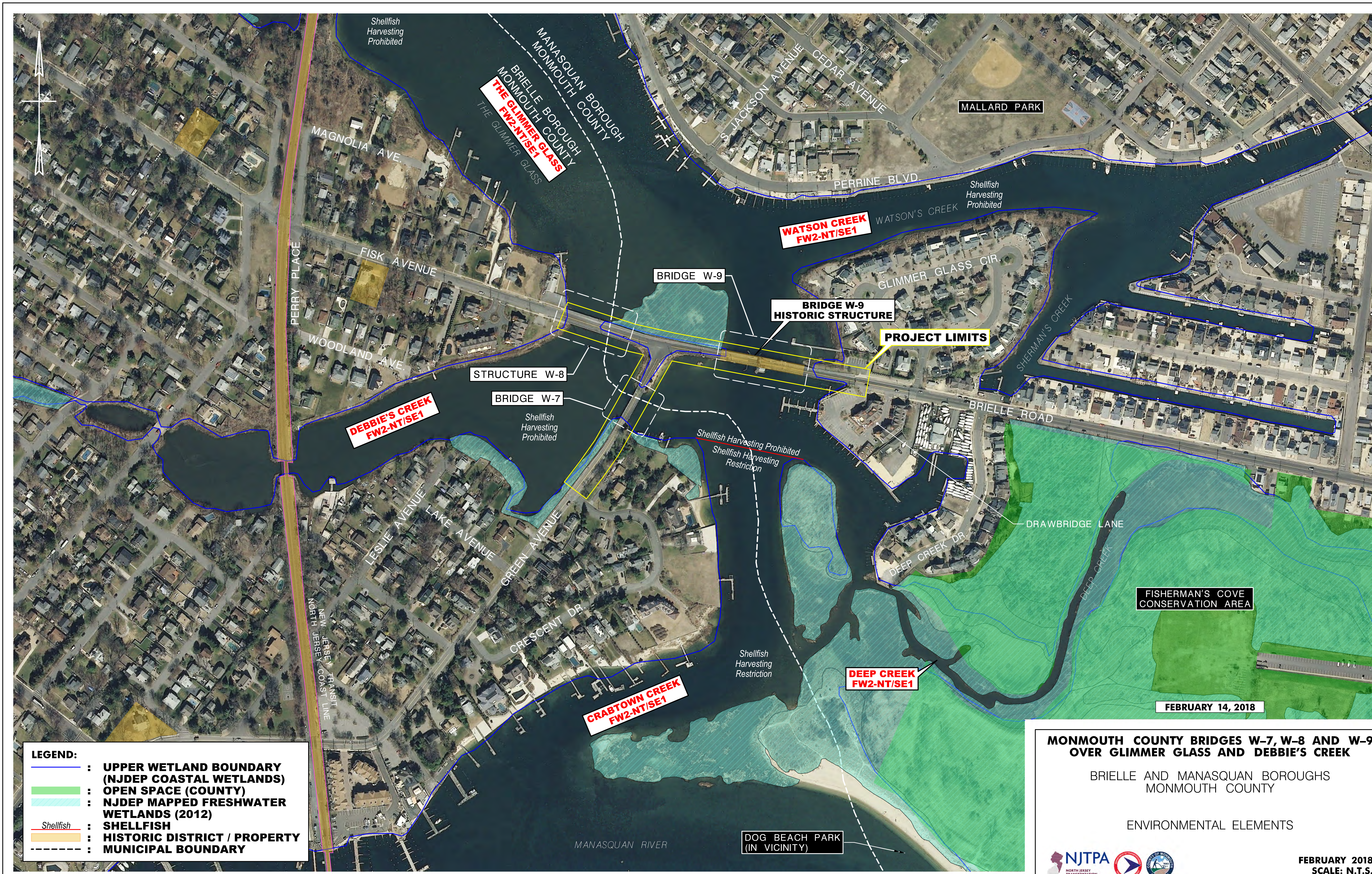
PROJECT NEED

- BRIDGE NEED (LOAD CAPACITY INCLUDING EMERGENCY VEHICLES, VERTICAL CLEARANCE, BRIDGE WIDTH)
- ROADWAY NEEDS (LANE AND SHOULDER WIDTHS, CROSS SLOPES)
- SYSTEM LINKAGE (ROADWAY NETWORK, EMERGENCY RESPONSE, COASTAL EVACUATION, MARINE)
- PEDESTRIAN AND BICYCLE COMPATIBILITY

PROJECT GOALS AND OBJECTIVES

- PROVIDE ADA COMPLIANT PEDESTRIAN FACILITIES AND CROSSINGS WITH CONNECTIVITY
- REDUCE SAFETY RISKS FOR ALL USERS
- REDUCE FREQUENCY OF MAJOR BRIDGE MAINTENANCE ACTIVITIES
- MAINTAIN TRAFFIC WITH MINIMUM DISRUPTION DURING CONSTRUCTION
- AVOID OR MINIMIZE SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS
- AVOID, MINIMIZE AND, IF NECESSARY, MITIGATE ADVERSE EFFECTS ON THE NATIONAL AND NJ REGISTER OF HISTORIC PLACES LISTED BRIDGE W-9
- INCORPORATE CONTEXT SENSITIVE SOLUTIONS APPROACH INTO THE DESIGN





LEGEND:

- : UPPER WETLAND BOUNDARY (NJDEP COASTAL WETLANDS)
- : OPEN SPACE (COUNTY)
- : NJDEP MAPPED FRESHWATER WETLANDS (2012)
- : SHELLFISH
- : HISTORIC DISTRICT / PROPERTY
- : MUNICIPAL BOUNDARY

**MONMOUTH COUNTY BRIDGES W-7, W-8 AND W-9
OVER GLIMMER GLASS AND DEBBIE'S CREEK**

BRIELLE AND MANASQUAN BOROUGH
MONMOUTH COUNTY

ENVIRONMENTAL ELEMENTS



**FEBRUARY 2018
SCALE: N.T.S.**

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02/15/2018

EXISTING CONDITIONS

Bridge W-7:

Green Avenue over Debbie's Creek

- NARROW BRIDGE ROADWAY WIDTH (21.7')
- SUBSTANDARD LIVE LOAD CAPACITY
- SUBSTANDARD RAILINGS
- 2015 NBIS REPORT SUFFICIENCY RATING OF 18.5 OUT OF 100



Structure W-8:

Fisk Avenue Culvert

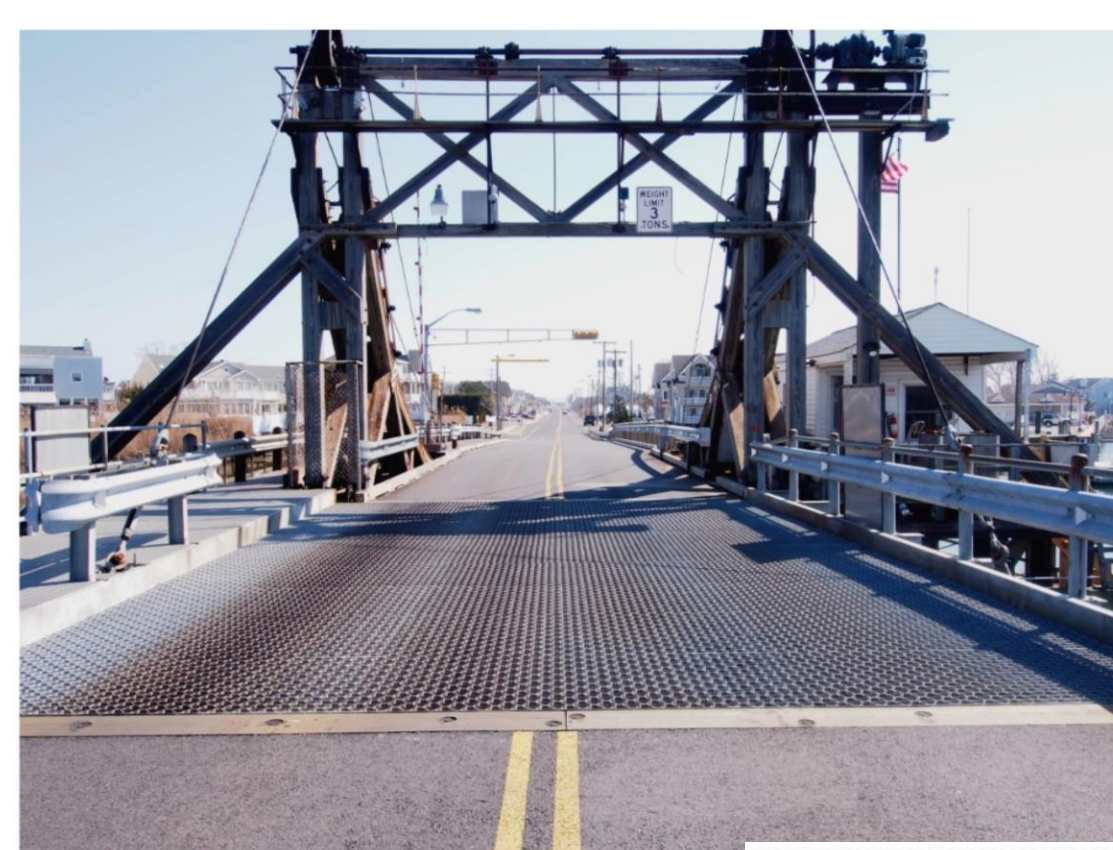
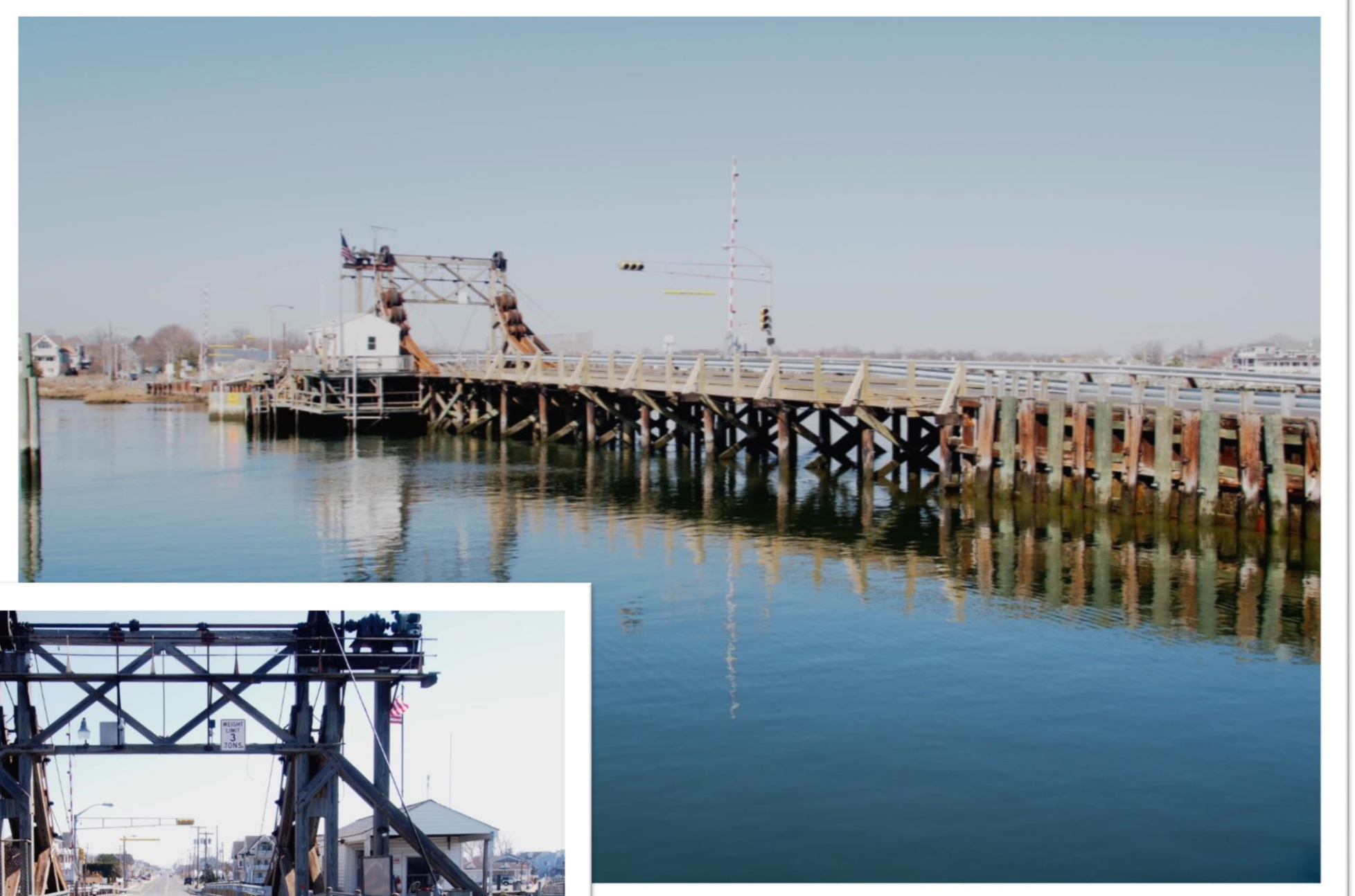
- CULVERT SUBMERGED AND PARTIALLY SILTED
- DETERIORATED STEEL SHEETING, RETAINING WALLS, AND CULVERT PIPE



Bridge W-9:

Brielle Road over The Glimmer Glass

- NARROW BRIDGE ROADWAY WIDTH (19.3' MIN. & VARIES)
- SUBSTANDARD LIVE LOAD CAPACITY
- SUBSTANDARD RAILINGS
- SUBSTANDARD VERTICAL CLEARANCE
- SUBSTANDARD & NON-REDUNDANT MECHANICAL & ELECTRICAL SYSTEMS
- 2015 NBIS REPORT SUFFICIENCY RATING OF 10.1 OUT OF 100



MONMOUTH COUNTY BRIDGES W-7, W-8 AND W-9 BOROUGHS OF BRIELLE AND MANASQUAN

W-7 (GREEN AVE.)



BRIDGE W-7 GREEN AVENUE OVER DEBBIE'S CREEK

KEY NOTES:

CONSTRUCTED 1944

120' LONG FIXED (7 SPAN) TIMBER BRIDGE

ROADWAY WIDTH 21.7'

2.9' WIDE SIDEWALK

10" FORCE SEWER MAIN

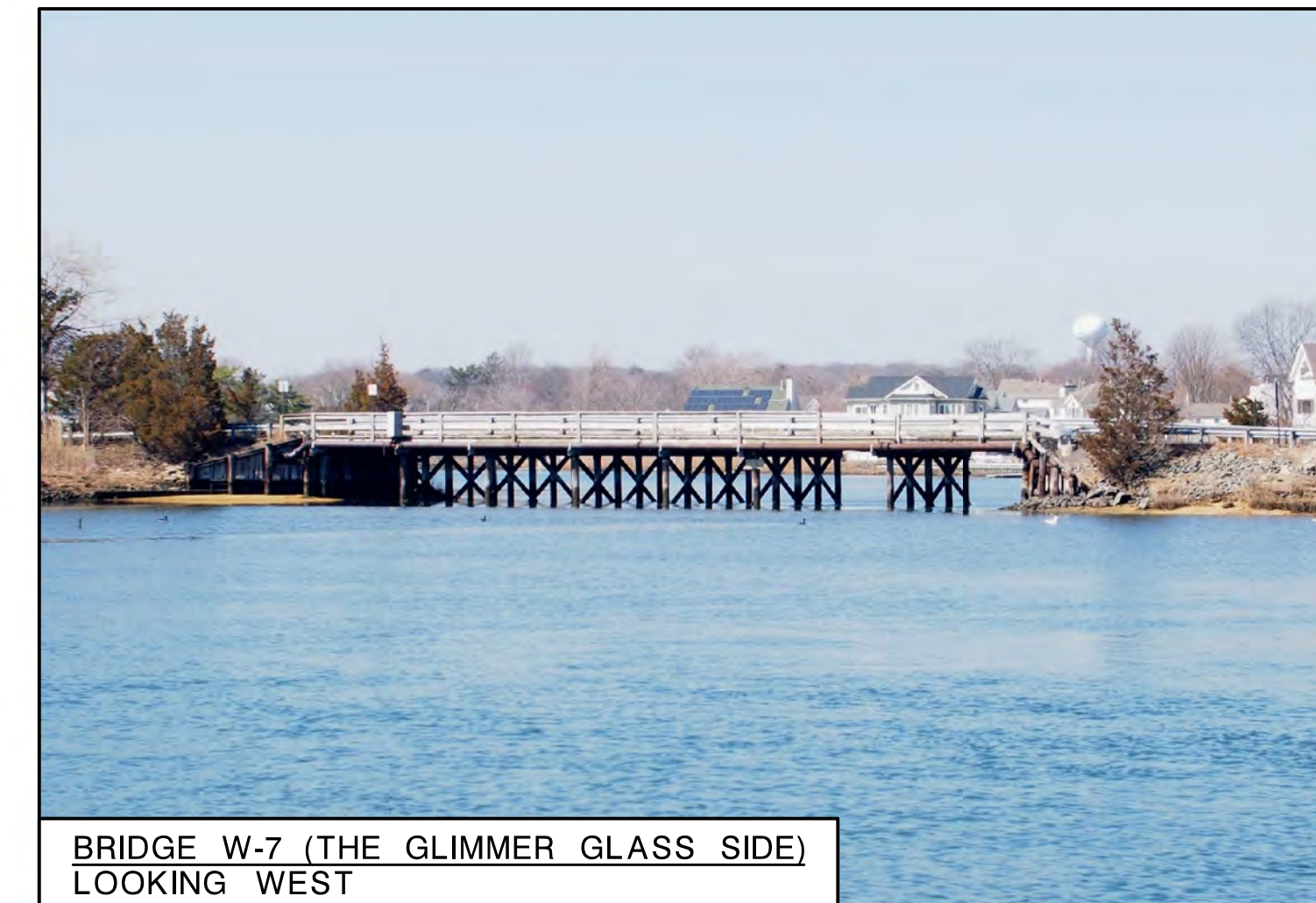
CONCERNS:

NARROW BRIDGE ROADWAY WIDTH (21.7')

SUBSTANDARD LIVE LOAD CAPACITY

SUBSTANDARD RAILINGS

2015 NBIS REPORT SUFFICIENCY RATING OF 18.5



BRIDGE W-7 (THE GLITTER GLASS SIDE)
LOOKING WEST



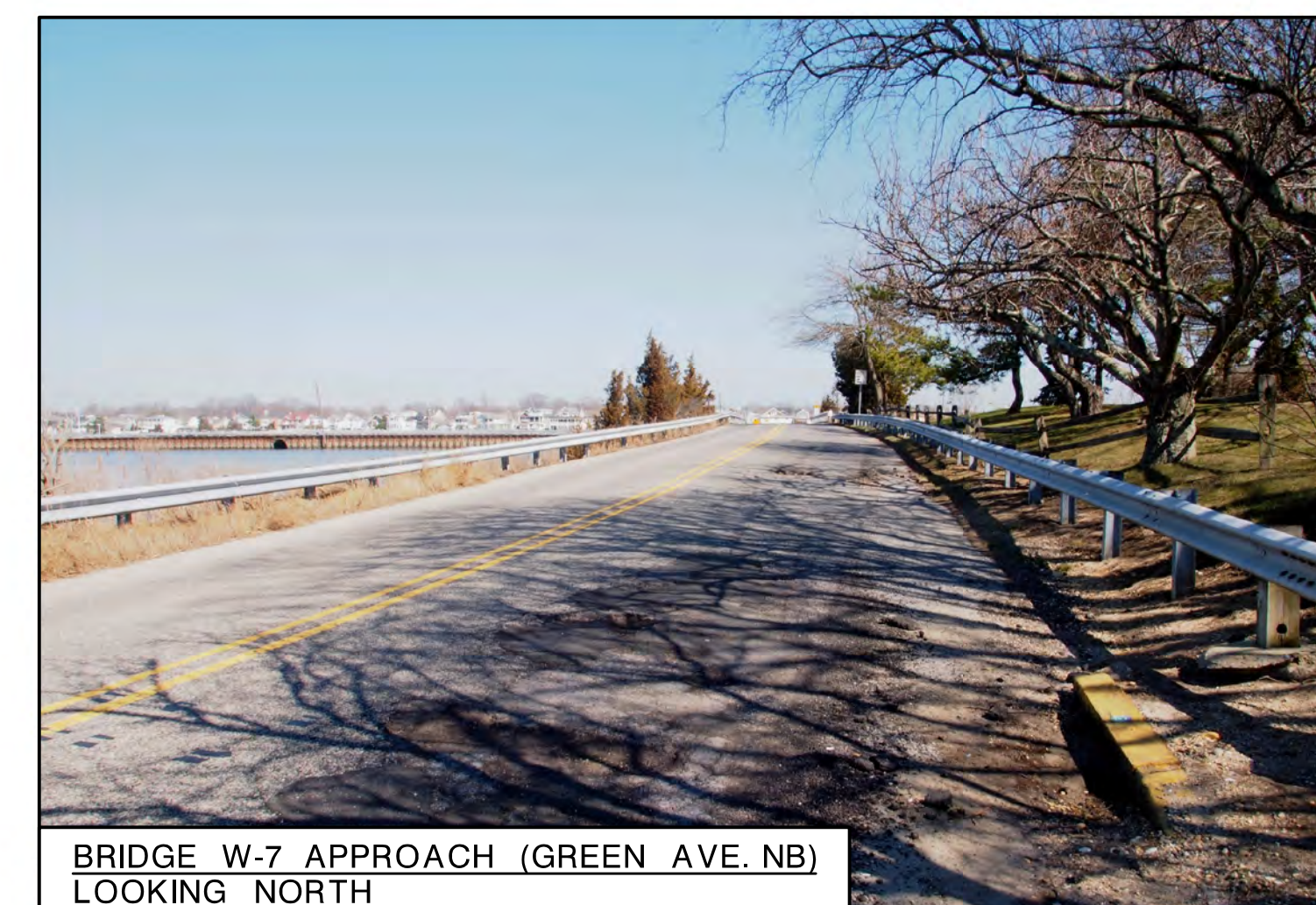
BRIDGE W-7 (DEBBIE'S CREEK SIDE)
LOOKING SOUTHEAST



BRIDGE W-7
LOOKING SOUTH



BRIDGE W-7
LOOKING NORTH TOWARDS FISK AVENUE



BRIDGE W-7 APPROACH (GREEN AVE. NB)
LOOKING NORTH



BRIDGE W-7 APPROACH (GREEN AVE. SB)
LOOKING SOUTH

PHOTOS TAKEN: MARCH 2016

Recommended Preliminary Preferred Alternative

Alternative - Variation Number	Description	Meets Project Purpose?	Achieves Project Needs?				Achieves Project Goals and Objectives										Key Advantages	Key Disadvantages
			Bridge Needs	Roadway Needs	System Linkage	Pedestrian and Bicyclist Compatibility	Sidewalk Connectivity	Safety Improvements	Long-Term Maintenance	Cultural Resources Impacts	Environmental Impacts	Permits Required ¹	ROW Impacts	Estimated Costs ²	Estimated Construction Duration	Traffic Impacts and Detours		
1	No Build	No	Structural Capacity: No Bridge Roadway Width: No Vertical Clearance: Not Applicable	No	No	No	No	Not Improved	High	No	None at first, but additional noise and vehicle emissions on local roads if bridge is closed	None	None	Yearly Maintenance Cost: ³ \$20K (<10 years)	Not Applicable	None at first, but bridge may eventually be closed and require permanent detour.	• No construction impacts	• Does not address substandard structural capacity or deck geometry of existing bridge • Potential for rising maintenance costs and eventual closure
2	Rehabilitation	No	Structural Capacity: Yes Bridge Roadway Width: No Vertical Clearance: Not Applicable	Partial ⁴	Yes	Partial ⁵	Partial ⁶	Partial: New bridge railings and guide rails.	Moderate	No	Low: Short term impacts during construction, 400 SF ± of permanent wetlands disturbance.	USACE (NWP 3, 6, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	1,850 SF ± of ROW acquisitions required and 4,850 SF ± of temporary construction easements across 4 parcels	Initial: \$2.4M (20-30 years) Life Cycle: \$6.3M ROW: \$55K	4-6 months	Low: Partial closures required, but shorter duration than full replacement option.	• Structural capacity increased • Nominal extension of service life	• Does not address long term structural integrity • Does not improve deck geometry • Still potential for high maintenance costs
3-1	Replacement with a Wider Bridge Sidewalks on One Side	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and updated geometry.	Low	No	Moderate: Short term impacts during construction, 1,500 SF ± of permanent wetlands disturbance.	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	5,300 SF ± of ROW acquisitions required and 6,300 SF ± of temporary construction easements across 4 parcels	Initial: \$4.9M (75+ years) Life Cycle: \$6.2M ROW: \$80K	6-8 months	Moderate: Full closure required for short period.	• Addresses all project needs • Provides longest projected service life	• High initial cost • Higher construction impacts than rehabilitation • Requires moderate ROW acquisitions
3-2	Replacement with a Wider Bridge Sidewalks on Both Sides	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and updated geometry.	Low	No	High: 4800 SF ± of permanent wetlands disturbance	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	8,800 SF ± of ROW acquisitions required and 7,300 SF ± of temporary construction easements	Initial: \$5.2M (75+ years) Life Cycle: \$6.6M ROW: \$130K	6-8 months	Moderate: Full closure required for short period.	• Addresses all project needs • Provides longest projected service life • Provides better sidewalk connectivity and reduces safety risks for pedestrians/bicyclists when compared to Alternative 3-1	• High initial cost • Higher construction impacts than rehabilitation • Higher environmental and ROW impacts when compared to Alternative 3-1
4-1 ⁷	Replacement with Bridge W-9 Modified Rehabilitated Bridge W-9 (Operational)	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Partial: New bridge railings and guide rails and bascule span safety features.	High	Yes	Moderate: Short term impacts during construction, 1,500 SF ± of permanent wetlands disturbance.	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	5,300 SF ± of ROW acquisitions required and 6,300 SF ± of temporary construction easements across 4 parcels	Initial: \$11.6M (40-50 years) Life Cycle: \$17.6M ROW: \$80K	20-22 months	High: Full closure required and at same time as Bridge W-9 work.	• Historic Resource partially maintained near original location	• Very high cost and construction impacts
4-2 ⁷	Replacement with Bridge W-9 Modified Rehabilitated Bridge W-9 (Fixed)	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Partial: New bridge railings and guide rails and bascule span safety features.	Moderate	Yes	Moderate: Short term impacts during construction, 1,000 SF ± of permanent wetlands disturbance.	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	5,300 SF ± of ROW acquisitions required and 6,300 SF ± of temporary construction easements across 4 parcels	Initial: \$8.3M (40-50 years) Life Cycle: \$12.6M ROW: \$80K	16-18 months	High: Full closure required and at same time as Bridge W-9 work.	• Historic Resource partially maintained near original location • Reduced initial and long-term costs and maintenance when compared to Alternatives 4-1 and 4-3	• Very high cost and construction impacts • Changed use of historic resource
4-3 ⁷	Replacement with Bridge W-9 Rehabilitated Bridge W-9 (Operational)	No	Structural Capacity: No Bridge Roadway Width: No Vertical Clearance: No	No	No	No	Yes	Partial: New bridge railings and guide rails and bascule span safety features.	Very High	Yes	Moderate: Short term impacts during construction, 1,000 SF ± of permanent wetlands disturbance.	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	3,300 SF ± of ROW acquisitions required and 3,800 SF ± of temporary construction easements across 4 parcels	Initial: \$10.6M (40-50 years) Life Cycle: \$15.9M ROW: \$50K	18-20 months	High: Full closure required and at same time as Bridge W-9 work.	• Historic Resource partially maintained near original location • Reduced initial and long-term costs and maintenance when compared to Alternative 4-1 • More features of historic resource are preserved compared to Alternatives 4-1 and 4-2	• Very high cost and construction impacts • Does not address any of the project needs

¹ Permit Legend: United States Army Corp of Engineers (USACE), Nationwide Permit (NWP), General Permit (GP), Individual Permit (IP) New Jersey Department of Environmental Protection (NJDEP), Coastal Area Facility Review Act (CAFRA), Waterfront Development (WFD)

² Life cycle costs assume a common 100-year period. All future costs are converted to present value dollars. Life cycle costs include initial costs as well as anticipated long-term replacement/maintenance costs within the noted 100-year period.

³ Yearly maintenance costs are averaged and fluctuate by year. They do not include normal operating costs.

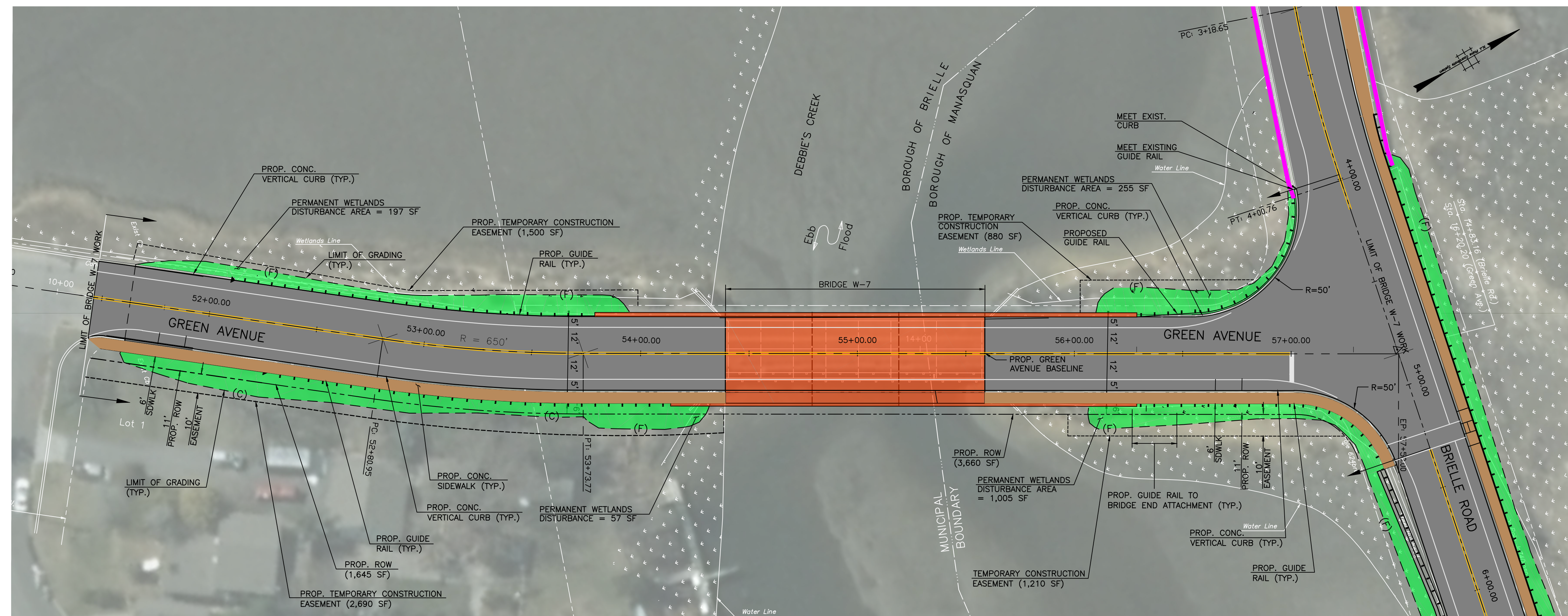
⁴ Cross slopes improved, but roadway width not addressed.

⁵ Nominal sidewalk widening, but no provisions for bicyclists.

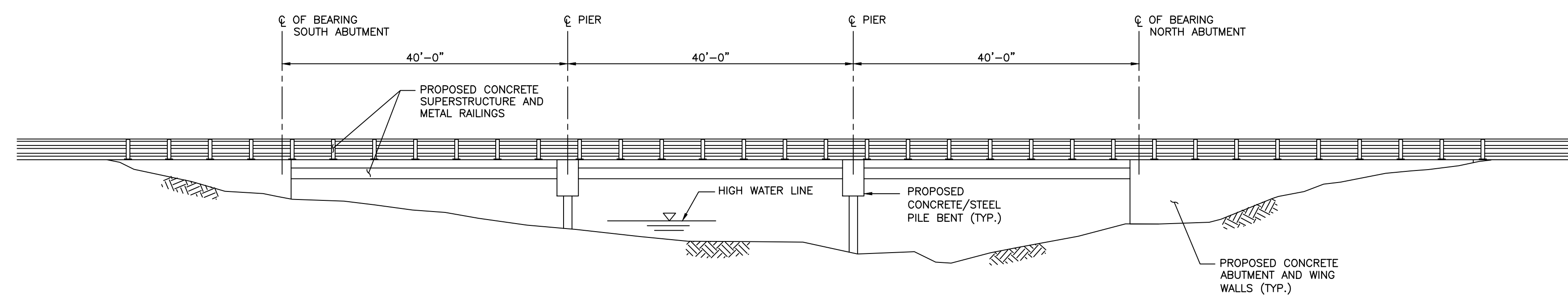
⁶ Sidewalk remains on current side, limited improvements on approaches.

⁷ Selection of any of the variations of Alternative 4 for Bridge W-7 would eliminate Alternatives 1, 2 and 3 and all of their sub-alternatives and variations for Bridge W-9.

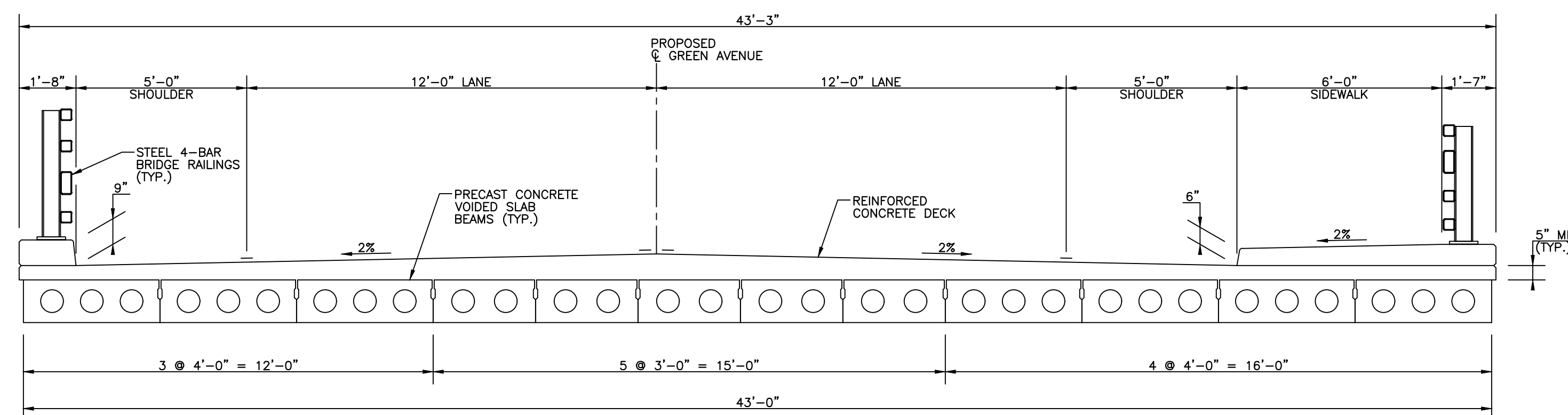
Bridge W-7



OVERALL PLAN



BRIDGE ELEVATION



BRIDGE SECTION

**RECOMMENDED PRELIMINARY
PREFERRED ALTERNATIVE:**

ALTERNATIVE 3: REPLACEMENT WITH A WIDER BRIDGE

- NEW WIDER CONCRETE SUPERSTRUCTURE WITH STANDARD WIDTH LANES, BICYCLE COMPATIBLE SHOULDERS AND STANDARD ADA COMPLIANT SIDEWALKS
- NEW CONCRETE/STEEL SUBSTRUCTURES (REDUCED NUMBER)
- RECONSTRUCTED WIDER APPROACH ROADWAYS

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MONMOUTH COUNTY BRIDGES W-7, W-8 AND W-9 BOROUGH OF BRIELLE AND MANASQUAN

W-8 (FISK AVE.)



STRUCTURE W-8 FISK AVENUE CULVERT BETWEEN DEBBIE'S CREEK AND THE GLIMMER GLASS

KEY NOTES:

CONSTRUCTED 1946

80" x 80" FLAT BOTTOM REINFORCED CONCRETE PIPE STRUCTURE

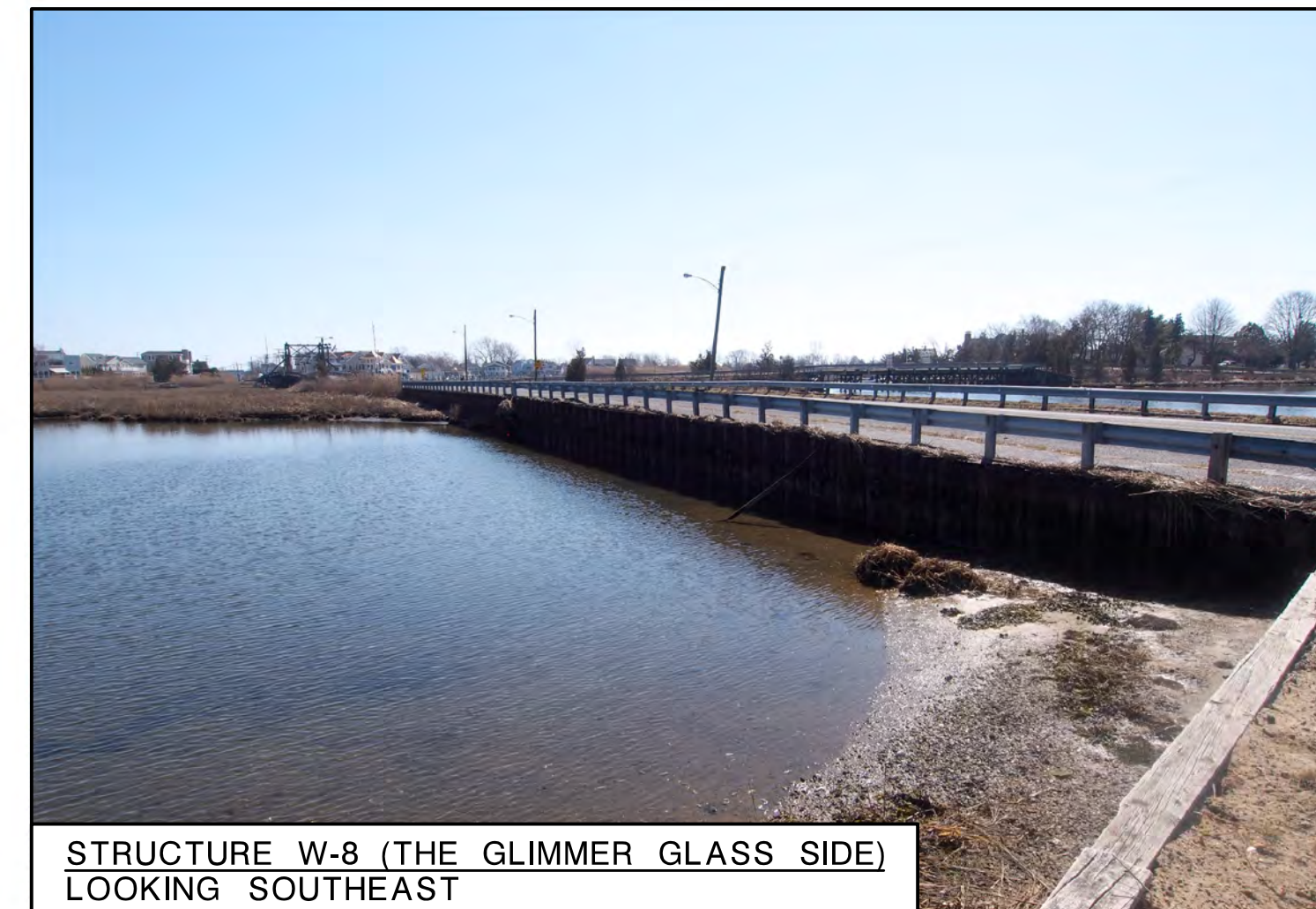
34.8' CURB TO CURB WIDTH

6' WIDE SIDEWALK

CONCERNS:

CULVERT SUBMERGED & PARTIALLY SILTED

DETERIORATED STEEL SHEETING RETAINING WALLS AND CULVERT PIPE



STRUCTURE W-8 (THE GLIMMER GLASS SIDE)
LOOKING SOUTHEAST



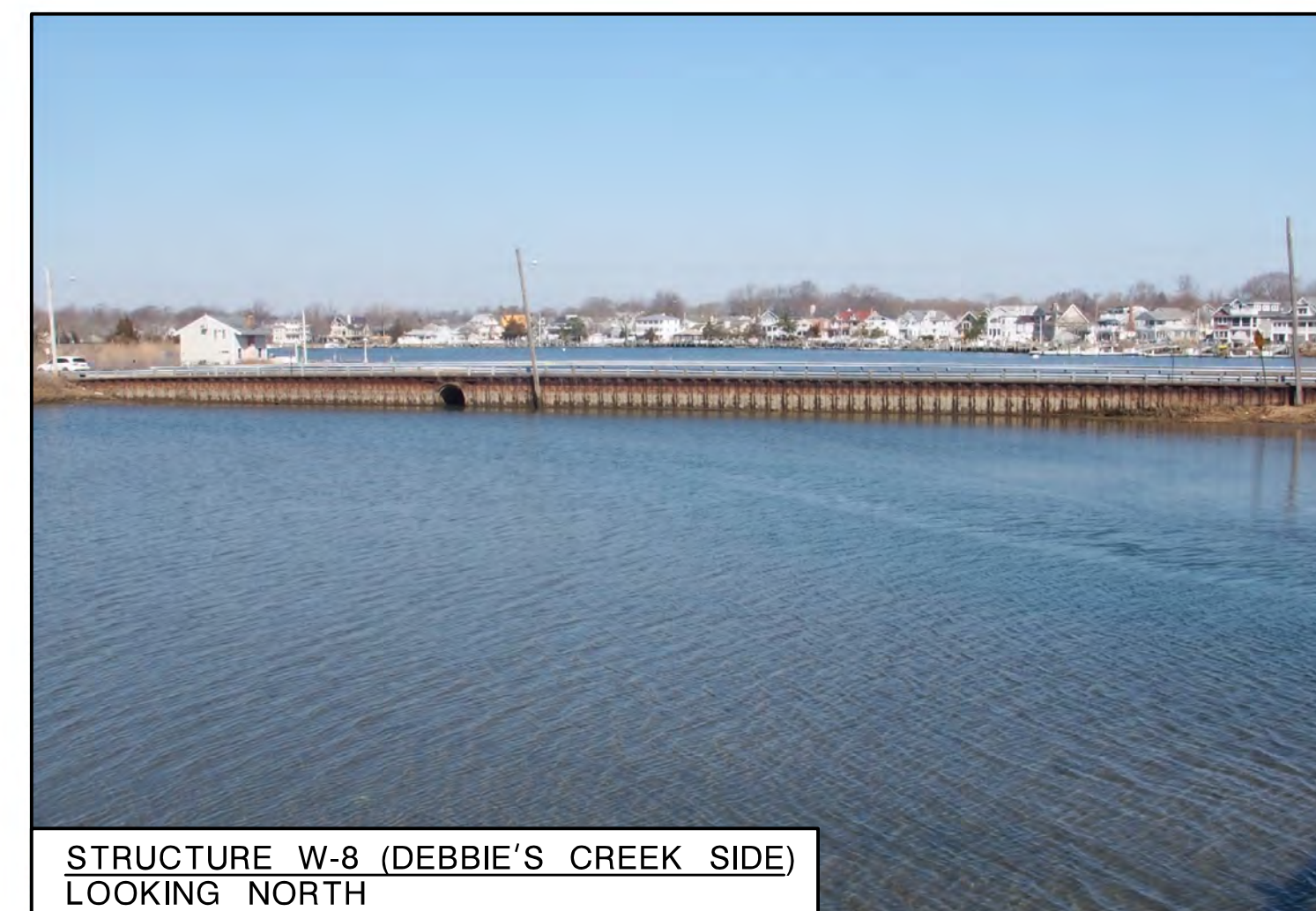
STRUCTURE W-8 (DEBBIE'S CREEK SIDE)
LOOKING NORTHEAST



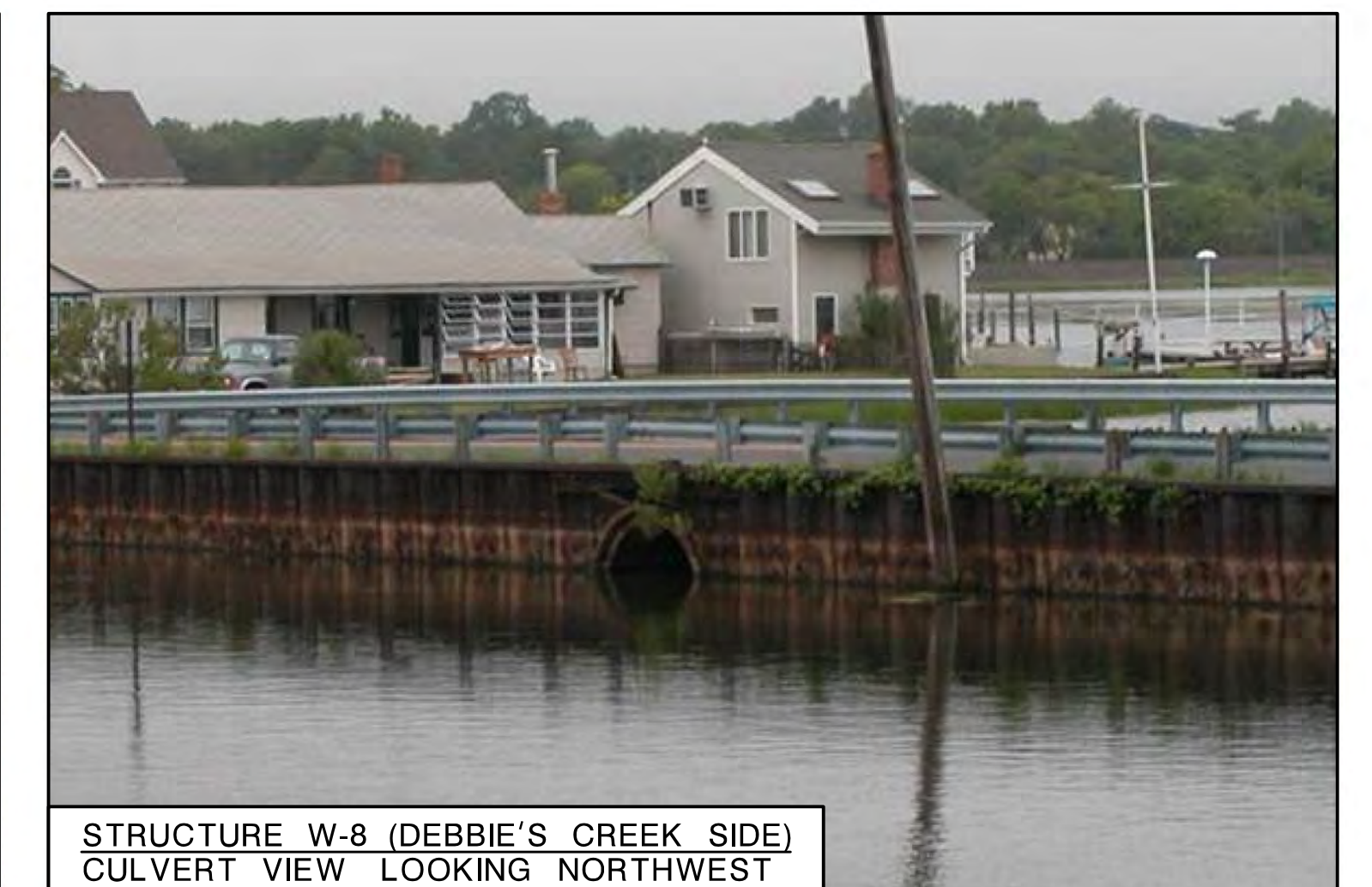
STRUCTURE W-8 - FISK AVENUE WESTBOUND
LOOKING WEST



STRUCTURE W-8 - FISK AVENUE EASTBOUND
LOOKING EAST



STRUCTURE W-8 (DEBBIE'S CREEK SIDE)
LOOKING NORTH



STRUCTURE W-8 (DEBBIE'S CREEK SIDE)
CULVERT VIEW LOOKING NORTHWEST

PHOTOS TAKEN: MARCH 2016

Recommended
Preliminary
Preferred
Alternative

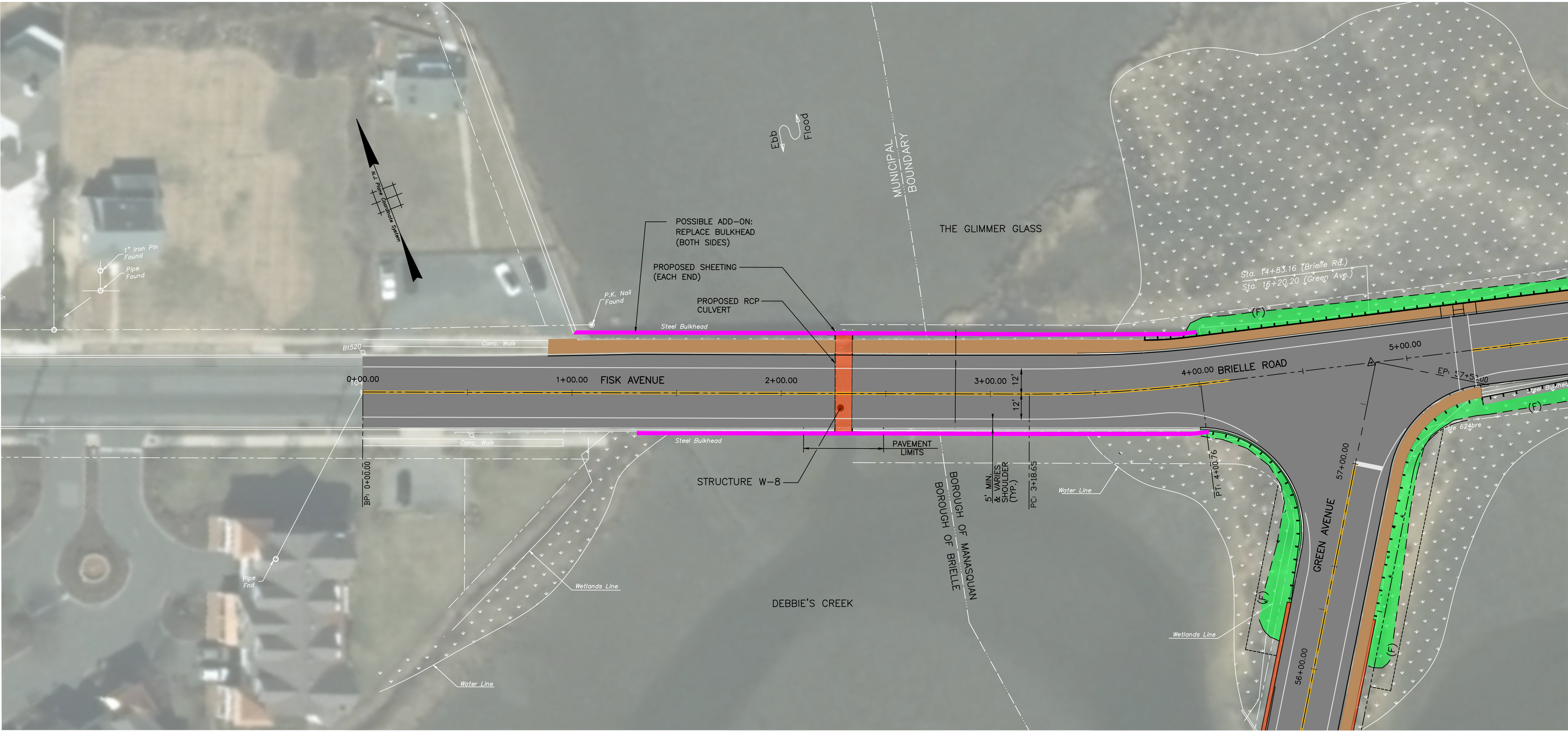
Alternative - Variation Number	Description	Meets Project Purpose?	Achieves Project Needs?				Achieves Project Goals and Objectives										Key Advantages	Key Disadvantages
			Bridge Needs	Roadway Needs	System Linkage	Pedestrian and Bicyclist Compatibility	Sidewalk Connectivity	Safety Improvements	Long-Term Maintenance	Cultural Resources Impacts	Environmental Impacts	Permits Required ¹	ROW Impacts	Estimated Costs ²	Estimated Construction Duration	Traffic Impacts and Detours		
1	No Build	No	Structural Capacity: No Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	No	No	No	Not Improved	Very High	No	None at first, but additional noise and vehicle emissions on local roads if bridge closes	No permits required.	No ROW acquisitions required.	Yearly Maintenance Cost: ² \$5K (<10 years)	Not Applicable	None at first, but bridge may eventually be closed and require permanent detour.	• No construction impacts	• Does not address structural capacity of existing culvert • Potential for rising maintenance costs and eventual partial collapse
2	Rehabilitation	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	Yes	Yes	Yes	Moderate: New guide rails.	High	No	Minimal: short term impacts during construction	USACE (NWP 3, 6, & 33), NJDEP (CAFRA, WFD, GP 23, & Tidelands)	No ROW acquisitions required.	Initial: \$410K (15-20 years)	2 months	Low: Partial closures required, but shorter duration than full replacement option.	• Minimizes cost, construction duration, and impacts	• Does not address long term structural integrity of culvert • Provides only nominal extension of service life. Replacement will eventually still be required
3	Elimination of the Culvert	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	Yes	Yes	Yes	Moderate: New guide rails.	Low	No	Moderate to High: hydrological study required to investigate.	USACE (NWP 6 & 14), NJDEP (CAFRA, WFD, GP 23, & Tidelands)	No ROW acquisitions required.	Initial: \$670K ³	2 months	Moderate: Full closure required for short period.	• Addresses project needs • Practically eliminates long term maintenance costs	• Requires hydraulic study to confirm environmental effects • Permits may not be granted depending on results of study
4	Replacement of Culvert	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Not Applicable	Yes	Yes	Yes	Yes	Moderate: New guide rails.	Moderate	No	Minimal: short term impacts during construction	USACE (NWP 6 & 14), NJDEP (CAFRA, WFD, GP 23, & Tidelands)	No ROW acquisitions required.	Initial: \$940K ³ (75+ years)	3 months	Moderate: Full closure required for short period.	• Addresses project needs • Provides longest projected service life	• Highest initial cost • Largest construction impacts

¹ Permit Legend: United States Army Corp of Engineers (USACE), Nationwide Permit (NWP), General Permit (GP), Individual Permit (IP) New Jersey Department of Environmental Protection (NJDEP), Coastal Area Facility Review Act (CAFRA), Waterfront Development (WFD)

² Yearly maintenance costs are averaged and fluctuate by year. They do not include normal operating costs.

³ If considered, replacement of the entire steel sheet pile bulkhead would add approximately \$300-350K to the initial costs.

Structure W-8



OVERALL PLAN

**RECOMMENDED PRELIMINARY
PREFERRED ALTERNATIVE:**

ALTERNATIVE 4: REPLACEMENT OF CULVERT

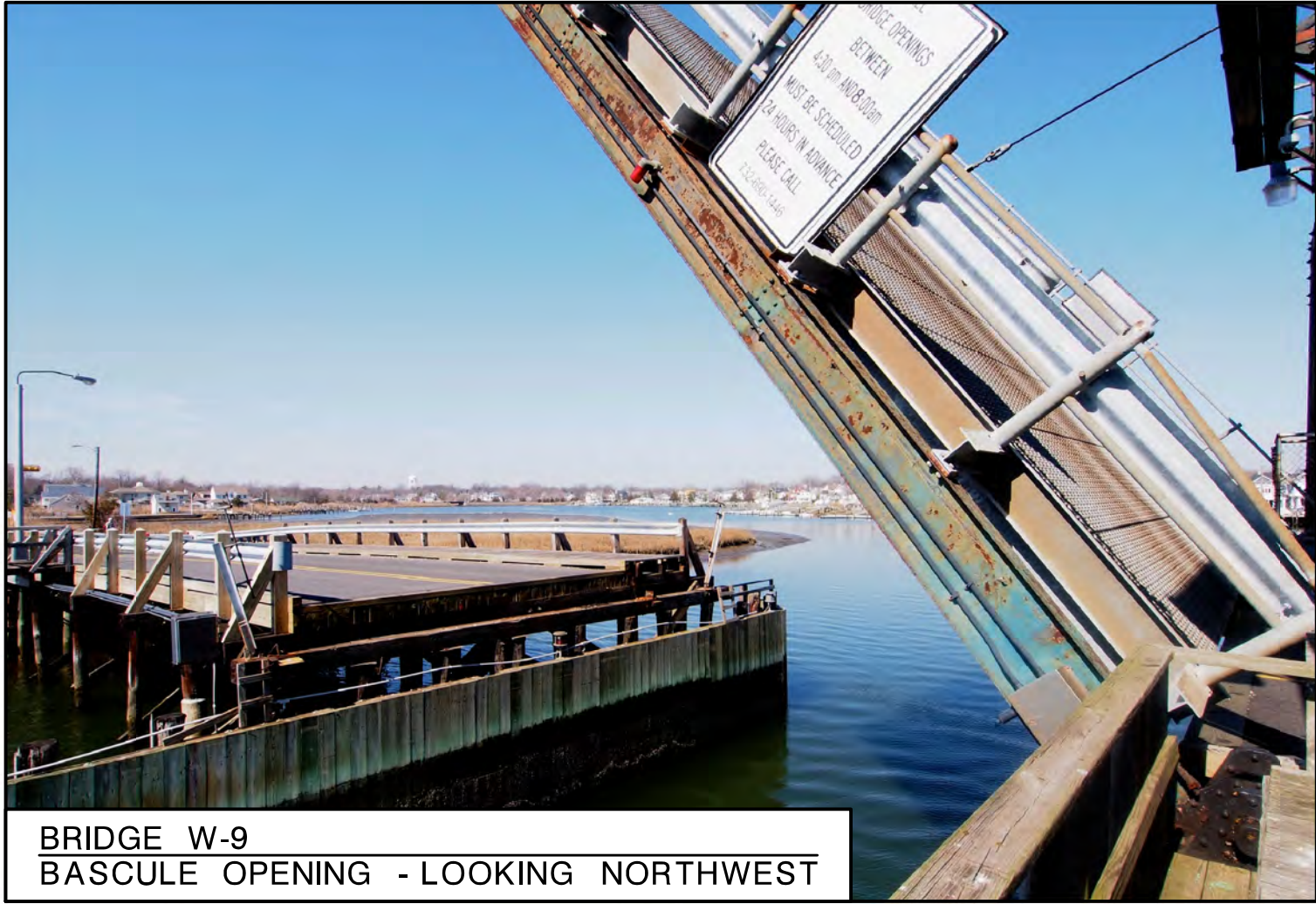
- REPLACE EXISTING CULVERT WITH NEW CONCRETE CULVERT
- INSTALL NEW STEEL SHEETING AT EACH END
- RECONSTRUCT PAVEMENT OVER CULVERT
- POSSIBLE ADD-ON: REPLACE STEEL BULKHEAD FULL LENGTH

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MONMOUTH COUNTY BRIDGES W-7, W-8 AND W-9
BOROUGH OF BRIELLE AND MANASQUAN

W-9 (BRIELLE RD.)



BRIDGE W-9
BRIELLE ROAD OVER THE GLIMMER GLASS

KEY NOTES:

- 1889 - 590' LONG FIXED TIMBER TRESTLE BRIDGE
- 1938 - BASCULE MOVABLE SPAN INSERTED
- 1950 - MAJOR RECONSTRUCTION & REDUCED TO 279' LENGTH
- 2008 - NJ & NATIONAL REGISTERS OF HISTORIC PLACES
- 2014 - EMERGENCY INTERIM REPAIRS TO TIMBER APPROACH SPANS & PILES
- 2017 - EMERGENCY INTERIM REPAIRS

CONCERNS:

- NARROW BRIDGE ROADWAY WIDTH (20' & VARIES)
- SUBSTANDARD LIVE LOAD CAPACITY
- SUBSTANDARD RAILINGS
- SUBSTANDARD VERTICAL CLEARANCE
- SUBSTANDARD AND NON-REDUNDANT MECHANICAL AND ELECTRICAL SYSTEMS
- 2013 NBIS REPORT SUFFICIENCY RATING OF 2.0
- 2015 NBIS REPORT SUFFICIENCY RATING OF 10.1

Recommended Preliminary Preferred Alternative

Alternative - Variation Number	Description	Meets Project Purpose ?	Achieves Project Needs?				Achieves Project Goals and Objectives											Key Advantages	Key Disadvantages
			Bridge Needs	Roadway Needs	System Linkage	Pedestrian and Bicyclist Compatibility	Sidewalk Connectivity	Safety Improvements	Long-Term Maintenance	Cultural Resources Impacts	Environmental Impacts	Permits Required ¹	ROW Impacts	Estimated Costs ²	Estimated Construction Duration	Traffic Impacts and Detours			
1	No Build	No	Structural Capacity: No Bridge Roadway Width: No Vertical Clearance: No	No	No	No	No	Not Improved	Very High	No	None at first, but additional noise and vehicle emissions on local roads after bridge closure	None	No ROW acquisitions required	Yearly Maintenance Cost: ³ \$135K+ (10-15 years)	Not Applicable	None at first, but bridge may eventually be closed and require permanent detour.	• No impacts on historic resource • No construction impacts	• Does not address any project needs • Potential for rising maintenance costs and eventual closure	
2A-1	Restoration	No	Structural Capacity: Partial ⁴ Bridge Roadway Width: No Vertical Clearance: No	No	Partial ⁵	No	Partial ⁶	Partial: New bridge railings and guide rails and bascule span safety features.	High	Yes	Minimal: no wetlands would be impacted	USACE (NWP 3 & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$10.3M (20-30 years) Life Cycle: \$23.7M	18-20 months	Moderate: Full closure required, but shorter duration than full replacement options.	• Limited impacts on historic resource • Construction impacts are minimized • Nominal safety improvements	• Live load capacity and bridge geometry still substandard • High cost relative to life cycle gains with continued high maintenance • No improvements to bicycle/pedestrian compatibility	
2A-2	Rehabilitation without Widening	No	Structural Capacity: Yes Bridge Roadway Width: No Vertical Clearance: No	No	Partial ⁵	No	Partial ⁶	Partial: New bridge railings and guide rails and bascule span safety features.	High	Yes	Minimal: no wetlands would be impacted	USACE (NWP 3 & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$11.7M (40-50 years) Life Cycle: \$18.8M	18-20 months	Moderate: Full closure required, but shorter duration than full replacement options.	• Historic resource partially maintained • Structural capacity improved • Nominal safety improvements	• Bridge geometry still substandard • High cost relative to life cycle gains • No improvements to bicycle/pedestrian compatibility	
2B	Modified Rehabilitation	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Partial: New bridge railings and guide rails and bascule span safety features.	High	Yes	Moderate: around 1950 SF ± of wetlands would be impacted	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$14.3M (40-50 years) Life Cycle: \$21.8M	18-20 months	High: Full closure required of similar duration to full replacement options.	• Limited components of historic resource reused as compared to replacement options • Structural capacity and geometry improved	• High cost relative to life cycle gains	
2C	Rehabilitation of Movable Span and Replacement of the Approach Spans	No	Structural Capacity: Partial ⁷ Bridge Roadway Width: Partial Vertical Clearance: No	No	Partial ⁸	No	Partial ⁹	Partial: New bridge railings and guide rails and bascule span safety features.	Moderate	Yes	Moderate: around 1950 SF ± of wetlands would be impacted	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$13.7M (20-30 years) Life Cycle: \$21.4M	18-20 months	High: Full closure required for extended period	• Limited impacts on key aspects of historic resource • Approach roadway geometry improved • Reduces long term maintenance	• Live load capacity and bridge geometry still substandard due to bascule span • Minimal improvements to bicycle/pedestrian compatibility	
3A	Retain Existing Bridge (Close to Vehicular Traffic) and Build New Bridge on a Parallel Alignment - High Level Fixed Span Bridge	No	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	No	Yes	No	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	Moderate	Yes	Significant environmental impacts from new road/bridge on new alignment, including impacts to wetlands and green acres land.	USACE (IP), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	Significant additional ROW (>30 parcels) with possible loss of access to additional properties & Riparian Grant / License	>\$25M Detailed costs not prepared for this alternative.	28-30 months	Moderate: Parallel construction would minimize required closures	• Historic resource fully maintained (changed use) • New bridge with standard structural capacity and geometry • Eliminates bridge opening delays • Improved bicycle and pedestrian compatibility	• Very high initial cost • Excessive environmental and property/ROW impacts • Creates access issues for several properties • Requires future maintenance of 2 bridges	
3B	Retain Existing Bridge (Close to Vehicular Traffic) and Build New Bridge on a Parallel Alignment - Movable Bridge	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	High	Yes	Significant environmental impacts from new road/bridge on new alignment, including impacts to wetlands and green acres land.	USACE (IP), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	Significant additional ROW (=5 parcels) & Riparian Grant / License	>\$25M Detailed costs not prepared for this alternative.	22-24 months	Low: Parallel construction would minimize required closures	• Historic resource fully maintained (changed use) • New bridge with standard structural capacity and geometry • Improved bicycle and pedestrian compatibility	• Very high initial cost • Excessive environmental and property/ROW impacts • Requires future maintenance of 2 movable bridges	
3C	Retain Existing Bridge (Convert to One-Way Traffic) and Build New Bridge on a Parallel Alignment – Movable Bridge	No	Structural Capacity: Partial ¹⁰ Bridge Roadway Width: Yes Vertical Clearance: Partial ¹¹	Yes	Partial ¹²	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	High	Yes	Significant environmental impacts from new road/bridge on new alignment, including impacts to wetlands and green acres land.	USACE (IP), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	Significant additional ROW (=5 parcels) & Riparian Grant / License	>\$25M Detailed costs not prepared for this alternative	22-24 months	Moderate: Parallel construction would minimize required closures	• Historic resource fully maintained (maintained use) • New bridge with standard structural capacity and geometry • Improved bicycle and pedestrian compatibility	• Very high initial cost • Excessive environmental and property/ROW impacts • Vertical clearance and structural capacity not improved on existing bridge • Requires future maintenance of 2 movable bridges	
3D	Rehabilitate Existing Bridge and Build New Pedestrian/ Bicyclist Bridge on a Parallel Alignment – Movable Bridge	No	Structural Capacity: Partial ¹³ Bridge Roadway Width: No Vertical Clearance: No	No	Yes	Yes	Yes	Partial: New bridge railings and guide rails, but limited changes to geometry	High	Yes	Significant environmental impacts from new road/bridge on new alignment, including impacts to wetlands and green acres land.	USACE (IP), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	Significant additional ROW (=5 parcels) & Riparian Grant / License	>\$25M Detailed costs not prepared for this alternative	16-18 months	High: Similar to Alternative 2B	• Historic resource fully maintained (maintained use) • Pedestrians and bicyclists accommodated in new separate bridge	• High initial cost • High environmental and property/ROW impacts • Substandard geometry and structural capacity of existing bridge is not fully addressed • Requires future maintenance of 2 movable bridges	
4A	Build New Bridge on Current Alignment - High Level Fixed Span Bridge	No	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	No	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	Low	Yes	Moderate	USACE (IP), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	Significant additional ROW (>30 parcels) with possible loss of access to additional properties	>\$25M (75+ years) Detailed costs not prepared for this alternative	22-24 months	Very High: Full closure required for extended period	• New bridge with standard structural capacity and geometry • Minimized maintenance and operation costs • Improved bicycle and pedestrian compatibility	• Significant effects to historic resource • Creates access issues for several properties • Moderate environmental impacts	
4B	Build New Bridge on Current Alignment - Movable Bridge, Vertical Lift	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	Moderate	Yes	Moderate: Around 1950 SF ± of wetlands would be impacted	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$19.5M (75+ years) Life Cycle: \$25.7M	18-20 months	High: Full closure required for extended period	• New bridge with standard structural capacity and geometry • Improved bicycle and pedestrian compatibility	• Significant effects to historic resource • Not as cost effective as Alternative 4D • Structure would be visually out of context • Moderate environmental impacts	
4C	Build New Bridge on Current Alignment - Movable Bridge, Trunnion Bascule	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	Moderate	Yes	Moderate: Around 1950 SF ± of wetlands would be impacted	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$16.4M (75+ years) Life Cycle: \$21.5M	18-20 months	High: Full closure required for extended period	• New bridge with standard structural capacity and geometry • Improved bicycle and pedestrian compatibility	• Significant effects to historic resource • Not as cost effective as Alternative 4D • Moderate environmental impacts	
4D	Build New Bridge on Current Alignment - Movable Bridge, Rolling Counterweight	Yes	Structural Capacity: Yes Bridge Roadway Width: Yes Vertical Clearance: Yes	Yes	Yes	Yes	Yes	Substantial: New bridge railings and guide rails and bascule span safety features, improved geometry	Moderate	Yes	Moderate: Around 1950 SF ± of wetlands would be impacted	USACE (NWP 6, 14, & 15), USCG (Bridge Permit), NJDEP (CAFRA, WFD, Coastal Wetlands, GP 23, & Tidelands), Soil Erosion and Sediment Control Plan	No ROW acquisitions required	Initial: \$15.2M (75+ years) Life Cycle: \$19.7M	16-18 months	High: Full closure required for extended period	• New bridge with standard structural capacity and geometry • Improved bicycle and pedestrian compatibility • Existing bridge aesthetics and general method of mechanical operation replicated	• Significant effects to historic resource • Operation not as efficient as Alternatives 4B and 4C • Moderate environmental impacts	

¹ Permit Legend: United States Army Corp of Engineers (USACE), Nationwide Permit (NWP), General Permit (GP), Individual Permit (IP) New Jersey Department of Environmental Protection (NJDEP), Coastal Area Facility Review Act (CAFRA), Waterfront Development (WFD)

² Life cycle costs assume a common 100-year period. All future costs are converted to present value dollars. Life cycle costs include initial costs as well as anticipated major replacement/maintenance costs within the noted 100-year period. They do not include normal operating costs.

³ Yearly maintenance costs are averaged and fluctuate by year. They do not include normal operating costs.

⁴ Nominal improvements are possible, but full legal capacity would not be provided.

⁵ Bridge would remain operational in this alternative, but at current level of service and would not adequately service all users.

⁶ No improvements to sidewalk width, but sidewalk ramps and pedestrian crossings would be provided.

⁷ Capacity of bridge would be limited by movable span, where full legal capacity would not be provided.

⁸ Bridge would remain operational in this alternative, but at current level of service and would not adequately service all users.

⁹ Improvements to sidewalk width limited to approach spans, but sidewalk ramps and pedestrian crossings would be provided.

¹⁰ Full legal capacity would be provided on new parallel bridge, but not on existing bridge.

¹¹ Adequate clearance would be provided on new parallel bridge, but not on existing bridge.

¹² Existing bridge would remain operational in this alternative, but at current level of service and would not adequately service all users.

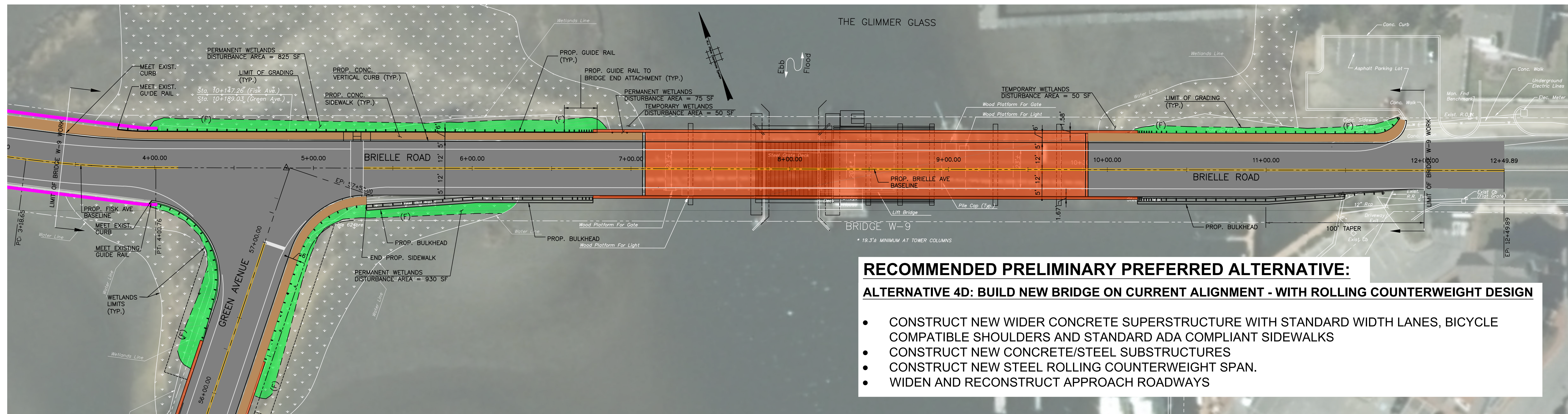
¹³ Nominal improvements to the existing bridge are possible, but full legal capacity would not be provided.

Bridge W-9



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RECOMMENDED PRELIMINARY PREFERRED ALTERNATIVE:

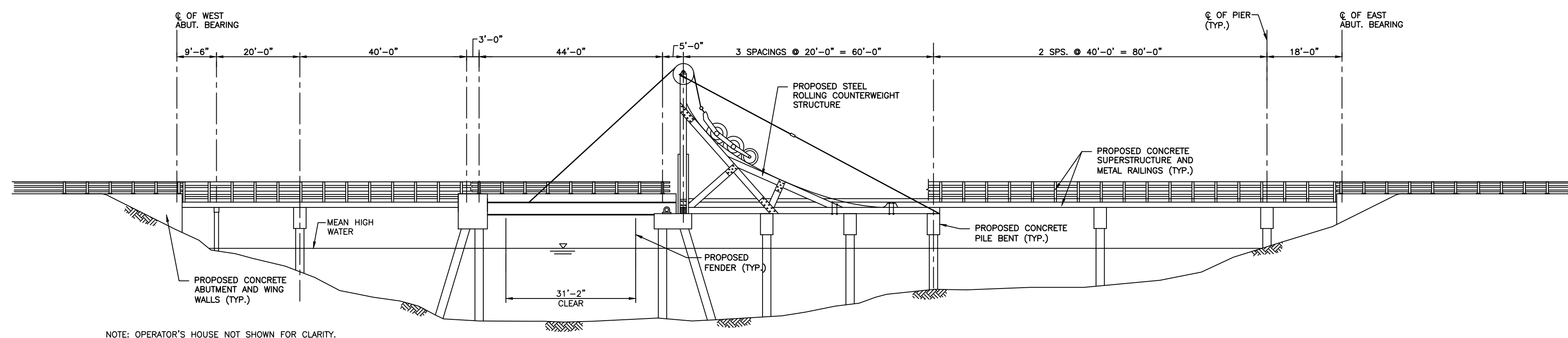
ALTERNATIVE 4D: BUILD NEW BRIDGE ON CURRENT ALIGNMENT - WITH ROLLING COUNTERWEIGHT DESIGN

- CONSTRUCT NEW WIDER CONCRETE SUPERSTRUCTURE WITH STANDARD WIDTH LANES, BICYCLE COMPATIBLE SHOULDERS AND STANDARD ADA COMPLIANT SIDEWALKS
- CONSTRUCT NEW CONCRETE/STEEL SUBSTRUCTURES
- CONSTRUCT NEW STEEL ROLLING COUNTERWEIGHT SPAN.
- WIDEN AND RECONSTRUCT APPROACH ROADWAYS

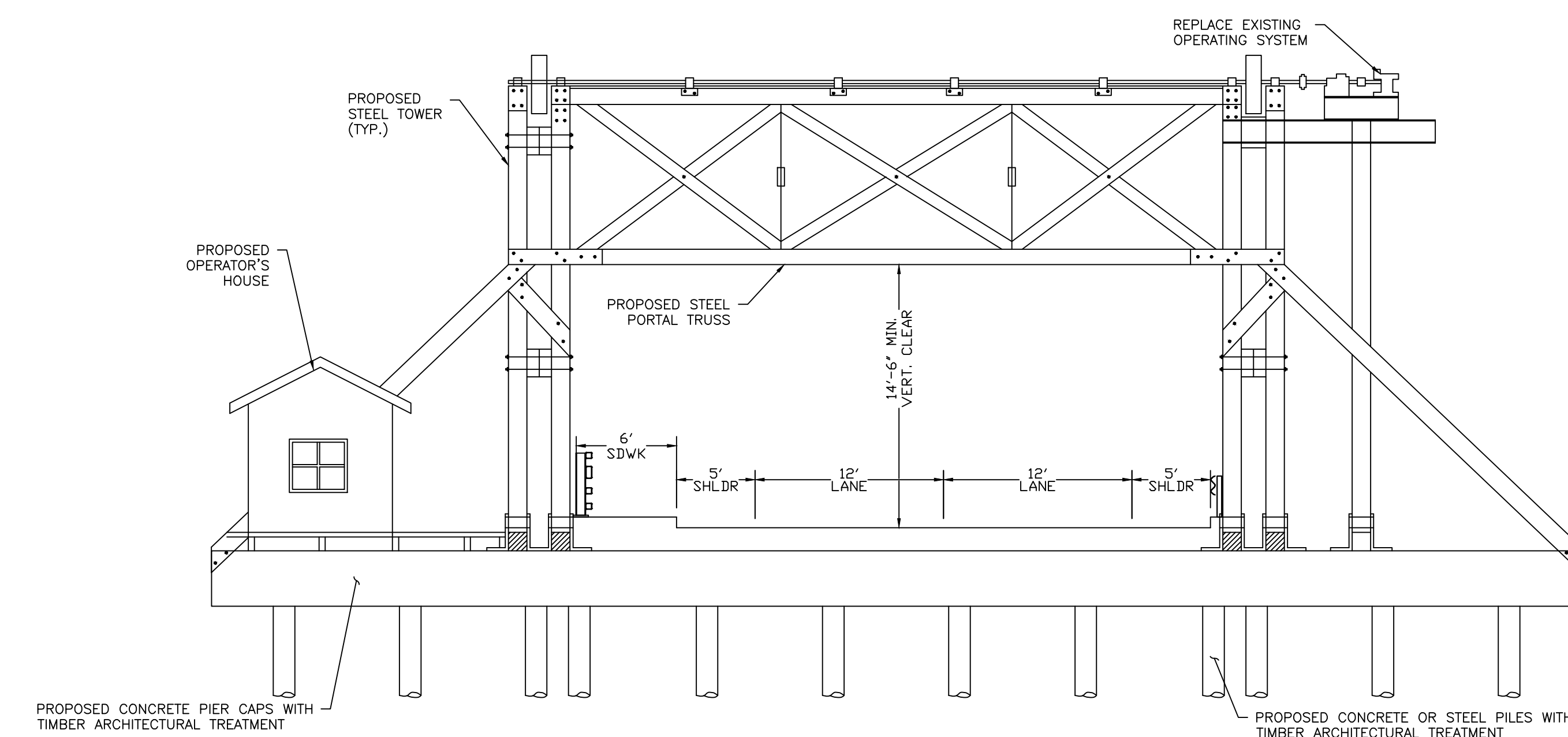
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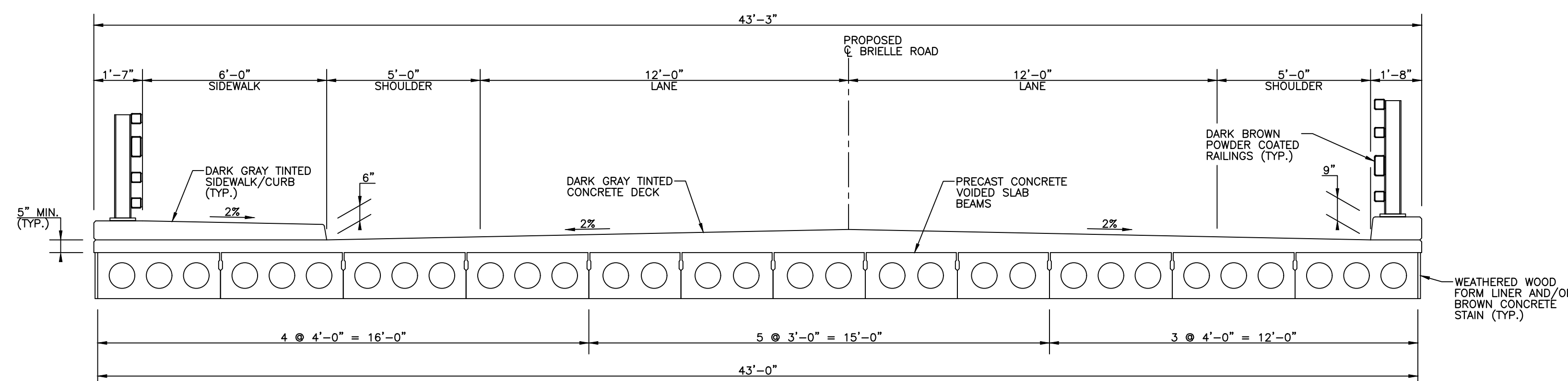
OVERALL PLAN



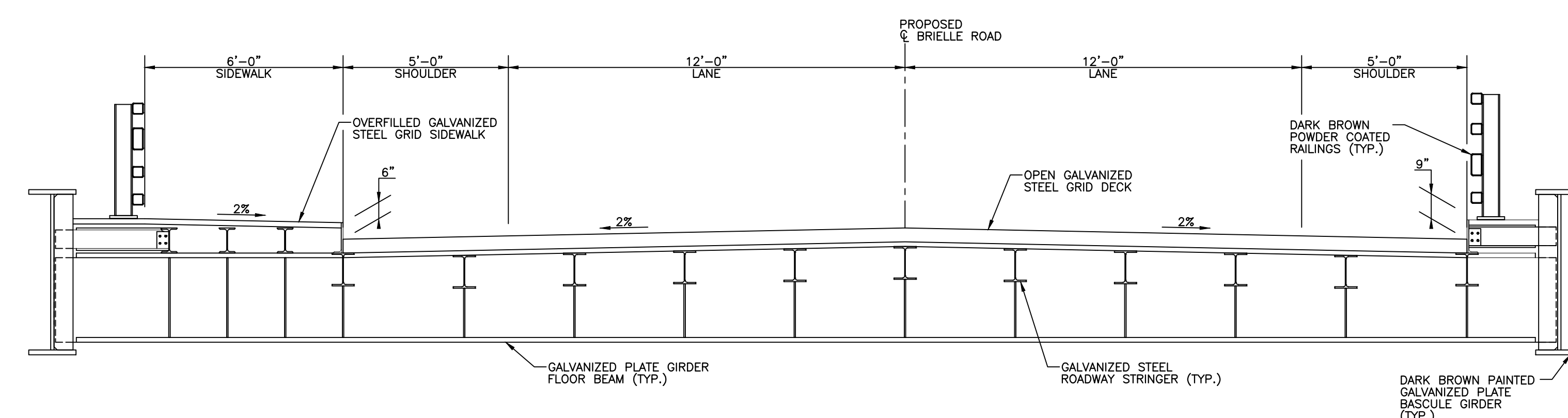
BRIDGE ELEVATION



BRIDGE SECTION AT TOWER



BRIDGE SECTION AT APPROACH SPANS



BRIDGE SECTION AT BASCULE SPAN