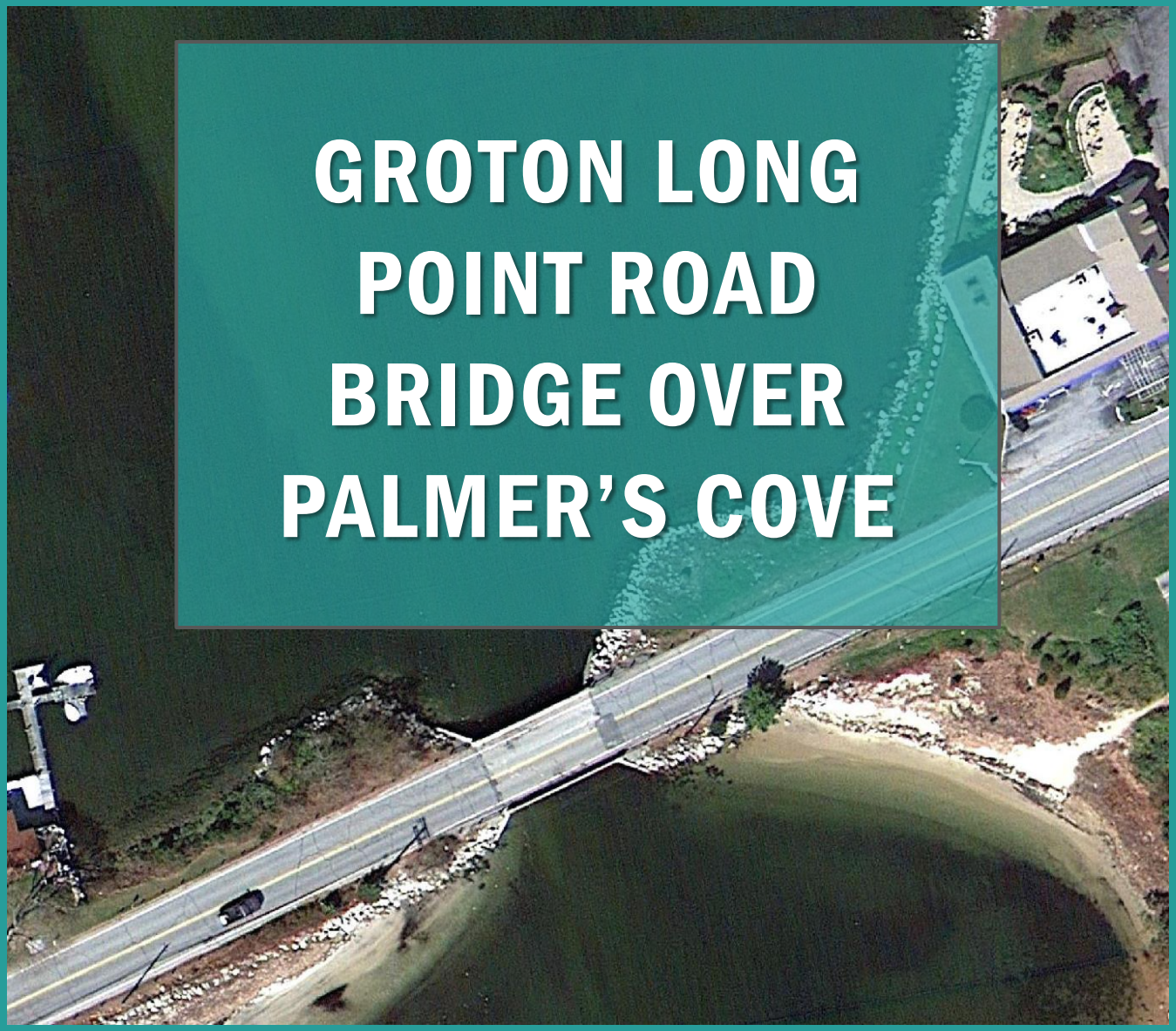


GROTON LONG POINT ROAD BRIDGE OVER PALMER'S COVE

Town of Groton Department of Public Works

AECOM

GROTON LONG POINT ROAD BRIDGE STRUCTURE TYPE STUDY REPORT

Groton, Connecticut

Presentation By:
James A . Platosh, P.E.

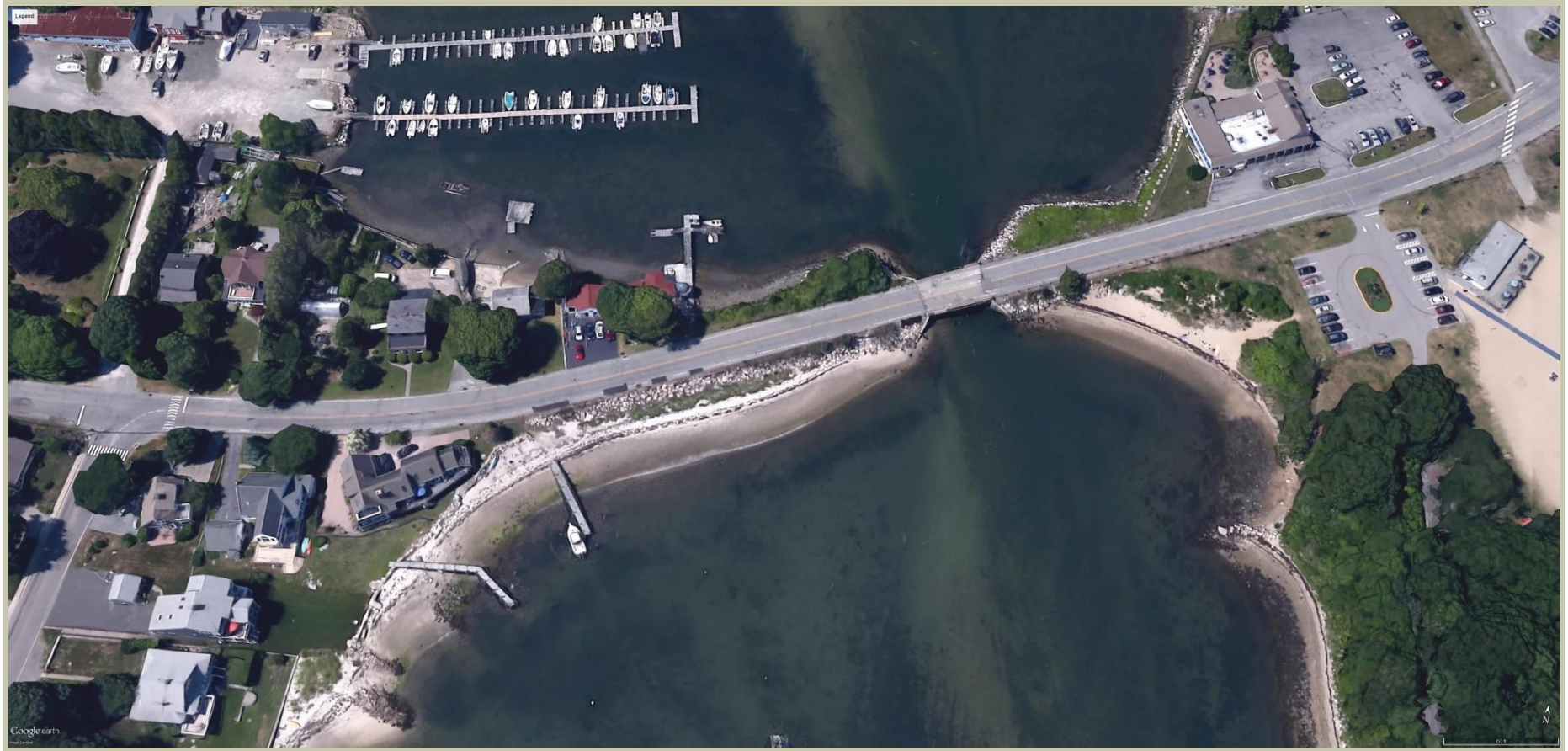
September 22, 2015

PRESENTATION OVERVIEW

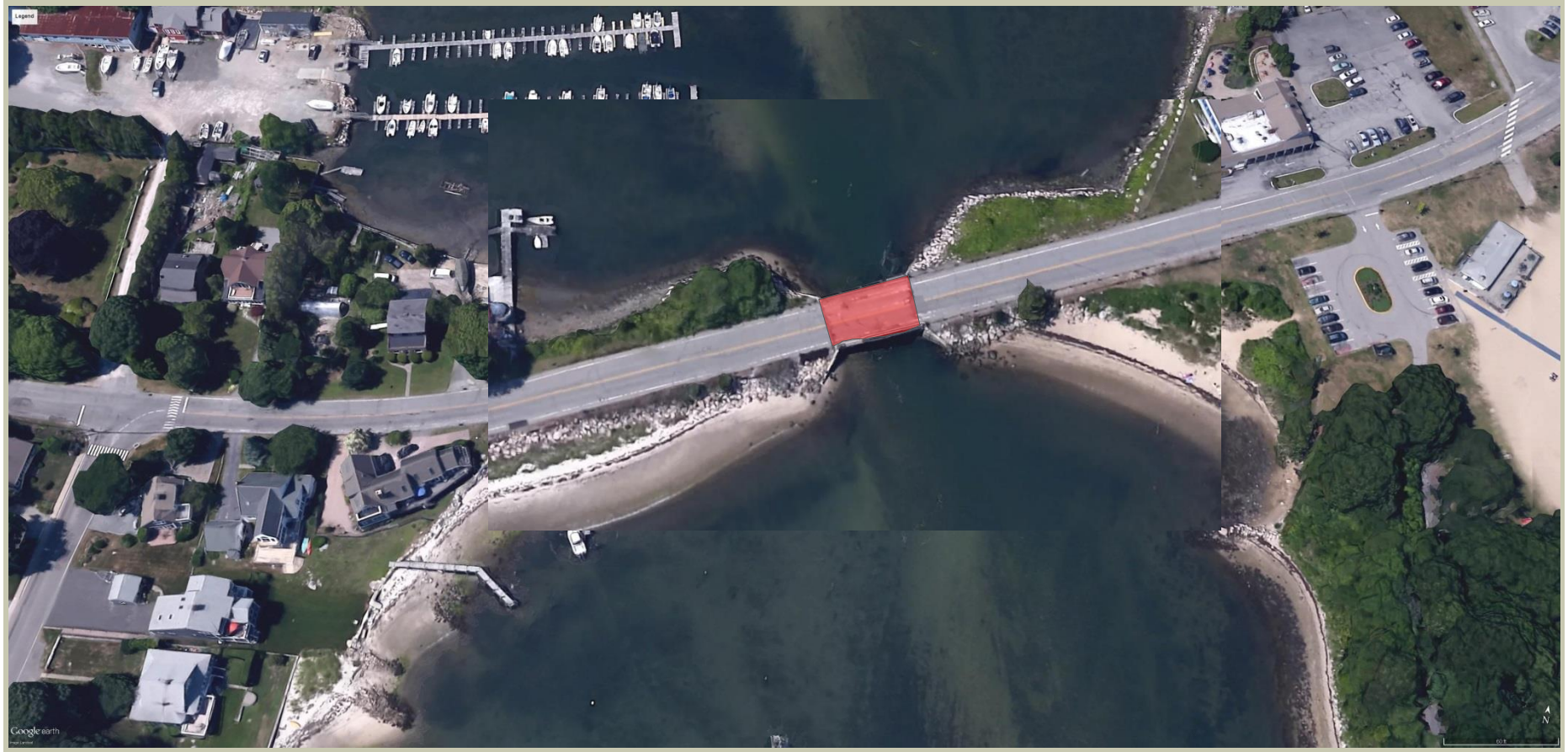
Groton Long Point Road Bridge Over Palmer's Cove

- Background – October 2013 Presentation of Bridge Study Final Report
- Presentation of Aug. 2015 Structure Type Study Report
  - Alternative Bridge Types Considered
  - Causeway Stability
  - Roadway Project Limits
  - Location of Sidewalk
  - Relocation of Overhead Utilities
  - Bridge Vertical Clearance
  - Federal Funding Opportunity

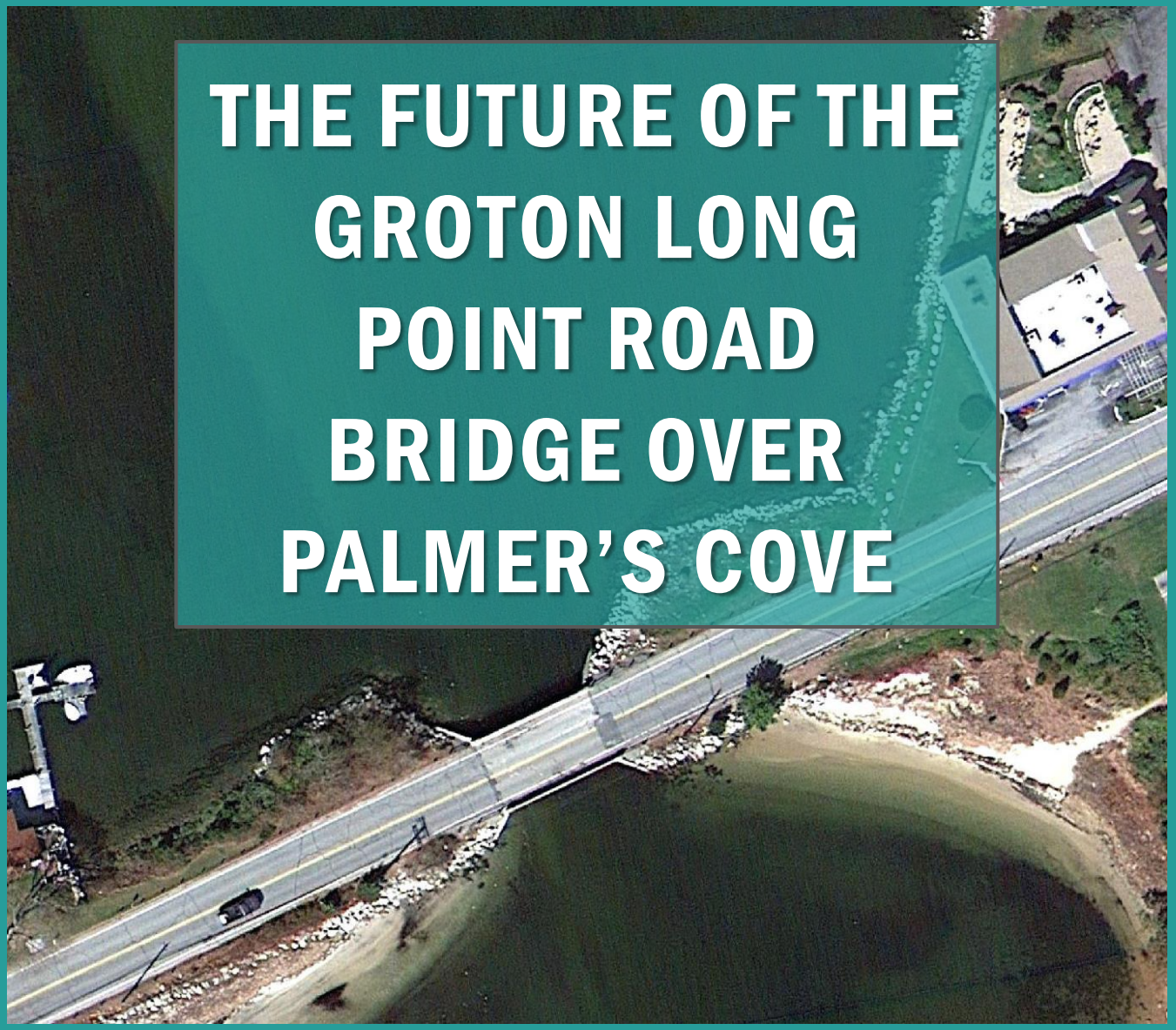
PROJECT AREA



GROTON LONG POINT ROAD BRIDGE



ROADWAY RECONSTRUCTION LIMITS



THE FUTURE OF THE GROTON LONG POINT ROAD BRIDGE OVER PALMER'S COVE

Town of Groton Department of Public Works

URS

GROTON LONG POINT ROAD BRIDGE STUDY FINAL REPORT

Groton, Connecticut

Presentation By:
James A . Platosh, P.E.

October 22, 2013

DID YOU VISIT US ONLINE?

Visit the website:
GrotonLongPointBridge.com

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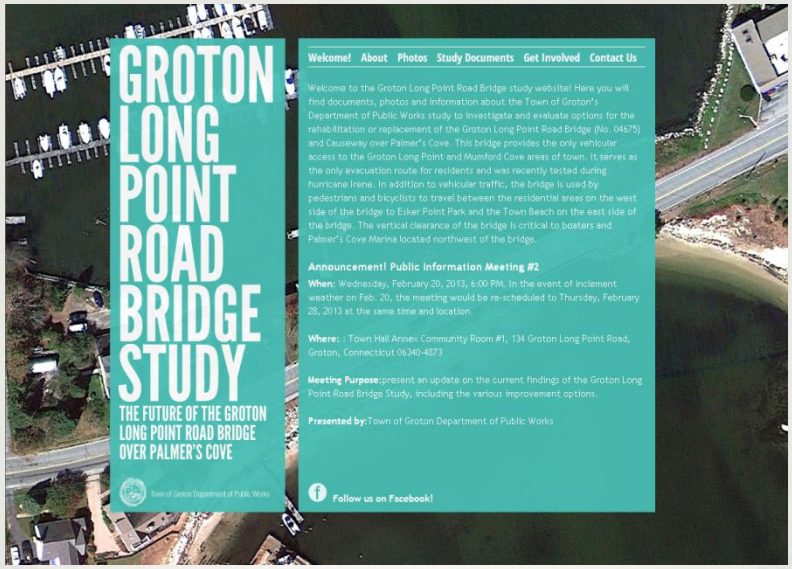


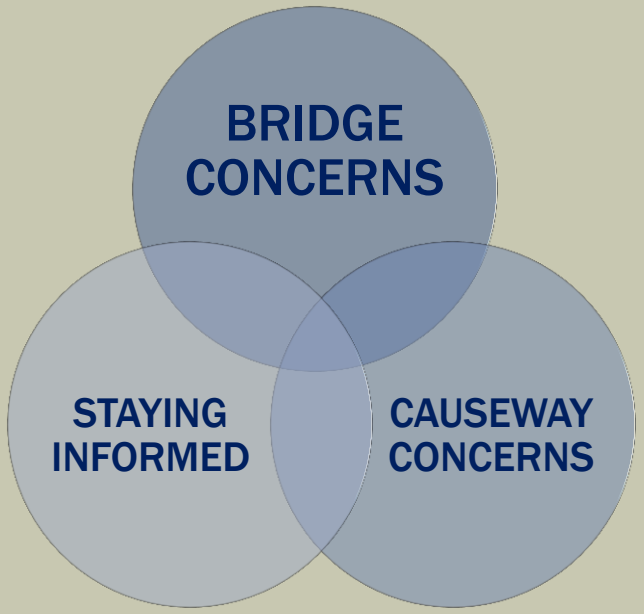
"We want to hear from you!"

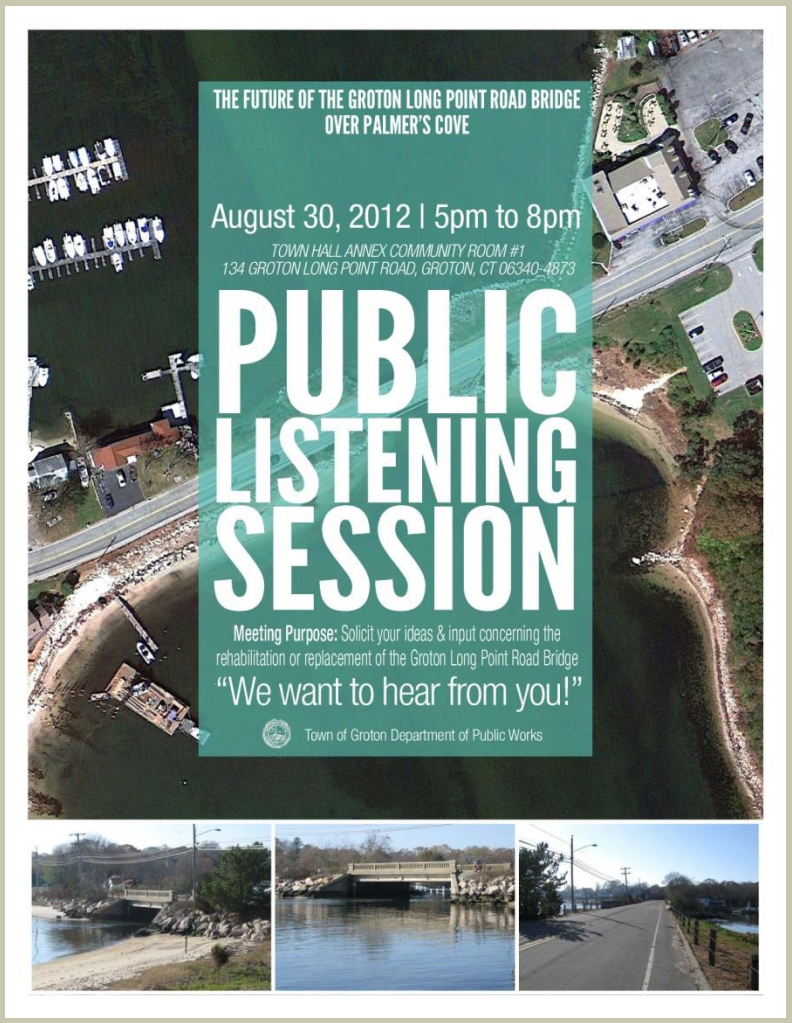
BACKGROUND

Public Meeting No. 1

August 30, 2012

5:00 to 8:00pm





COMMENTS

- Boater Concerns
  - Vertical Clearance
  - Horizontal Clearance
  - Dredge Channel
  - Maintain Access Between March and November and During Construction

- Bridge User Concerns
  - Widened for Bicycles and Pedestrians Safely
  - Walkway for Pedestrians
  - Children Jumping from Bridge
  - Fishing Platform
  - Water Main on Bridge is Back-up for Groton Long Point

COMMENTS CONTINUED…

- Environmental Concerns
  - Increase Tidal Flow
  - Sediment Accumulation Causing Sand Bar
  - Withstand Major Hurricanes
  - Protect Homeowners Adjacent
  - Only Route Off Point in Emergency

- Timing
  - Accident Waiting to Happen
  - Repaired ASAP

SCOPE OF WORK

Prepare Engineering Investigation and Evaluation of Rehabilitation Options for Bridge and Causeway.

STUDY OBJECTIVES

- Provide Safe Bridge Crossing and Roadway for Vehicles and Pedestrians
- Provide Causeway Capable of Withstanding Storm Surge
- Provide Structure that is Economical to Build and Maintain
- Minimize Environmental Impacts of Project
- Provide an Aesthetically Pleasing Structure that Complements the Area

EXISTING ROAD AND BRIDGE CONDITIONS

EXISTING ROADWAY

Bridge and Causeway Built in 1935

30’ Roadway

- Wire Rope Guide Rail
  - Substandard, poor condition
  - Not connected to bridge parapets
  - Minimal embedment due to erosion

EXISTING BRIDGE

- **Superstructure**
  - Concrete Encased Steel Beams
  - Cast-in-Place Concrete Deck
  - Abutments and Flared Wingwalls with Stone Veneer
  - Supported on Wood Piles
  - Concrete Parapets

UTILITIES

- Overhead Utilities
  - Electrical Feed to Fishers Island
- Watermain
- Sanitary Sewer Force Main

COMBINED UNDERWATER AND IN-DEPTH INSPECTION

BRIDGE NO. 04675
GROTON LONG POINT ROAD OVER PALMER COVE
GROTON, CONNECTICUT
SEPTEMBER 7, 2012

BRIDGE SAFETY INSPECTION

STATE PROJECT NO. 170-2868

RECEIVED
OCT 01 2012
CONNECTICUT - DOT
BRIDGE SAFETY & EVALUATION

CONNECTICUT DEPARTMENT OF TRANSPORTATION

STATE OF CONNECTICUT
MARK S. BUJTAS
No. 17690
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

McLaren ENGINEERING GROUP applied ingenuity
45 Barberry Lane, Meriden, CT 06457
100 Snake Hill Road, West Nyack, NY 10994

Garg Consulting Services, Inc.
ENGINEERS • CONSULTANTS • CONSTRUCTION MANAGERS
2096A Silas Deane Hwy
Rocky Hill, CT. 06067

CTDOT

SEPTEMBER 7, 2012

IN-DEPTH & UNDERWATER INSPECTION RESULTS

CTDOT BRIDGE SAFETY INSPECTION
September 7,2012

Project No. 170-2868 Bridge No. 04675
Sheet 4 of 40

Executive Summary

Bridge No. 04674 carries Groton Long Point Road over Palmer Cove in Groton. The single-span concrete encased steel multi-girder bridge with reinforced concrete deck was built in 1935, has an overall length of 56 feet and a curb-to-curb width of 30 feet. Stone masonry abutments support the superstructure. Palmer Cove is a salt water body with tidal flow. According to the information on file with the Connecticut Department of Transportation, the Inventory rating for an H-20 loading is 75 tons using composite action between the deck and girders. Due to the separation between the deck and beams, the previous load rating should be updated analyzing the bridge as a non-composite structure.

A combined underwater and in-depth inspection was started on September 7, 2012 and completed on September 12, 2012 and found the bridge to be in poor condition (overall rating = 4). The deficiencies found on the bridge and recommendations for repairs are as follows:

Deck:

The deck is in poor condition (Overall rating = 4) due to the following:

1. Approximately 50% of the bituminous concrete overlay has hollow areas with map cracks and areas of concrete pumping through cracks. There is a bituminous patch in eastbound lane over the East Abutment. Seal the cracks (400 LF).
2. The deck ends over the abutments have random transverse cracks up to full length, raveling areas up to 1 ft. by 3 in. by 1 in. deep, minor uneven areas, bituminous patches and spalls. Repair overlay and/or joint detail at deck ends (40 LF).
3. The underside of the concrete deck has random transverse hairline cracks with isolated dampness and efflorescence, and extensive areas of hairline map cracking with dampness and/or efflorescence. There are random hollow areas and spalls along the underside of the deck overhangs adjacent to the fascia girders up to 10 ft. long by 10 in. wide and up to 1 in. deep. Both deck ends over the abutments are spalled up to full length by 4 in. wide by 3 in. deep with random areas of exposed reinforcement. There is up to a 3/8 in. gap by 10 ft. long between the top of all girders and the deck overhang for full length. The total underside of deck deterioration is approximately 43.4%. Continue to monitor.
4. There are free fall drain pipes at all four corners of the bridge. The northeast, northwest and southeast pipes are fully clogged with dirt, and the end 6 in. of the drain pipes have up to 100% loss. Clean out drain pipes (3 EA).

Superstructure:

The superstructure is in poor condition (Overall rating = 4) due to the following:

1. Steel sliding plates at both abutments have light to moderate rust with random areas of painted over laminated rust and pack rust between plates up to 1 inch thick. West Abutment bearing plates have random areas of pitting up to ¼ in. deep. No evidence of movement. Continue to monitor.
2. The bottom flanges at the bearing areas have as little as ¾ in. remaining at the edge of the flange for up to 1 in. wide at both sides along the bearing plates (1 ¼ in. original, 2.7% loss in non

*"...found the **Bridge** to be in poor condition (Overall Rating = 4)..."*

*"...The **Deck** is in poor condition (Overall Rating = 4)..."*

*"...The **Superstructure** is in poor condition (Overall Rating = 4)..."*

CTDOT BRIDGE SAFETY INSPECTION
September 7,2012

critical zone). The remaining flange length has spotty areas of 1/8 in. deep pitting (< 5% loss). The concrete encasement has random cracks and hollow areas/spalls along the webs, up to full length by 1 ft. high by 1 in. deep, and along the haunches of the top flanges, up to full length by 8 in. wide by 2 in. deep. The top flange edges have laminated rust and up to 1/16 in. loss of width where exposed. There is laminated rust along the bottom flange edges with up to 1/16 in. loss of width.

Substructure:

The substructure is in fair condition (Overall rating = 5) due to the following:

1. There are random vertical and transverse hairline cracks in the concrete abutment caps with rust stains. The West Abutment has hollow areas under G5 & G6, 6 square feet total. Also, hollow areas extend along the side of bearings with heavy scale areas ½ in. deep. The stone masonry has random hairline cracks in the mortar joints. Continue to monitor.
2. The concrete wingwall caps have hairline map cracking throughout and several random vertical and transverse cracks up to ½ in. wide. Stems have random displaced stones. All four wingwalls have spalls near the ends of the walls up to 4 ft. long by 0.9 ft. high by 0.8 ft. deep. The caps are typically displaced at these spall locations, up to 1½ in. (all wingwalls except northwest). The stone masonry has up to 20% of loose/missing mortar along the joints with up to 1.5 ft. of penetration. The northwest wingwall has a ¼ in. wide by up to 6 ft. high vertical crack adjacent to the abutment stem. Repair deteriorated concrete along the caps (1 CY).

Channel and Channel Protection:

The channel is in satisfactory condition (Overall rating = 6) due to the following:

1. The mudline along the West Abutment has typically lowered up to 0.9 ft. and there is up to 1.2 ft. of degradation along the northwest wingwall since the 2008 inspection. The mudline along the East Abutment has typically lowered up to 0.5 ft. since the 2008 inspection. The mudline along the north fascia has lowered up to 0.9 ft. and has risen up to 0.7 ft. since the 2008 inspection. Continue to monitor.

Approach Condition:

The approach is in fair condition (Overall rating = 5, downrated from 6) due to the following:

1. The cables of the approach guide rails are typically slack, the timber posts are typically weathered and random posts are leaning/tilted. One post at the southeast approach is snapped off at ground level. Consider installing an improved guide rail system.
2. Both approach pavements have random longitudinal and transverse cracks. The pavement along the deck ends is breaking up with random areas of raveling, and is settled up to 2 in. (worst locations are in the north shoulder over the East Abutment). Seal the cracks (100± LF) and repair potholes and settlement (<½ TON).
3. There is an 8 in. diameter by 1 ft. deep erosion area at the northwest embankment adjacent to the first timber guard rail post, and a 10 ft. by 3 ft. by up to 1 ft. deep erosion area along the southwest embankment. Repair erosion areas (1 CY).

*"...The **Substructure** is in fair condition (Overall Rating = 5)..."*

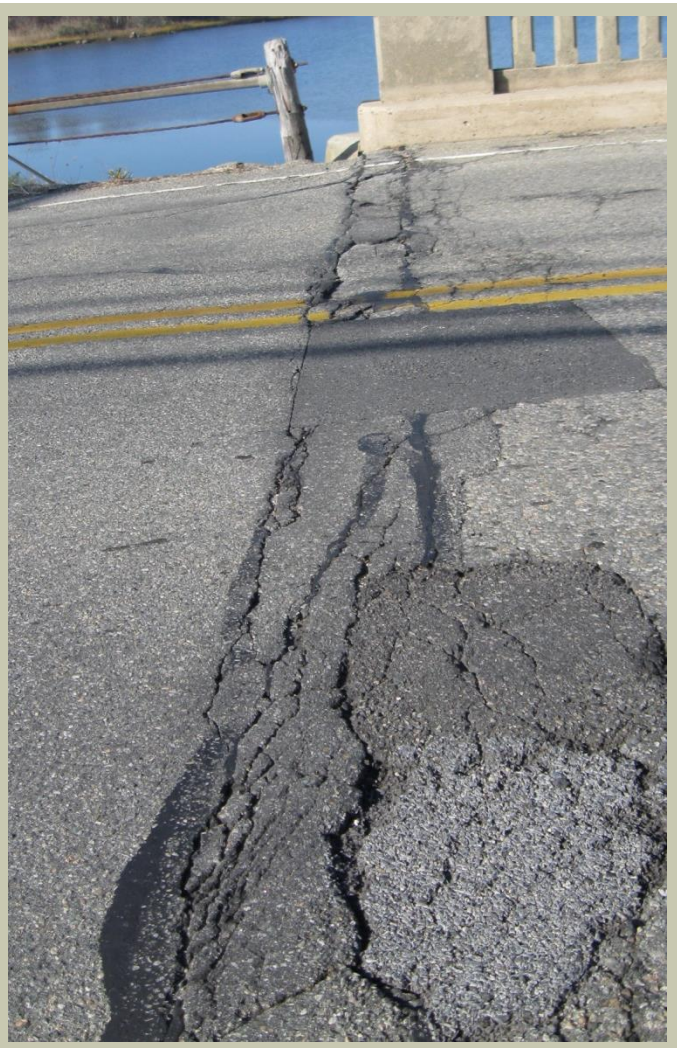
*"...The **Channel** is in satisfactory condition (Overall Rating =6)..."*

*"...The **Approach** is in fair condition (Overall Rating = 5, downrated from 6)..."*

CONDITIONS OF EXISTING BRIDGE

- Last inspected by CTDOT: September 7, 2012

- Deck
  - Roadway surface – Cracking at joints
  - Underside of deck – Extensive map cracking
  - **Rated: 4**



CONDITIONS OF EXISTING BRIDGE

- Superstructure
  - Concrete encased beams
  - **Rated: 4**

CONDITIONS OF EXISTING BRIDGE

- Substructure
  - Rated: 5
- Overall Condition:
  - *Poor*

CONDITIONS OF EXISTING CAUSEWAY

- Causeway
  - Randomly Placed Stone of Various Sizes
  - Brush, Small Trees
  - Sand Below High Tide Line

HURRICANE DAMAGE ASSESSMENT

Town Engineering Division

Hurricane Sandy Preliminary Damage Assessment Report

- Struck October 29, 2012
- No observable movement, cracking or shifting of substructure, substructure or roadway surface
- Eroded along edge of roadway on southern bank of causeway

HURRICANE DAMAGE ASSESSMENT

Town Engineering Division

Hurricane Sandy Preliminary Damage Assessment Report

- Water over-topped roadway in low profile area west of bridge

HURRICANE DAMAGE ASSESSMENT

Town Engineering Division

Hurricane Sandy Preliminary Damage Assessment Report

- Eastbound lane closed to traffic
- Roadway Elevations
  - Center of Bridge: Elevation 9.30
  - Roadway Low Point (240’ West of Bridge): Elevation 7.96

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) TIDE DATA

- New London Gauging Station
- Water level peaked October, 29, 2012 at 8:12pm
  - Water level peak: Elevation: 6.16
- Bridge Bottom Chord Elevation: Elevation 5.72

- Supports evidence wave action over-topped roadway
- From 7:48 PM to 8:54 PM
  - Water Level: Elevation 6.0
- From 6:00 PM to 10:36 PM
  - Water Level: Elevation 5.0

PROPOSED BRIDGE REHABILITATION ALTERNATIVES

OVERVIEW

Bridge Rehabilitation	Alternative No. 1	Superstructure Replacement
	Alternative No. 2	Superstructure Replacement with Pedestrian Bridge
Bridge Replacement	Alternative No. 3	Bridge Replacement Single Span
	Alternative No. 4	Bridge Replacement Three Span

BASIS OF ALTERNATIVE STRUCTURE TYPE SELECTION

- Must accommodate staged construction to maintain vehicular traffic flow
- Must be durable in coastal environment
- Must be economical to build and maintain
- Separate permanent or temporary pedestrian bridge is required to maintain pedestrian traffic during construction
- Reuse of some structural elements considered for reasons of economy
- Rehabilitation of existing superstructure considered deemed impractical and uneconomical

EXISTING ROADWAY

Roadway	30’
Travel Lanes	12’
Shoulders/Bike Lane	3’
Pedestrian Accommodations	None

Roadway	33’
Travel Lanes	12’
Shoulders/Bike Lane	4’ 6”
Pedestrian Accommodations	None

ALTERNATIVE NO. 1

Superstructure Replacement

Roadway	33’
Travel Lanes	12’
Shoulders/Bike Lane	4’ 6”
Pedestrian Accommodations	6’ Pedestrian Bridge

ALTERNATIVE NO.2

Superstructure Replacement with Sidewalk

Roadway	33’
Travel Lanes	12’
Shoulders/Bike Lane	4’ 6”
Pedestrian Accommodations	6’ Sidewalk

ALTERNATIVE NO.3

Bridge Replacement and Widening

EXISTING

URS

ALTERNATIVE NO.1 -SUPERSTRUCTURE REPLACEMENT

URS

ALTERNATIVE NO.2 - SUPERSTRUCTURE REPLACEMENT WITH SIDEWALK

URS

ALTERNATIVE NO.3 - BRIDGE REPLACEMENT AND WIDENING

URS

EXISTING

URS

ALTERNATIVE NO.1 -SUPERSTRUCTURE REPLACEMENT

URS

ALTERNATIVE NO.2 - SUPERSTRUCTURE REPLACEMENT WITH SIDEWALK

URS

ALTERNATIVE NO.3 - BRIDGE REPLACEMENT AND WIDENING

URS

EXISTING

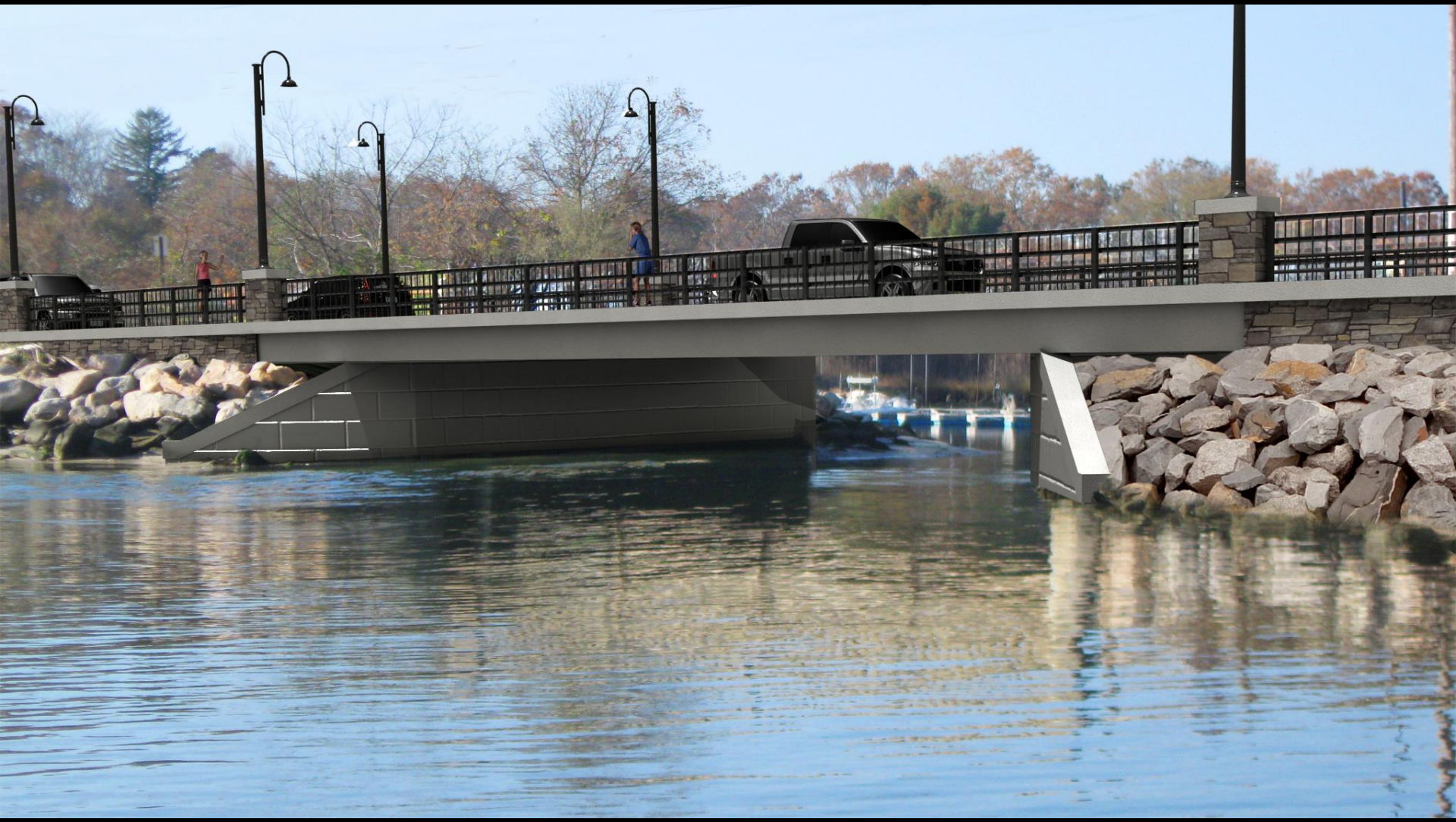
URS

ALTERNATIVE NO.1 -SUPERSTRUCTURE REPLACEMENT

URS

ALTERNATIVE NO.2 - SUPERSTRUCTURE REPLACEMENT WITH SIDEWALK

URS



ALTERNATIVE NO.3 - BRIDGE REPLACEMENT AND WIDENING

URS

SUMMARY

ALTERNATIVE NO. 1 – Superstructure Replacement

Roadway	33’
Travel Lanes	12’
Shoulders	4’ 6”
Pedestrian Accommodations	None

ALTERNATIVE NO. 2 – Superstructure Replacement with Sidewalk

Roadway	33’
Travel Lanes	12’
Shoulders	4’ 6”
Pedestrian Accommodations	6’ Pedestrian Bridge

ALTERNATIVE NO. 3 – Bridge Replacement with Widening and Sidewalk

Roadway	33’
Travel Lanes	12’
Shoulders	4’ 6”
Pedestrian Accommodations	6’ Sidewalk

ALTERNATIVE *NO. 4 – Full Replacement 3 Spans, 36’-86’-36’*

Roadway	33’
Travel Lanes	12’
Shoulders	4’ 6”
Pedestrian Accommodations	6’ Sidewalk

CONSTRUCTION COST SUMMARY

Bridge Alternatives

ALTERNATIVE NO. 1 - Superstructure Replacement	ALTERNATIVE NO. 2 – Superstructure Replacement with Sidewalk	ALTERNATIVE NO. 3 – Bridge Replacement and Widening	ALTERNATIVE NO. 4 – Full Bridge Replacement
$1,700,000	$2,400,000	$4,100,000+	$5,400,000+

PROPOSED CAUSEWAY REHABILITATION ALTERNATIVES

Alternative A	Placement of Additional Protective Stone Armoring
Alternative B	Pile Support Retaining Wall

CONSTRUCTION COST SUMMARY

Causeway Options	
ALTERNATIVE A – Protective Armoring	ALTERNATIVE B – Pile Supported Retaining Wall to Support Widened Roadway
$500,000	$1,000,000

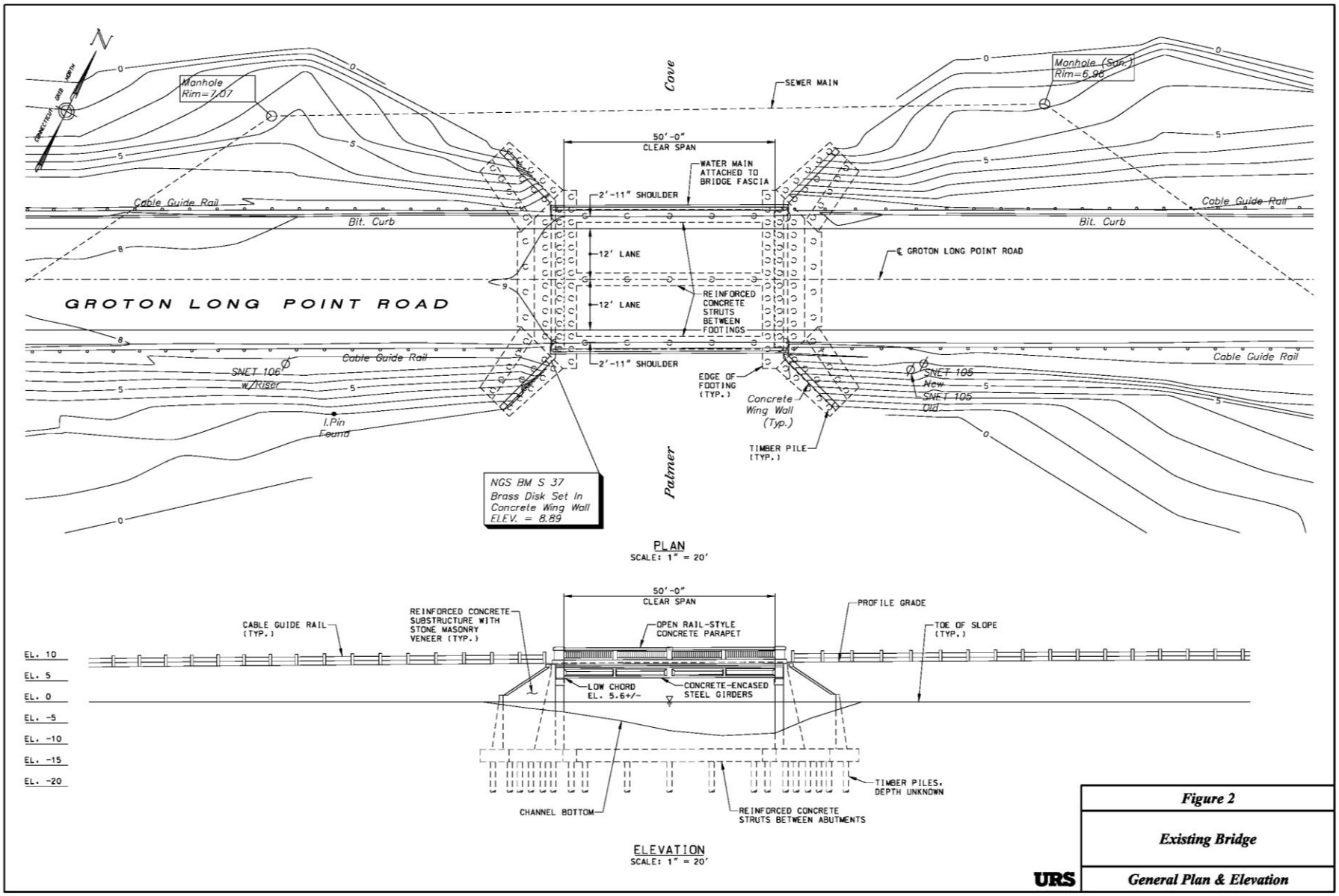
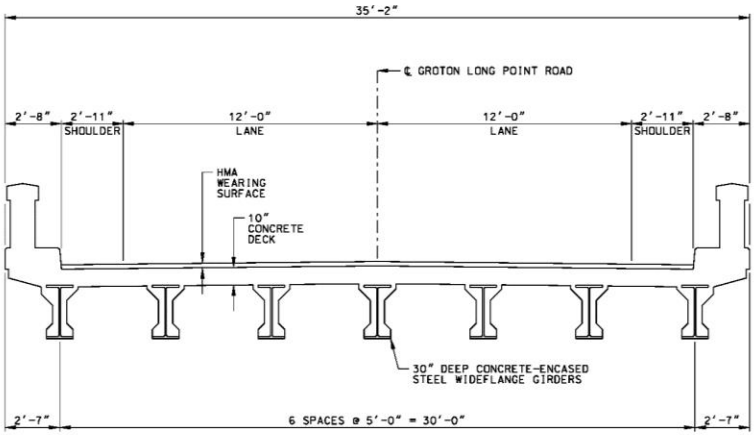


Figure 2

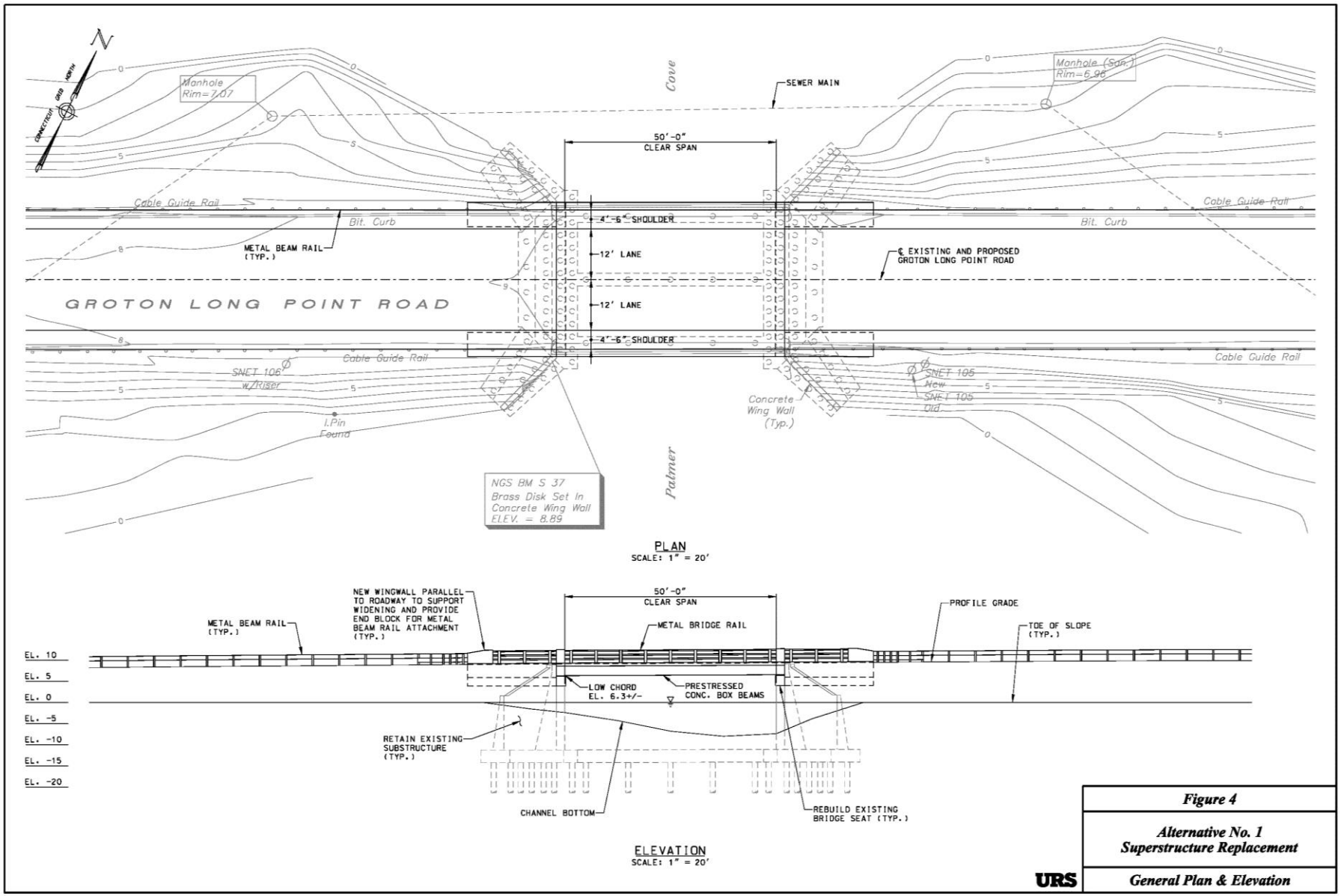
Existing Bridge

URS **General Plan & Elevation**



TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure 3
Existing Bridge
URS *Typical Section*



PLAN
SCALE: 1" = 20'

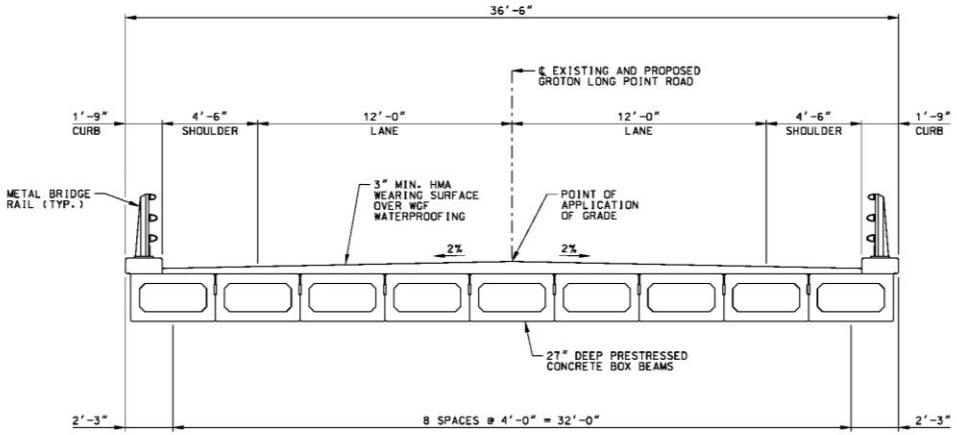
ELEVATION
SCALE: 1" = 20'

Figure 4

Alternative No. 1
Superstructure Replacement

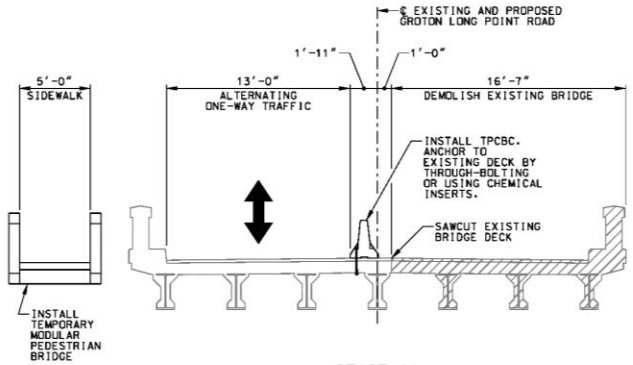
URS

General Plan & Elevation

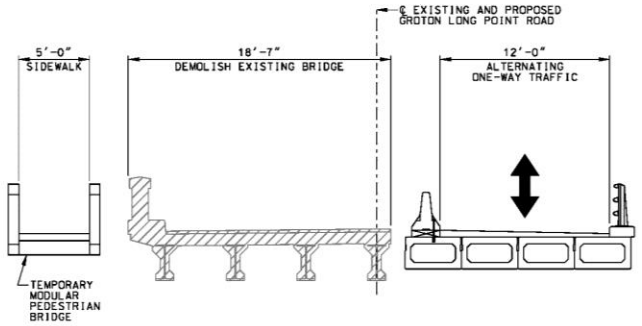


TYPICAL SECTION
SCALE: 3/16" = 1'-0"

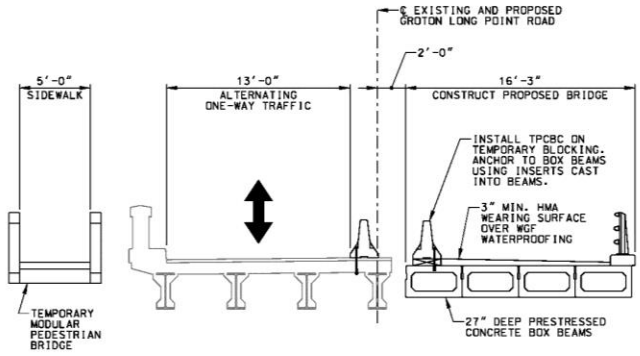
Figure 5
Alternative No. 1 ***Superstructure Replacement***
URS ***Typical Section***



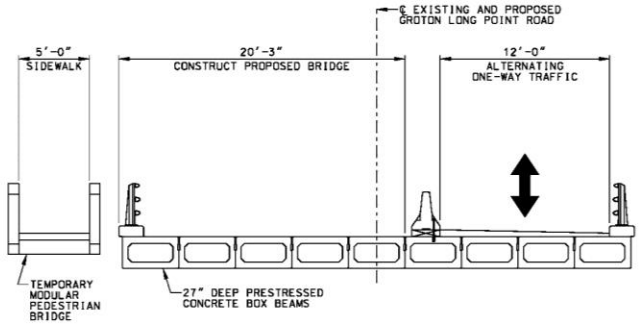
STAGE 1A



STAGE 2A



STAGE 1B



STAGE 2B

STAGE CONSTRUCTION
SCALE: 1/8" = 1'-0"

Figure 6

Alternative No. 1
Superstructure Replacement

URS

Stage Construction

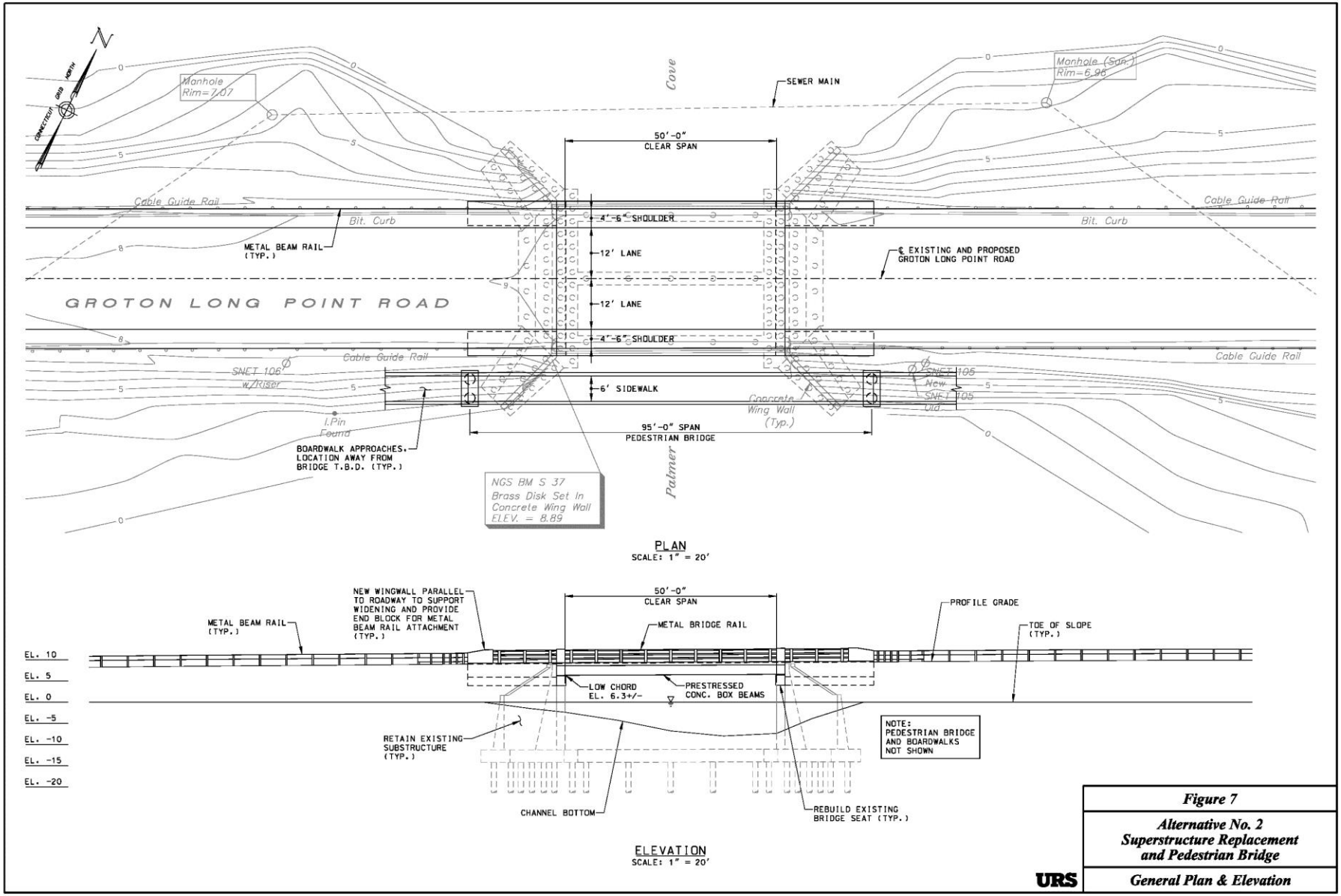
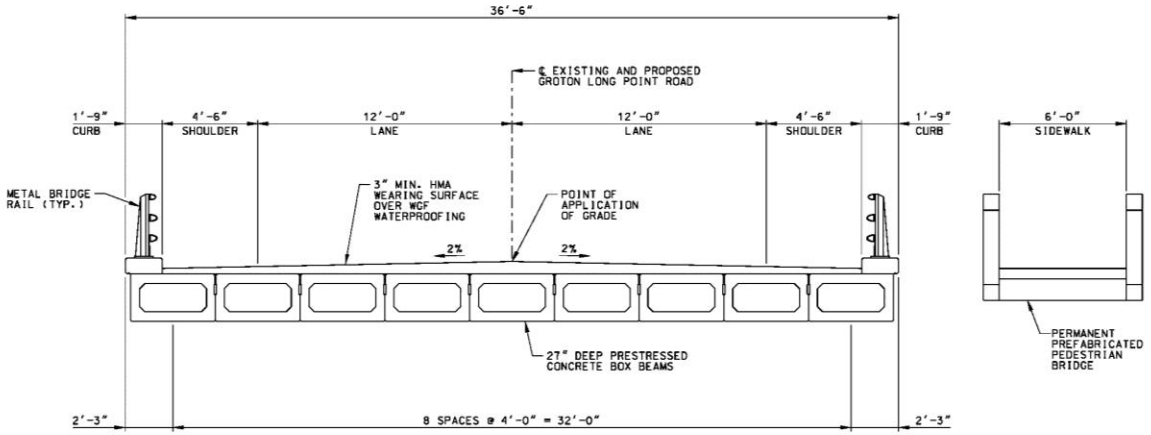


Figure 7

Alternative No. 2
Superstructure Replacement
and Pedestrian Bridge

General Plan & Elevation

URS



TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure 8
Alternative No. 2 Superstructure Replacement and Pedestrian Bridge
URS ***Typical Section***

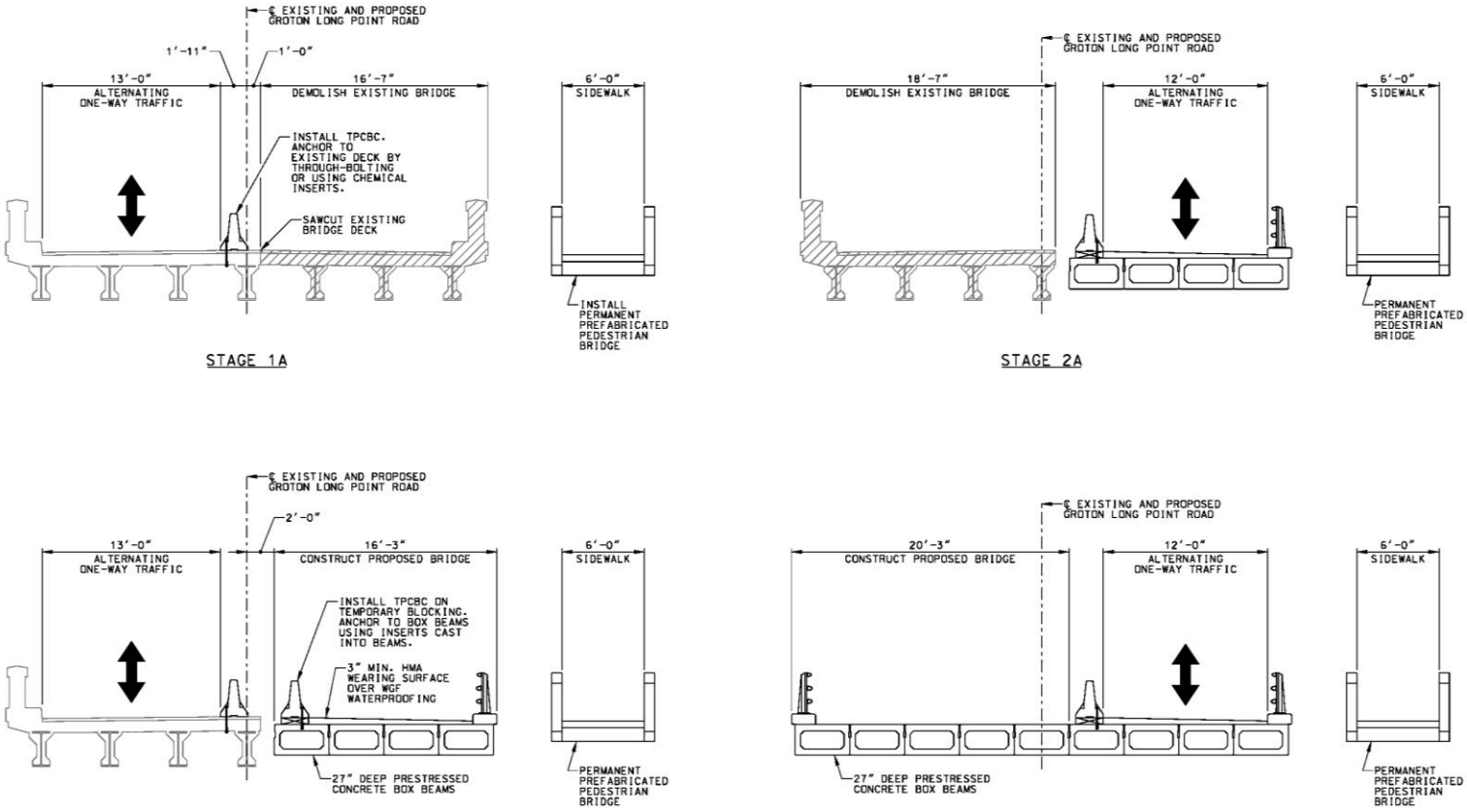
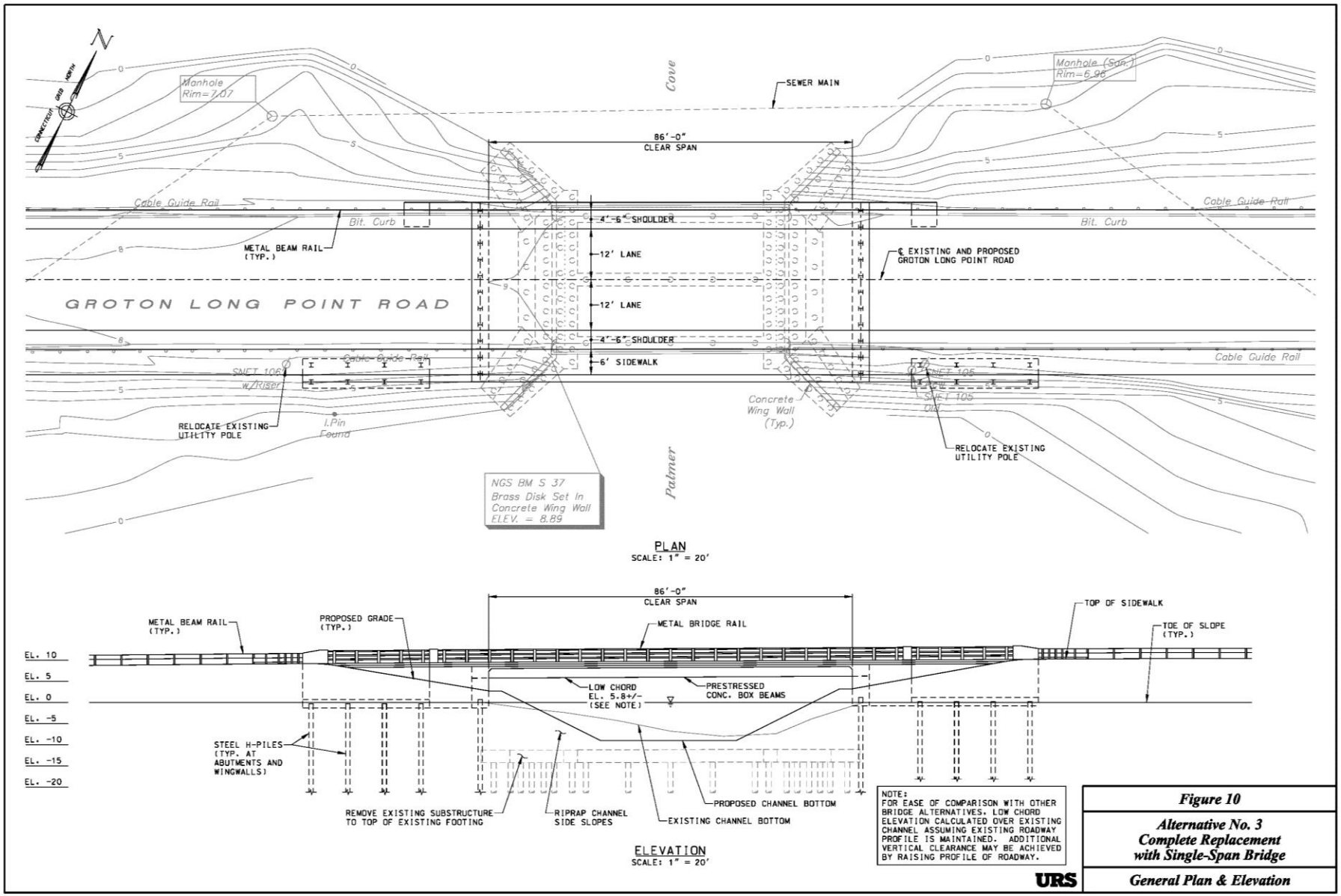


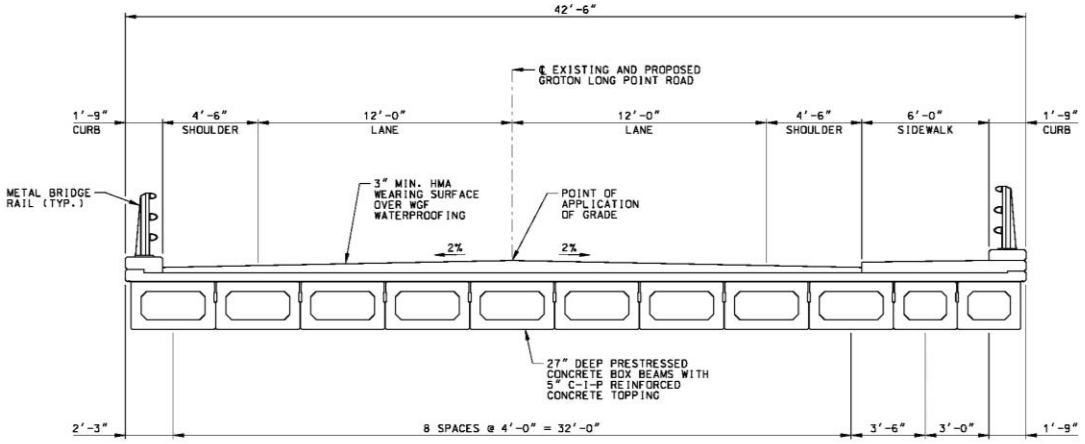
Figure 9

Alternative No. 2
Superstructure Replacement and Pedestrian Bridge

URS

Stage Construction

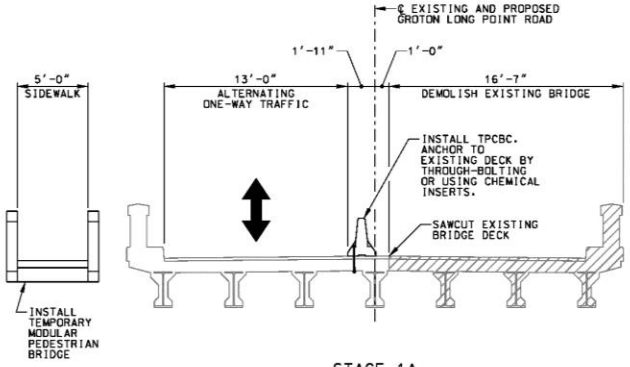

Manhole
Rim=7.07
Cove
SEWER MAIN
Manhole (San.)
Rim=6.96
86'-0"
CLEAR SPAN
Cable Guide Rail
Bit. Curb
4'-6" SHOULDER
12' LANE
12' LANE
4'-6" SHOULDER
6' SIDEWALK
METAL BEAM RAIL
(TYP.)
℄ EXISTING AND PROPOSED
GROTON LONG POINT ROAD
GROTON LONG POINT ROAD
SNET 106
w/Riser
RELOCATE EXISTING
UTILITY POLE
I.Pin
Found
NGS BM S 37
Brass Disk Set In
Concrete Wing Wall
ELEV. = 8.89
Palmer
Concrete
Wing Wall
(Typ.)
SNET 105
w/Riser
SNET 105
Old
RELOCATE EXISTING
UTILITY POLE
PLAN
SCALE: 1" = 20'
86'-0"
CLEAR SPAN
METAL BEAM RAIL
(TYP.)
PROPOSED GRADE
(TYP.)
METAL BRIDGE RAIL
TOP OF SIDEWALK
TOE OF SLOPE
(TYP.)
EL. 10
EL. 5
EL. 0
EL. -5
EL. -10
EL. -15
EL. -20
LOW CHORD
EL. 5.8+/-
(SEE NOTE)
PRESTRESSED
CONC. BOX BEAMS
STEEL H-PILES
(TYP. AT
ABUTMENTS AND
WINGWALLS)
REMOVE EXISTING SUBSTRUCTURE
TO TOP OF EXISTING FOOTING
RIPRAP CHANNEL
SIDE SLOPES
EXISTING CHANNEL BOTTOM
PROPOSED CHANNEL BOTTOM
ELEVATION
SCALE: 1" = 20'
NOTE:
FOR EASE OF COMPARISON WITH OTHER
BRIDGE ALTERNATIVES, LOW CHORD
ELEVATION CALCULATED OVER EXISTING
CHANNEL ASSUMING EXISTING ROADWAY
PROFILE IS MAINTAINED. ADDITIONAL
VERTICAL CLEARANCE MAY BE ACHIEVED
BY RAISING PROFILE OF ROADWAY.
URS
Figure 10
Alternative No. 3
Complete Replacement
with Single-Span Bridge
General Plan & Elevation



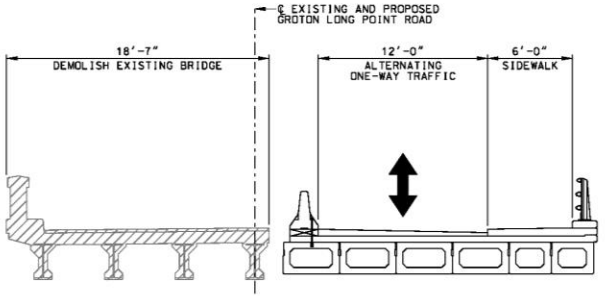
TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure 11
Alternative No. 3 Complete Replacement with Single-Span Bridge
Typical Section

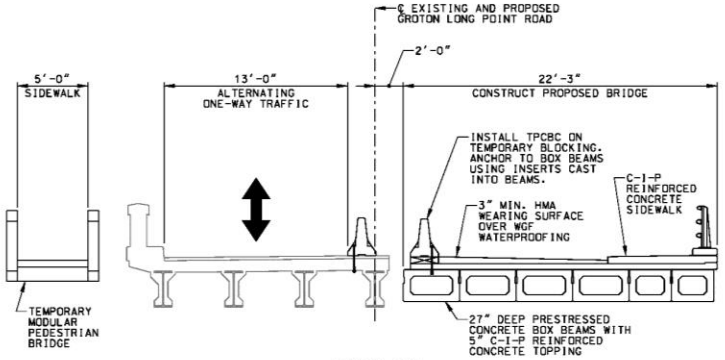
URS



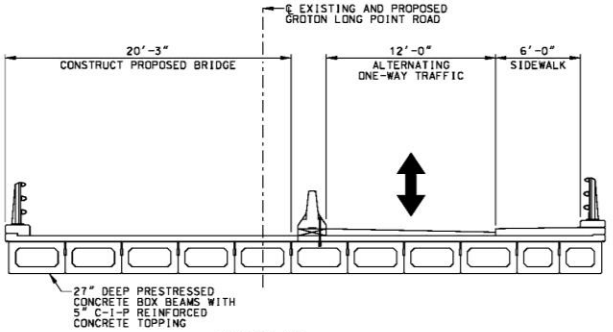
STAGE 1A



STAGE 2A



STAGE 1B



STAGE 2B

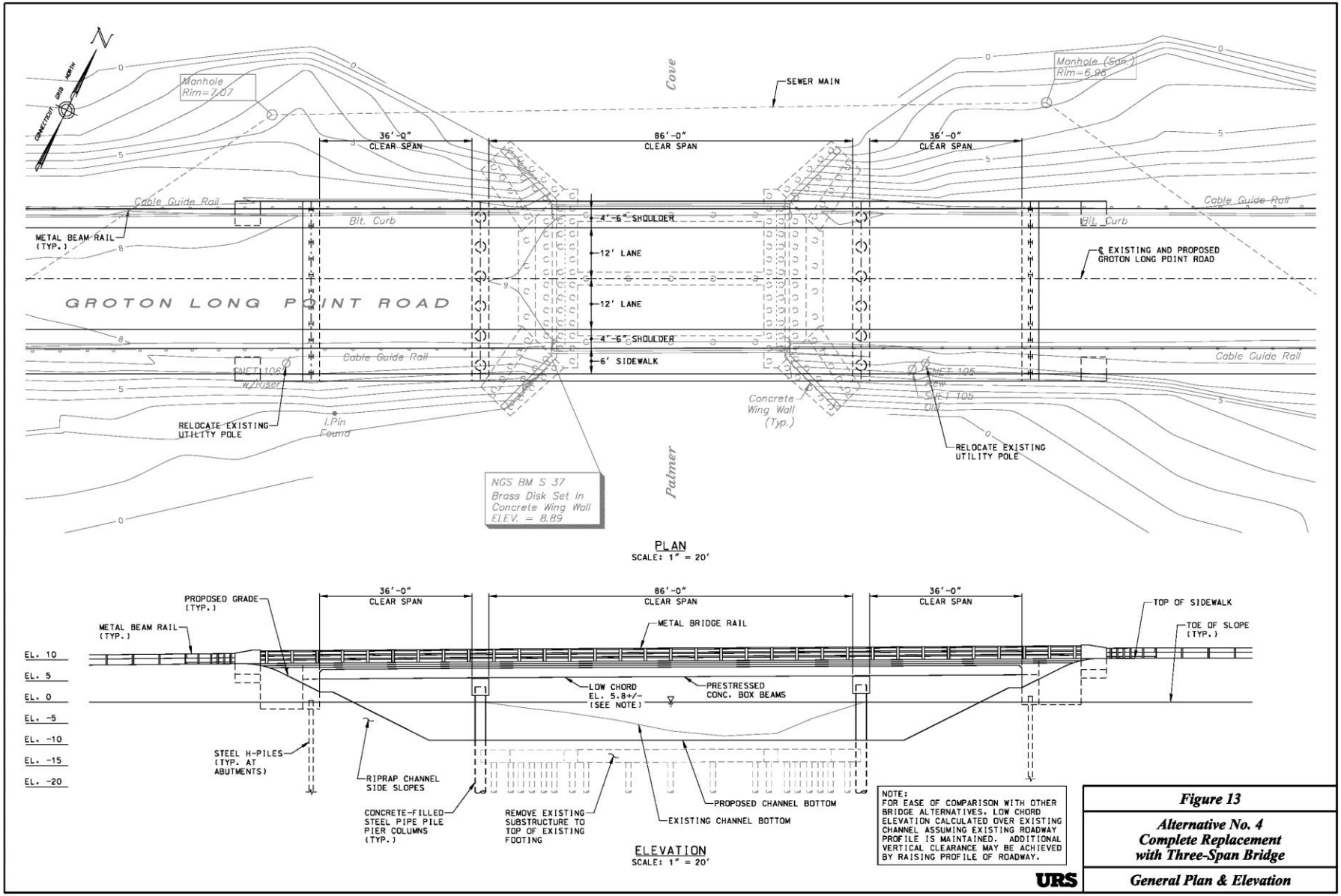
STAGE CONSTRUCTION
SCALE: 1/8" = 1'-0"

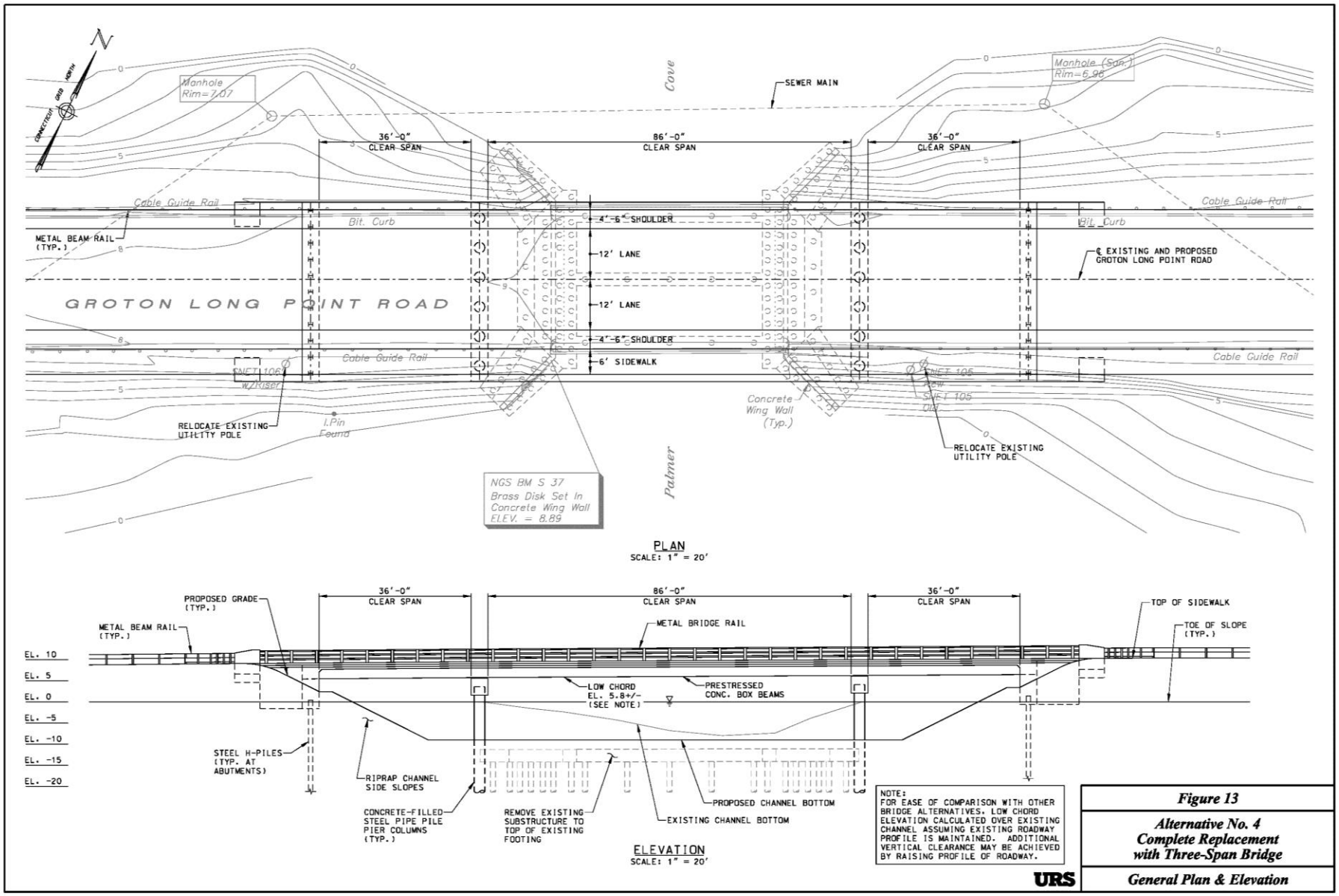
Figure 12

Alternative No. 3
Complete Replacement
with Single-Span Bridge

URS

Stage Construction


Manhole
Rim=7.07
Cove
SEWER MAIN
Manhole (San.)
Rim=6.96
36'-0"
CLEAR SPAN
86'-0"
CLEAR SPAN
36'-0"
CLEAR SPAN
Cable Guide Rail
Bit. Curb
4'-6" SHOULDER
12' LANE
12' LANE
4'-6" SHOULDER
6' SIDEWALK
METAL BEAM RAIL
(TYP.)
℄ EXISTING AND PROPOSED
GROTON LONG POINT ROAD
GROTON LONG POINT ROAD
UNIT 106
w/Riser
RELOCATE EXISTING
UTILITY POLE
I.Pin
Found
Concrete
Wing Wall
(Typ.)
UNIT 105
New
UNIT 105
Old
RELOCATE EXISTING
UTILITY POLE
Palmer
NGS BM S 37
Brass Disk Set In
Concrete Wing Wall
ELEV. = 8.89
PLAN
SCALE: 1" = 20'
PROPOSED GRADE
(TYP.)
METAL BEAM RAIL
(TYP.)
METAL BRIDGE RAIL
TOP OF SIDEWALK
TOE OF SLOPE
(TYP.)
EL. 10
EL. 5
EL. 0
EL. -5
EL. -10
EL. -15
EL. -20
LOW CHORD
EL. 5.8+/-
(SEE NOTE)
PRESTRESSED
CONC. BOX BEAMS
STEEL H-PILES
(TYP. AT
ABUTMENTS)
RIPRAP CHANNEL
SIDE SLOPES
CONCRETE-FILLED
STEEL PIPE PILE
PIER COLUMNS
(TYP.)
REMOVE EXISTING
SUBSTRUCTURE TO
TOP OF EXISTING
FOOTING
PROPOSED CHANNEL BOTTOM
EXISTING CHANNEL BOTTOM
ELEVATION
SCALE: 1" = 20'
NOTE:
FOR EASE OF COMPARISON WITH OTHER BRIDGE ALTERNATIVES, LOW CHORD ELEVATION CALCULATED OVER EXISTING CHANNEL ASSUMING EXISTING ROADWAY PROFILE IS MAINTAINED. ADDITIONAL VERTICAL CLEARANCE MAY BE ACHIEVED BY RAISING PROFILE OF ROADWAY.
URS
Figure 13
Alternative No. 4
Complete Replacement
with Three-Span Bridge
General Plan & Elevation



PLAN
SCALE: 1" = 20'

ELEVATION
SCALE: 1" = 20'

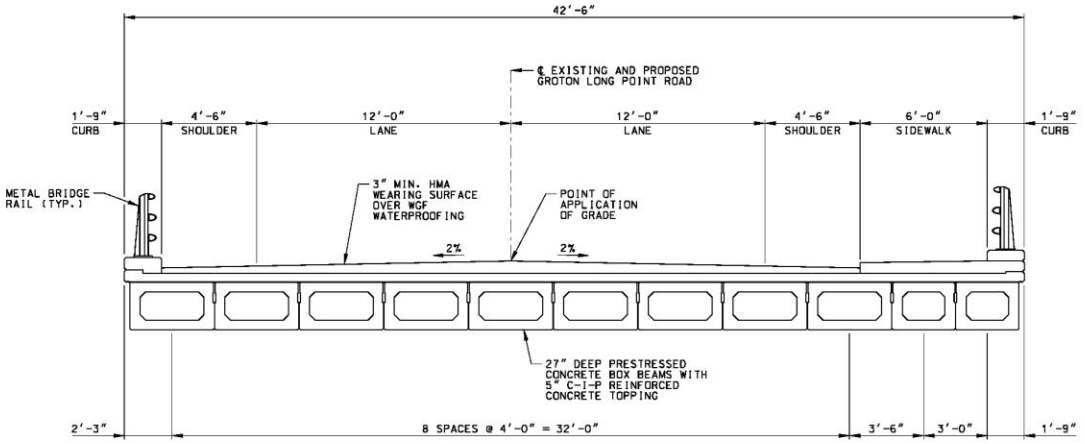
NOTE:
FOR EASE OF COMPARISON WITH OTHER BRIDGE ALTERNATIVES, LOW CHORD ELEVATION CALCULATED OVER EXISTING CHANNEL ASSUMING EXISTING ROADWAY PROFILE IS MAINTAINED. ADDITIONAL VERTICAL CLEARANCE MAY BE ACHIEVED BY RAISING PROFILE OF ROADWAY.

URS

Figure 13

Alternative No. 4
Complete Replacement
with Three-Span Bridge

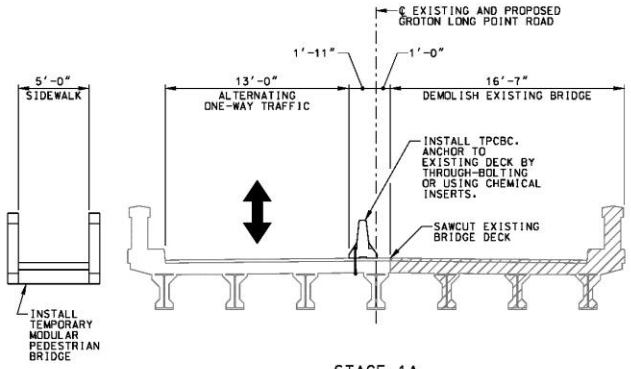
General Plan & Elevation



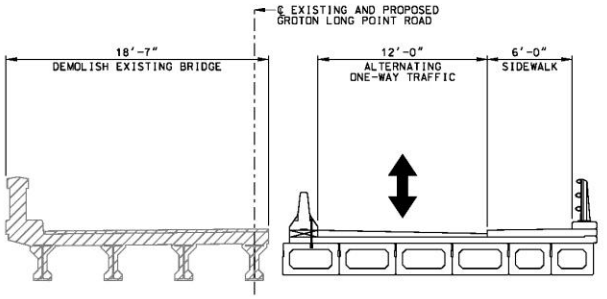
TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure 14
Alternative No. 4 Complete Replacement with Three-Span Bridge
Typical Section

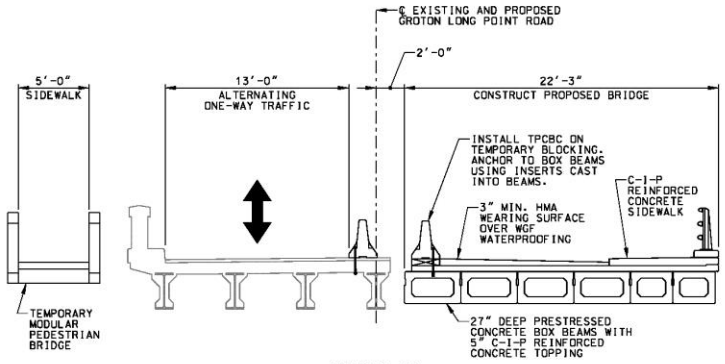
URS



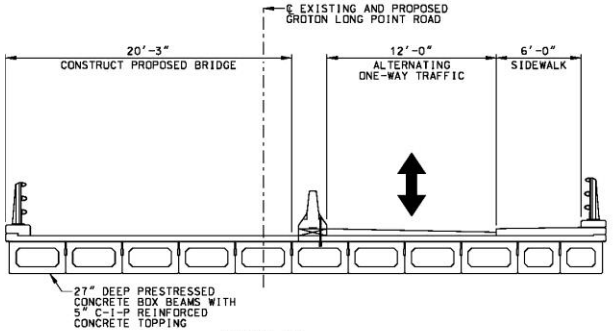
STAGE 1A



STAGE 2A



STAGE 1B



STAGE 2B

STAGE CONSTRUCTION

SCALE: $\frac{1}{8}$" = 1'-0"

Figure 15

Alternative No. 4
Complete Replacement
with Three-Span Bridge

URS

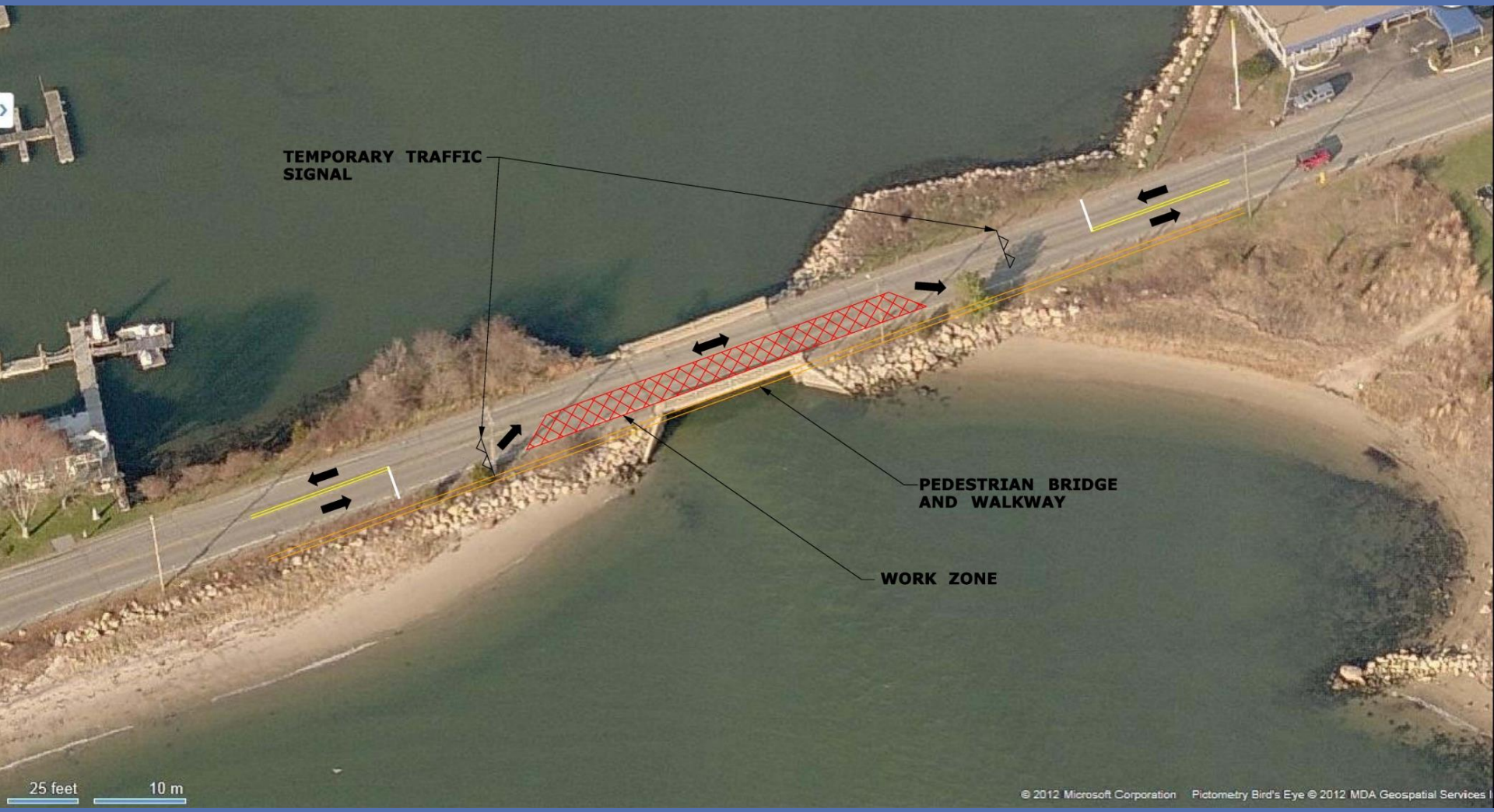
Stage Construction

CONSTRUCTION STAGING

CONSTRUCTION STAGING

Objective: Maintain vehicular, pedestrian, and marine traffic flow

- Construct Pedestrian Bridge and Walkway
- Install Temporary Traffic Signal
- Implement Alternating Traffic Flow
- **Construction Stage 1** - Southerly Half of Bridge
- Open Completed Half to Traffic
- **Construct Stage 2** - Northerly Half of Bridge
- Open New Bridge to Traffic


TEMPORARY TRAFFIC SIGNAL
PEDESTRIAN BRIDGE AND WALKWAY
WORK ZONE
25 feet
10 m
© 2012 Microsoft Corporation
Pictometry Bird's Eye © 2012 MDA Geospatial Services

STAGE 1


TEMPORARY TRAFFIC SIGNAL
WORK ZONE
TEMPORARY TRAFFIC SIGNAL
PEDESTRIAN BRIDGE AND WALKWAY
25 feet
10 m
© 2012 Microsoft Corporation
Pictometry Bird's Eye © 2012 MDA Geospatial Services

STAGE 2

CONSTRUCTION SCHEDULE

- Driven by Environmental Permit Restrictions
- Stage 1
  - First Season
- Stage 2
  - Second Season

OPEN DISCUSION
AND
QUESTIONS & ANSWERS

Visit the website:

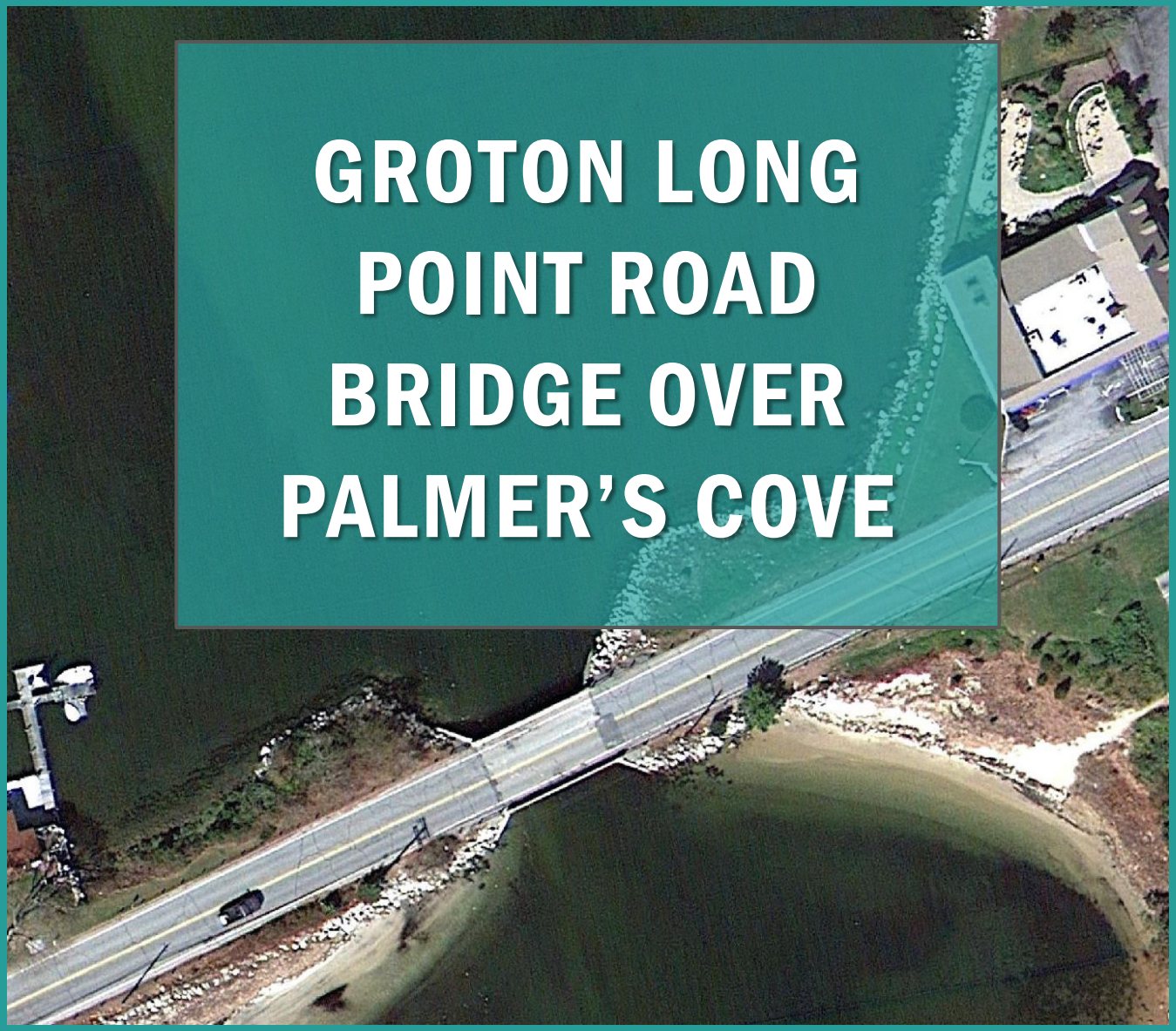
GrotonLongPointBridge.com

Follow us on Facebook

"We want to hear from you!"

Town of Groton Department of Public Works

URS



GROTON LONG POINT ROAD BRIDGE OVER PALMER'S COVE

Town of Groton Department of Public Works

AECOM

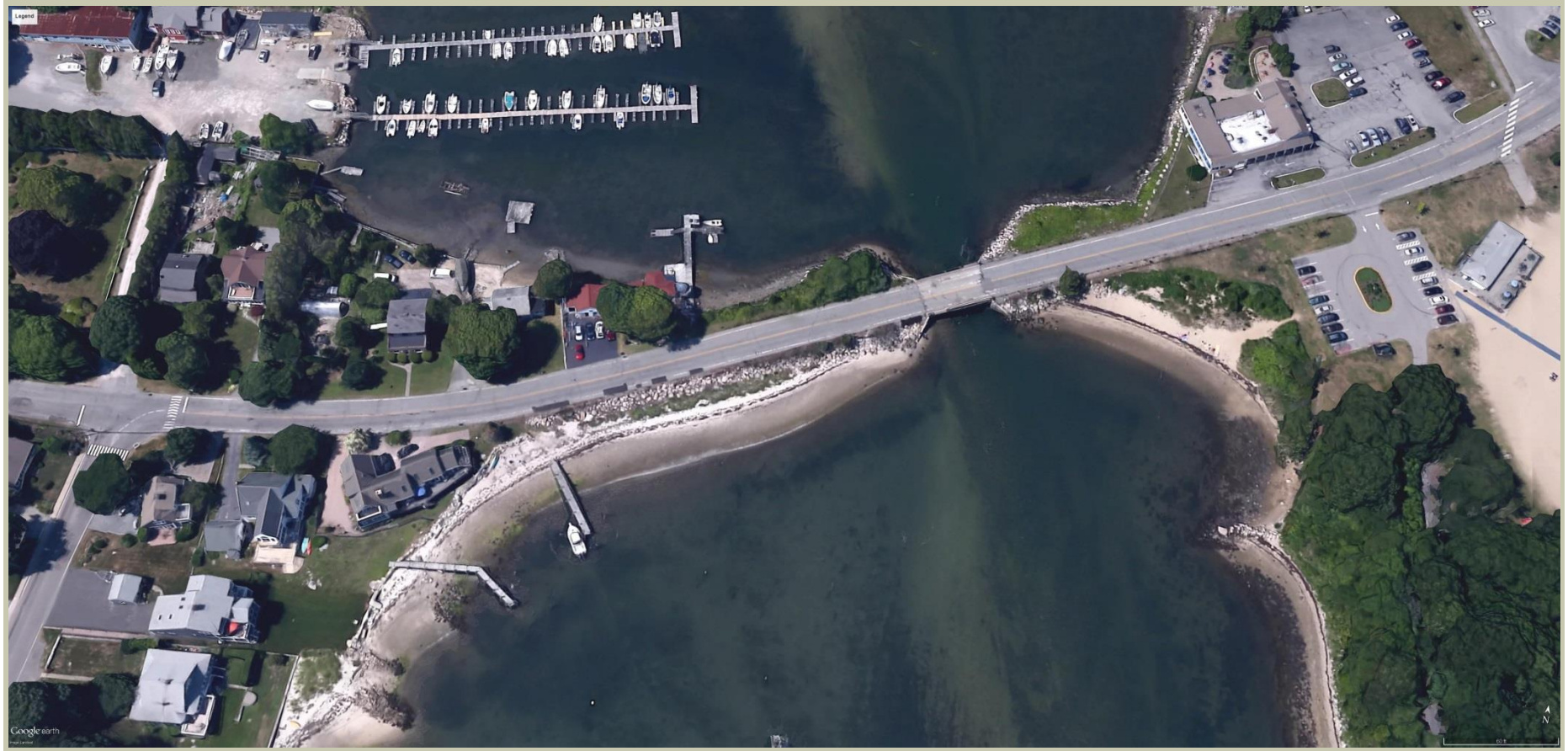
GROTON LONG POINT ROAD BRIDGE STRUCTURE TYPE STUDY REPORT

Groton, Connecticut

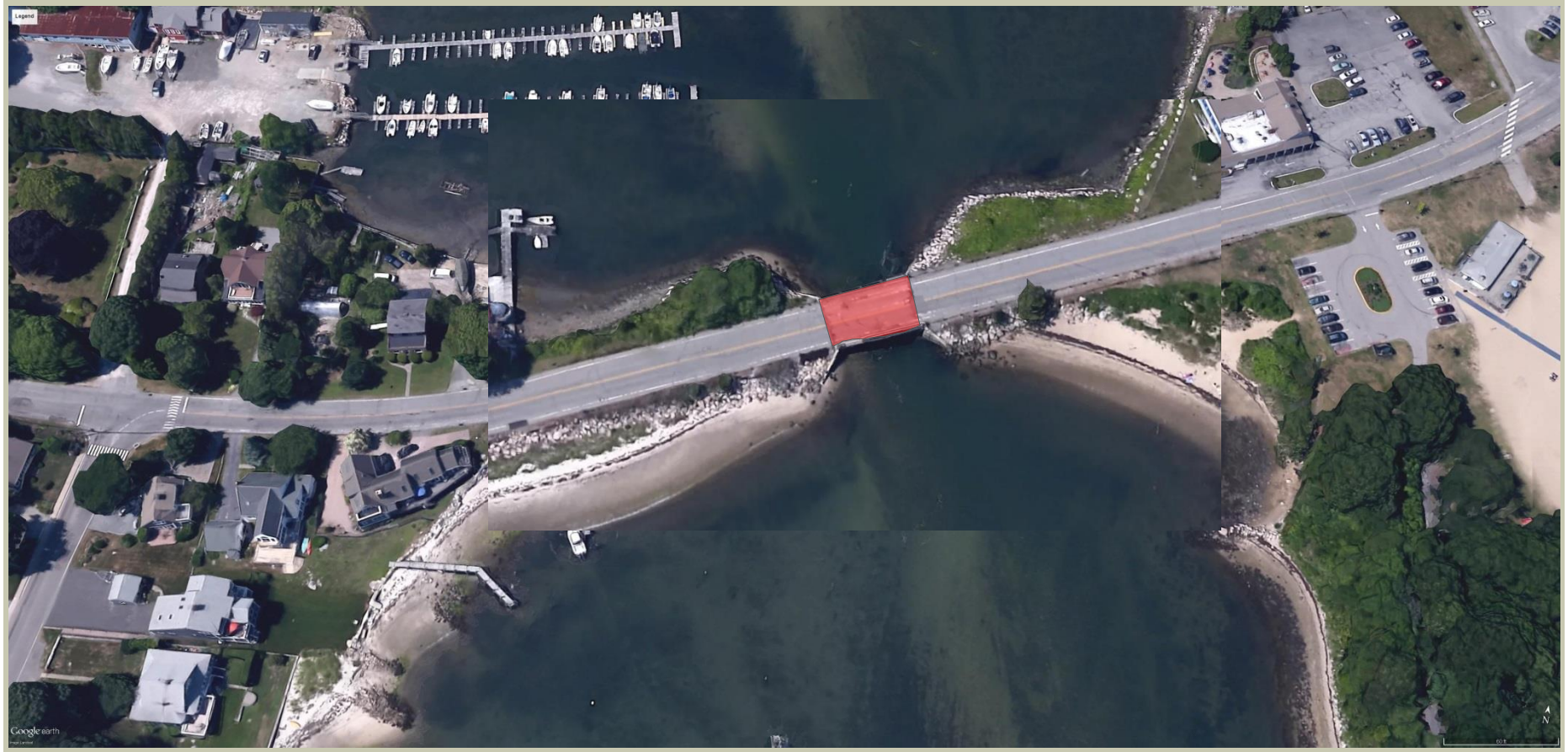
Presentation By:
James A . Platosh, P.E.

September 22, 2015

PROJECT AREA

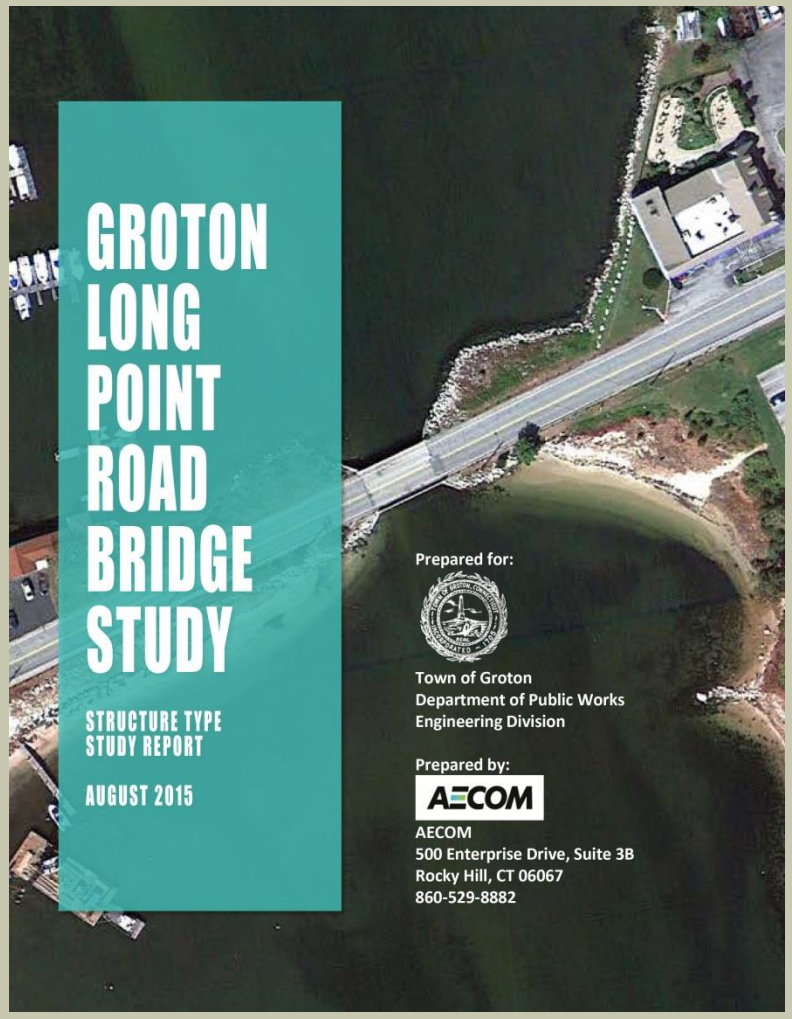


GROTON LONG POINT ROAD BRIDGE



ROADWAY RECONSTRUCTION LIMITS

STRUCTURE TYPE STUDY REPORT COMPLETED AUGUST 2015



- Evaluated
  - (3) roadway structure type options
  - (3) pedestrian structure type option
  - Causeway stability analysis

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ALTERNATIVE BRIDGE TYPES CONSIDERED

- Superstructure Replacement Alternatives
  - Alternative SR1, Prestressed Concrete Box Beams
  - Alternative SR2, Steel Rolled Beams
  - Alternative SR3, NEXT Beams
- Pedestrian Bridge Alternatives
  - Alternative PB1, Prestressed Concrete Box Beams
  - Alternative PB2, Steel Rolled Beams
  - Alternative PB3, Prefabricated Half Through Truss

AECOM

CONSTRUCTION COST

- Superstructure Replacement Alternatives
  - Alternative SR1, Prestressed Concrete Box Beams - $898,000
  - Alternative SR2, Steel Rolled Beams - $973,000
  - Alternative SR3, NEXT Beams - $927,000
- Pedestrian Bridge Alternatives
  - Alternative PB1, Prestressed Concrete Box Beams - $417,000
  - Alternative PB2, Steel Rolled Beams - $491,000
  - Alternative PB3, Prefabricated Half Through Truss - $378,000
- Cost Differences between Alternatives are Negligible

AECOM

ROADWAY RECONSTRUCTION

- Maintain essentially same width within 60 R.O.W.
  - Start at Fisherman Restaurant
  - End at East Shore Drive
- Provide sidewalk on one side
  - Need further study to determine North or South side
- Maintain essentially same profile grade on approaches
  - Grade at bridge about 1 foot higher

AECOM

[redacted]

EXISTING

UTILITIES

- Relocate Overhead Utilities
  - Electrical
  - Telephone
  - Cable

- Relocate Watermain to New Bridge

CAUSEWAY

- Existing constructed after Hurricane Carol (1954)
- Revetment comprised of large riprap (stones with dimensions of 4-5 feet)
- Withstood numerous major storms since construction
  - Numerous Nor'easters
  - Tropical Storm Irene (2011)
  - Remnants of Hurricane Sandy (2012 – Storm of Record)
- Minor damage reported
- Revetment will be reconstructed to support widened roadway

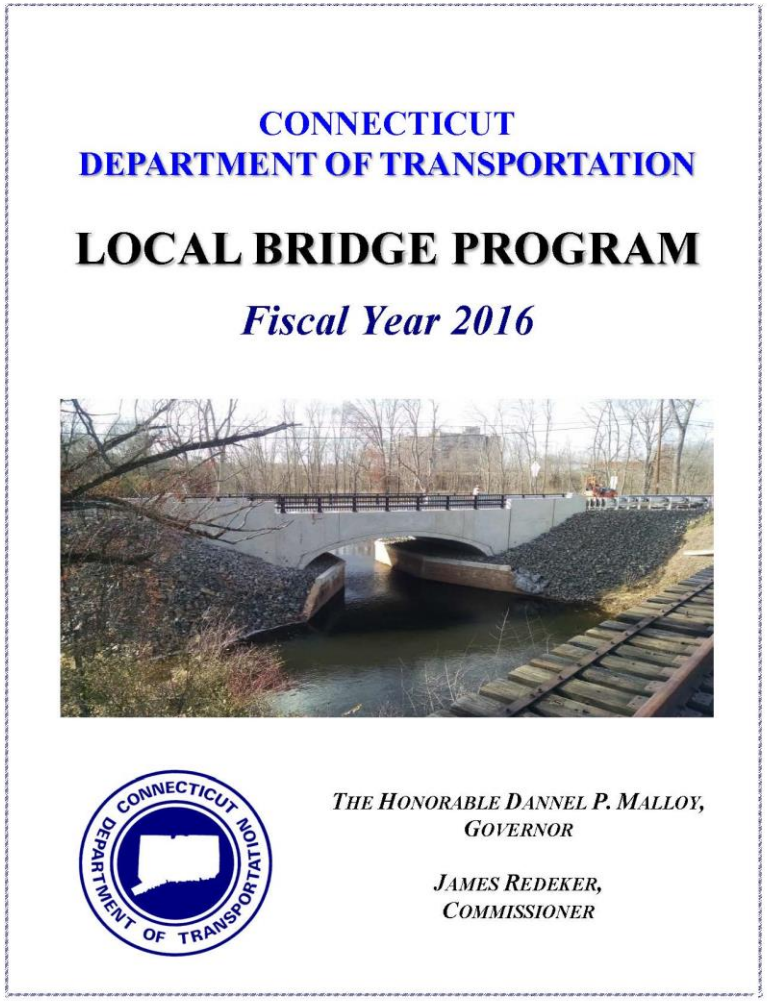
AECOM

CAUSEWAY (CONTINUED)

- New revetment designed according to state-of-the-art Federal Highway guidelines and procedures
- New revetment will comprise well-graded riprap of approximately the same size
- Designed with top and toe embedment
- New design considers projected sea level rise
  - 10” of the next 100 years

AECOM

FUNDING OPTION



- Federal Funds
- HBP / Off System Bridge STP
- Reimbursement
  - Federal – 80%
  - Town – 20%

AECOM

FEDERAL FUNDING

- Eligible Costs
- Preliminary Engineering
  - Advertising for consulting engineer selection (RFQ/RFPs, etc.)
  - Engineering studies and inspections undertaken to determine whether a bridge is eligible for the Local Bridge Program
  - Preliminary surveys
  - Preliminary engineering activities, including type studies, preparation of project plans, specifications, and cost estimates
  - Preparation of bid documents
  - Preparation of permit applications
  - Soil borings and other subsurface investigations used for design
  - Public hearings and legal notices
  - Historical reviews and archeological studies prior to construction

AECOM

FEDERAL FUNDING (CONTINUED)

- Rights of Way
  - Property and easement acquisition
  - Property appraisals
  - Title searches
  - Legal fees for eminent domain proceedings
- Utilities
- Construction
  - Construction costs
  - Temporary structures necessary to perform the work
  - Payroll costs of municipal employees directly working on the project
  - Costs generally recognized as reasonable and necessary for the performance of the project taking
  - Costs incurred to comply with Federal and State laws and regulations

AECOM

FEDERAL FUNDING (CONTINUED)

- Construction Engineering / Incidentals to Construction
  - Construction inspection
  - Materials testing
  - Construction advertising
  - Construction bid review and analysis
  - Review of shop, construction and working drawings
  - Engineering support and consultation during construction
  - Inspector's field office costs
  - Archeological studies after beginning construction
  - Construction staking and surveying not performed by the construction contractor
  - Other costs generally recognized as reasonable and necessary for the performance of the project to the standards used on CTDOT projects

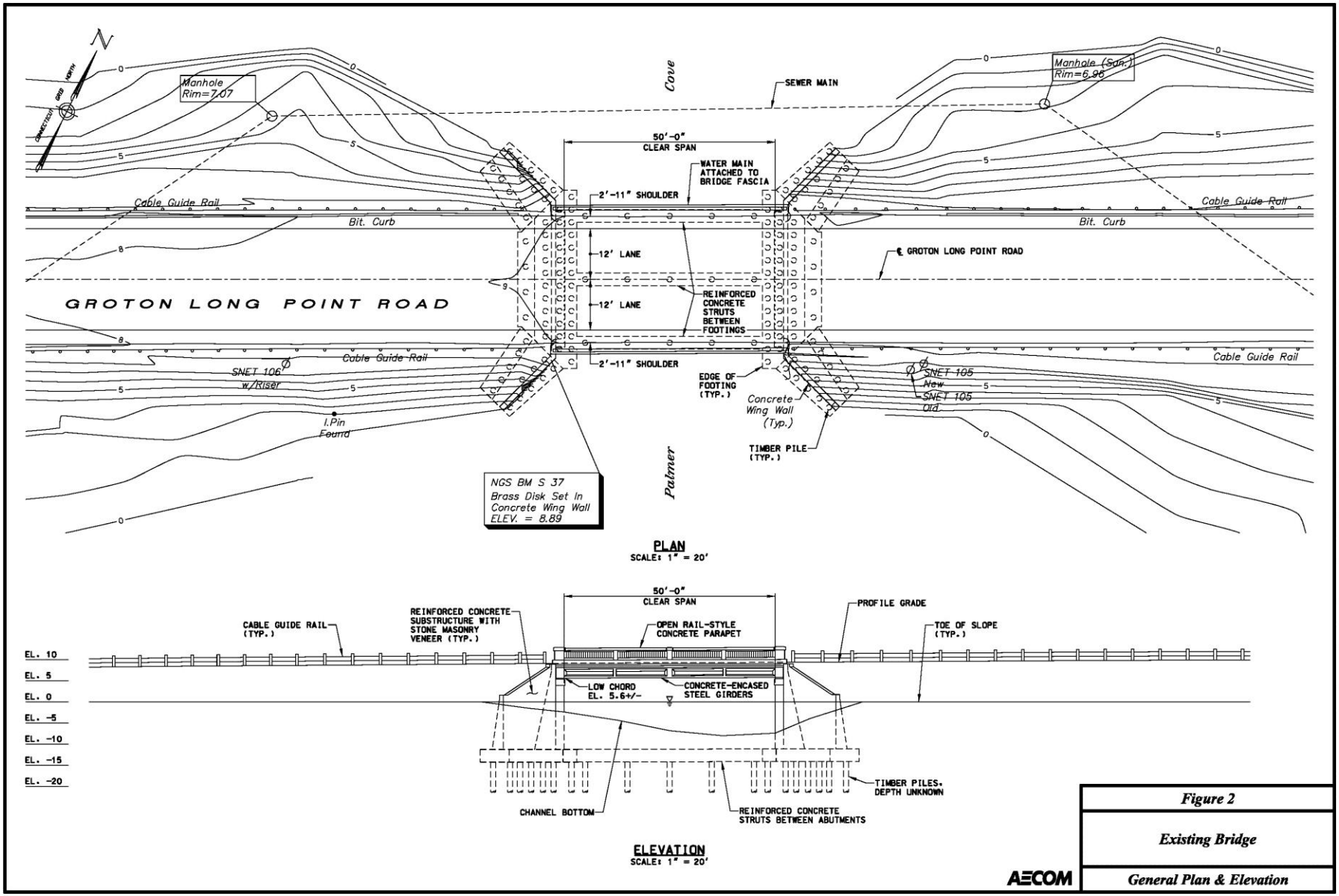
AECOM

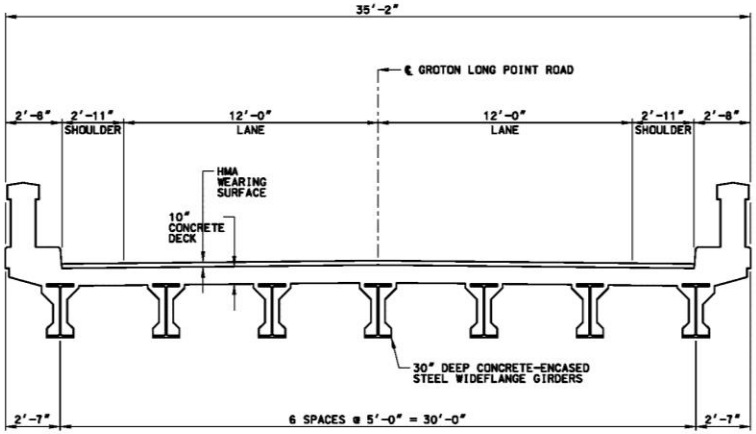
NEXT STEPS

- Advance bridge design
- Establish roadway profile
- Design roadway reconstruction
  - Confirm project limits
- Determine sidewalk location
- Design causeway stability
- Determine project funding

AECOM

OPEN DISCUSION
AND
QUESTIONS & ANSWERS

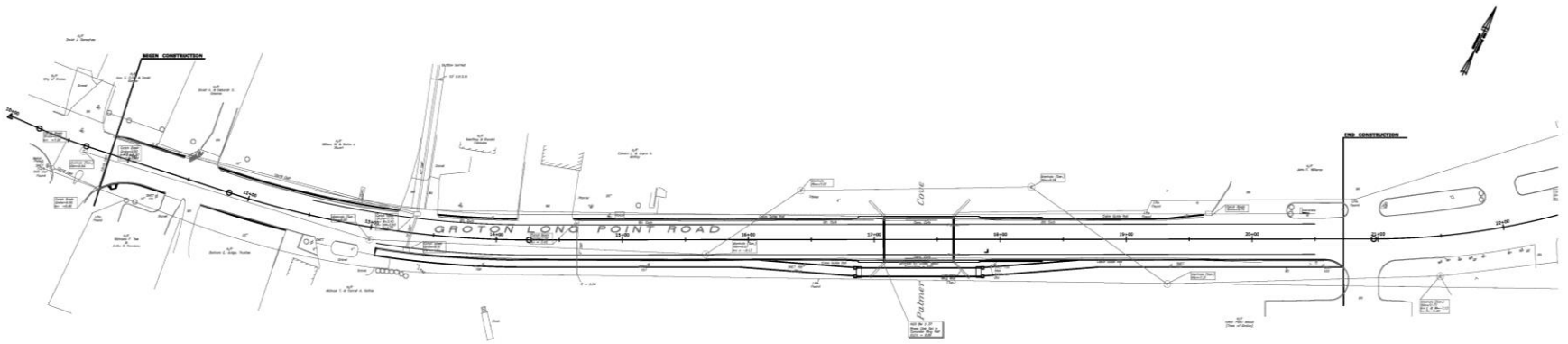

Manhole
Rim=7.07
Cove
SEWER MAIN
Manhole (Sqr.)
Rim=6.96
50'-0"
CLEAR SPAN
WATER MAIN
ATTACHED TO
BRIDGE FASCIA
2'-11" SHOULDER
Cable Guide Rail
Bit. Curb
12' LANE
℄ GROTON LONG POINT ROAD
GROTON LONG POINT ROAD
12' LANE
REINFORCED
CONCRETE
STRUTS
BETWEEN
FOOTINGS
2'-11" SHOULDER
SNET 106
w/Riser
I.Pin
Found
EDGE OF
FOOTING
(TYP.)
Concrete
Wing Wall
(Typ.)
TIMBER PILE
(TYP.)
SNET 105
New
SNET 105
Old
Palmer
NGS BM S 37
Brass Disk Set In
Concrete Wing Wall
ELEV. = 8.89
PLAN
SCALE: 1" = 20'
CABLE GUIDE RAIL
(TYP.)
REINFORCED CONCRETE
SUBSTRUCTURE WITH
STONE MASONRY
VENEER (TYP.)
OPEN RAIL-STYLE
CONCRETE PARAPET
PROFILE GRADE
TOE OF SLOPE
(TYP.)
EL. 10
EL. 5
EL. 0
EL. -5
EL. -10
EL. -15
EL. -20
LOW CHORD
EL. 5.6+/-
CONCRETE-ENCASED
STEEL GIRDERS
TIMBER PILES.
DEPTH UNKNOWN
CHANNEL BOTTOM
REINFORCED CONCRETE
STRUTS BETWEEN ABUTMENTS
ELEVATION
SCALE: 1" = 20'
Figure 2
Existing Bridge
AECOM
General Plan & Elevation

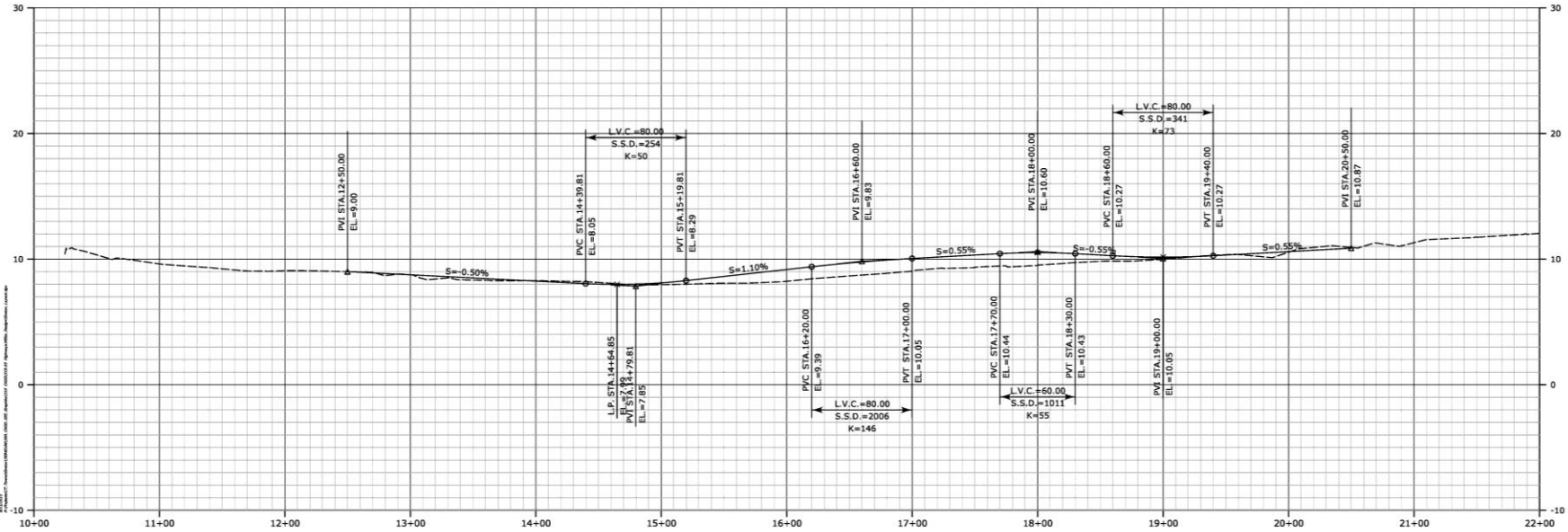


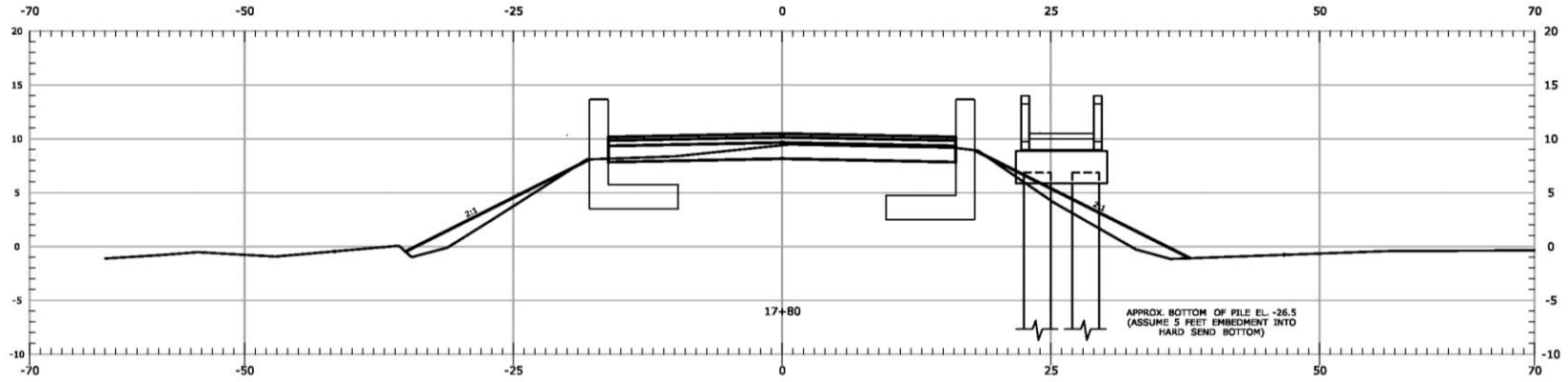
TYPICAL SECTION
SCALE: 3/16" = 1'-0"

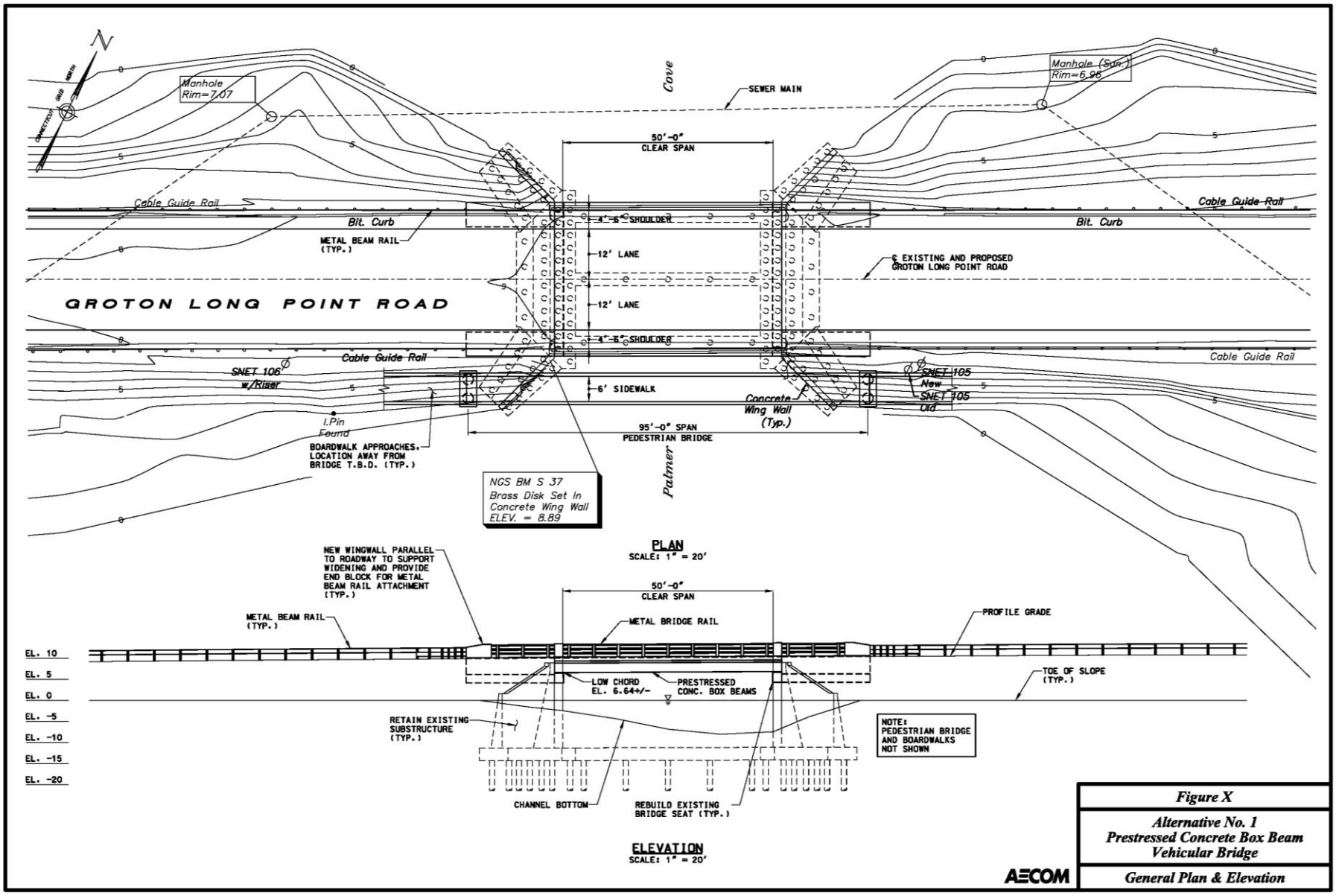
Figure X
Existing Bridge
Typical Section

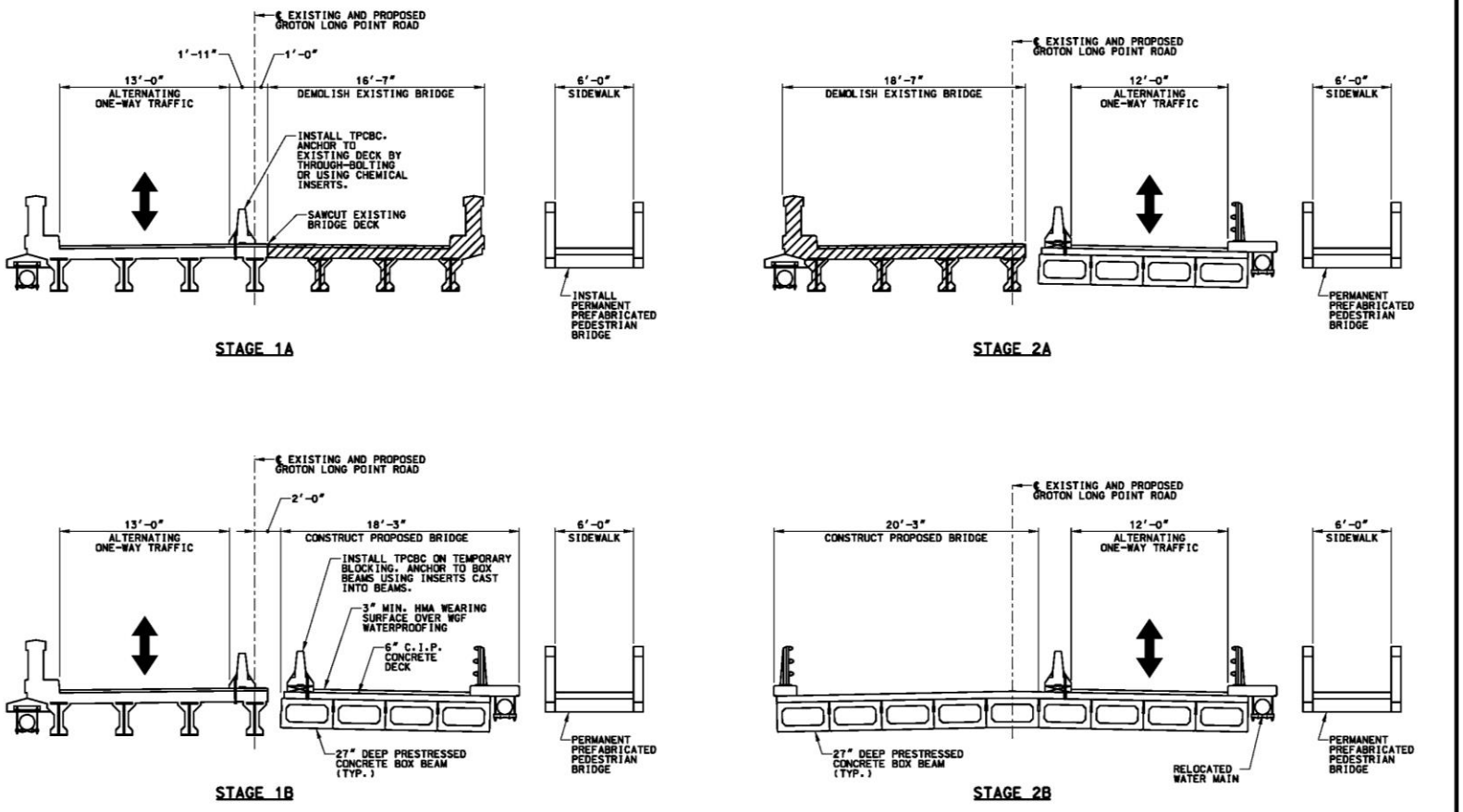
AECOM


BEGIN CONSTRUCTION
END CONSTRUCTION
GROTON LONG POINT ROAD
Palmer Cove


PVI STA.12+50.00
EL=9.00
PVC STA.14+39.81
EL=8.05
L.V.C.=80.00
S.S.D.=254
K=50
PVT STA.15+19.81
EL=8.29
L.P. STA.14+64.85
EL=7.93
PVT STA.14+79.81
EL=7.85
S=-0.50%
S=1.10%
PVC STA.16+20.00
EL=9.39
PVI STA.16+60.00
EL=9.83
L.V.C.=80.00
S.S.D.=2006
K=146
PVT STA.17+00.00
EL=10.05
S=0.55%
PVC STA.17+70.00
EL=10.44
PVI STA.18+00.00
EL=10.60
L.V.C.=60.00
S.S.D.=1011
K=55
PVT STA.18+30.00
EL=10.43
S=-0.55%
PVC STA.18+60.00
EL=10.27
L.V.C.=80.00
S.S.D.=341
K=73
PVI STA.19+00.00
EL=10.05
PVT STA.19+40.00
EL=10.27
S=0.55%
PVI STA.20+50.00
EL=10.87
30
20
10
0
-10
10+00
11+00
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
22+00

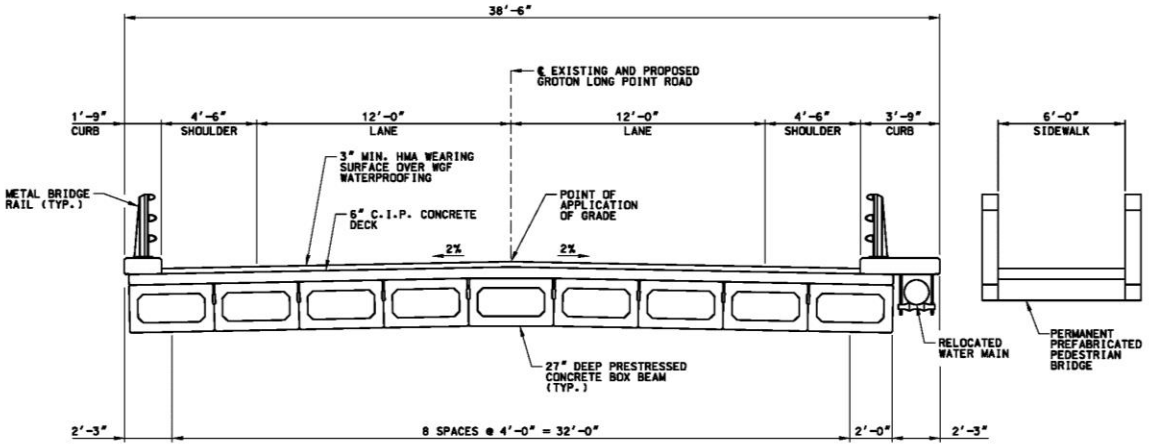

-70
-50
-25
0
25
50
70
20
15
10
5
0
-5
-10
2:1
2:1
17+80
APPROX. BOTTOM OF PILE EL. -26.5
(ASSUME 5 FEET EMBEDMENT INTO
HARD SEND BOTTOM)


Manhole
Rim=7.07
Cove
SEWER MAIN
Manhole (Sqr.)
Rim=6.96
50'-0"
CLEAR SPAN
Cable Guide Rail
Bit. Curb
4'-6" SHOULDER
METAL BEAM RAIL
(TYP.)
12' LANE
℄ EXISTING AND PROPOSED
GROTON LONG POINT ROAD
GROTON LONG POINT ROAD
12' LANE
4'-6" SHOULDER
Cable Guide Rail
SNET 106
w/Riser
6' SIDEWALK
SNET 105
New
SNET 105
Old
Concrete
Wing Wall
(Typ.)
I.Pin
Found
95'-0" SPAN
PEDESTRIAN BRIDGE
BOARDWALK APPROACHES,
LOCATION AWAY FROM
BRIDGE T.B.D. (TYP.)
NGS BM S 37
Brass Disk Set In
Concrete Wing Wall
ELEV. = 8.89
Palmer
PLAN
SCALE: 1" = 20'
NEW WINGWALL PARALLEL
TO ROADWAY TO SUPPORT
WIDENING AND PROVIDE
END BLOCK FOR METAL
BEAM RAIL ATTACHMENT
(TYP.)
50'-0"
CLEAR SPAN
METAL BEAM RAIL
(TYP.)
METAL BRIDGE RAIL
PROFILE GRADE
EL. 10
EL. 5
EL. 0
EL. -5
EL. -10
EL. -15
EL. -20
LOW CHORD
EL. 6.64+/-
PRESTRESSED
CONC. BOX BEAMS
TOE OF SLOPE
(TYP.)
RETAIN EXISTING
SUBSTRUCTURE
(TYP.)
NOTE:
PEDESTRIAN BRIDGE
AND BOARDWALKS
NOT SHOWN
CHANNEL BOTTOM
REBUILD EXISTING
BRIDGE SEAT (TYP.)
ELEVATION
SCALE: 1" = 20'
Figure X
Alternative No. 1
Prestressed Concrete Box Beam
Vehicular Bridge
AECOM
General Plan & Elevation



STAGE CONSTRUCTION
SCALE: 1/8" = 1'-0"

Figure X
Alternative No. 1 *Prestressed Concrete Box Beam* *Vehicular Bridge*
AECOM *Stage Construction*



NOTE:

APPROXIMATE VEHICULAR BRIDGE DEPTH IS 3.50 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure X
Alternative No. 1 *Prestressed Concrete Box Beam* *Vehicular Bridge*
AECOM *Typical Section*

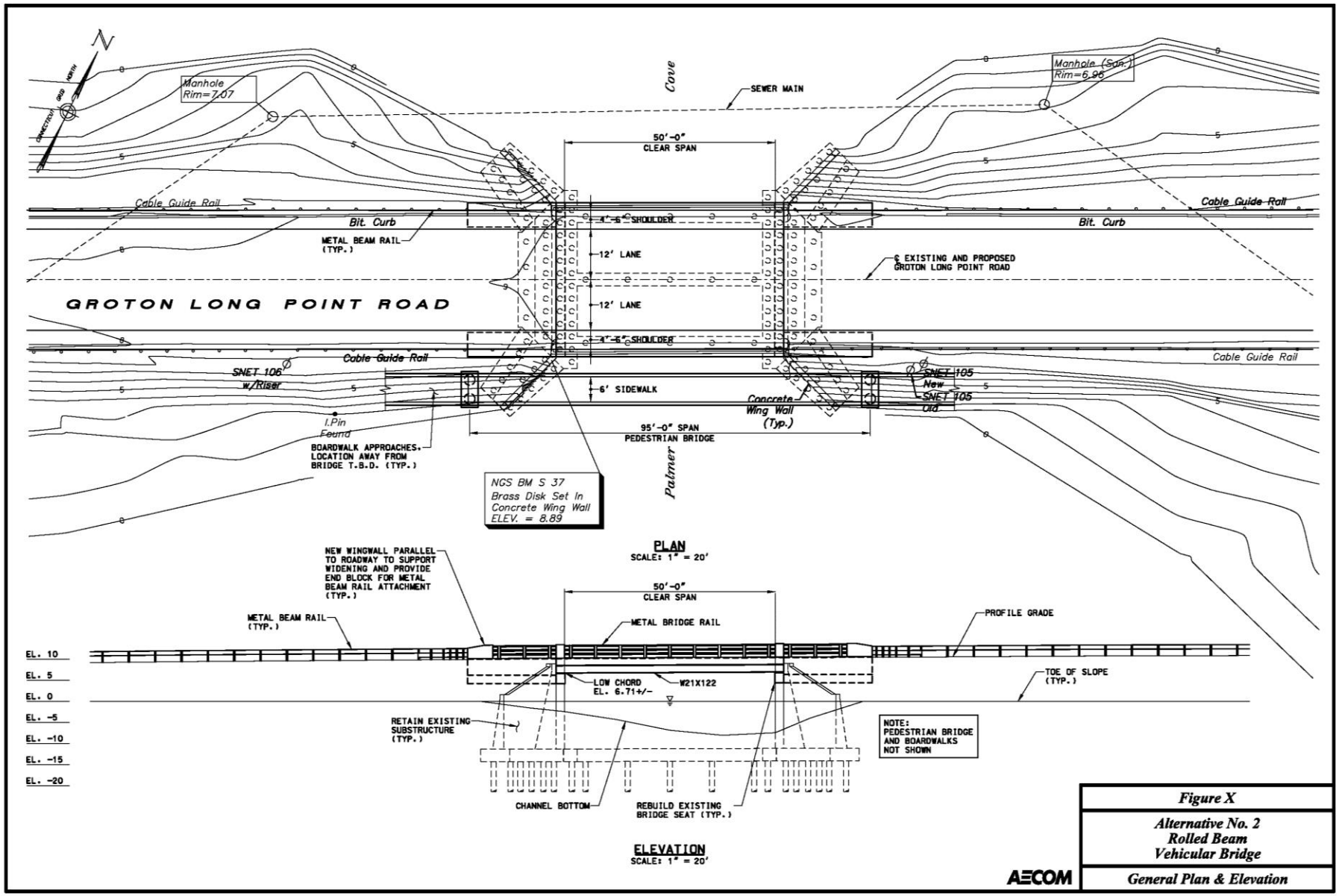
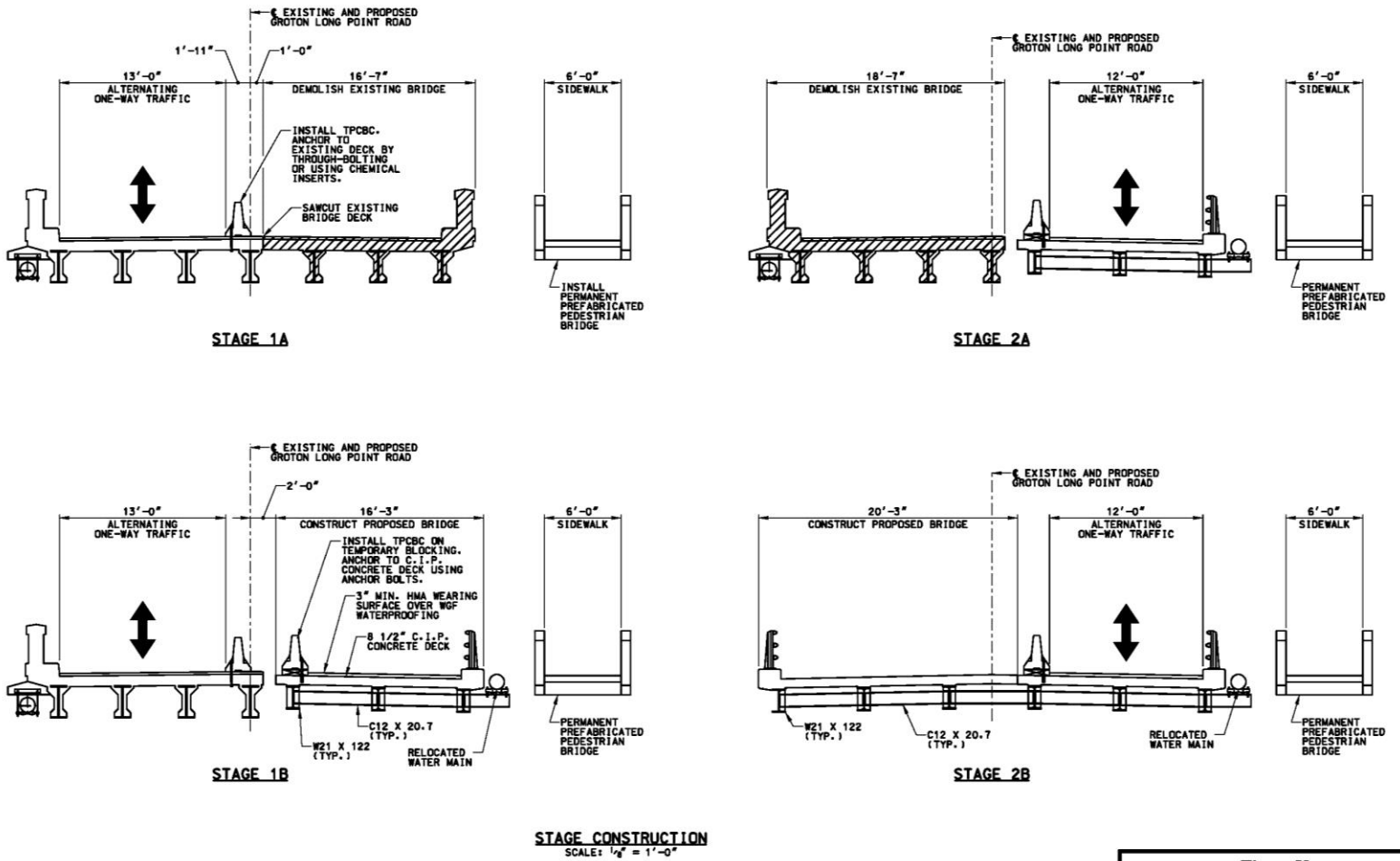


Figure X

Alternative No. 2
Rolled Beam
Vehicular Bridge

AECOM

General Plan & Elevation



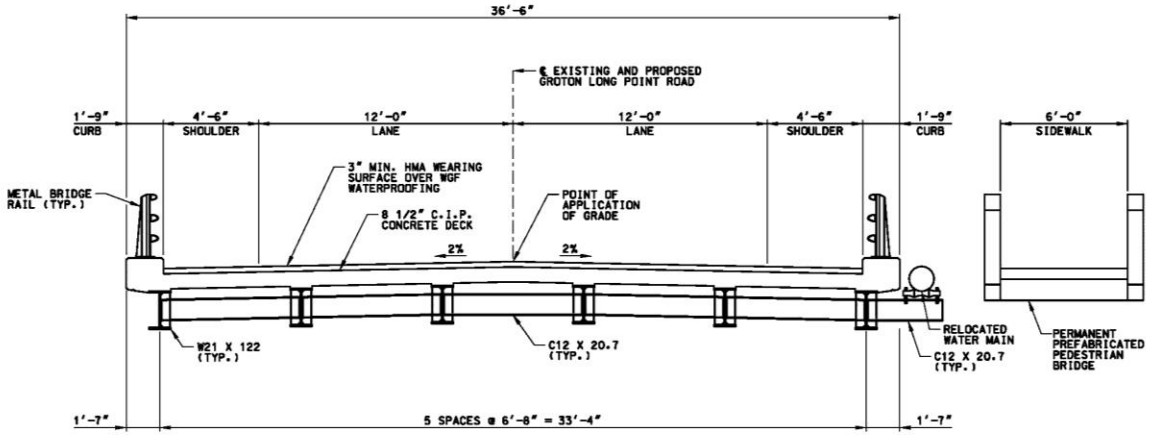
STAGE CONSTRUCTION
SCALE: 1/8" = 1'-0"

Figure X

Alternative No. 2
Rolled Beam
Vehicular Bridge

AECOM

Stage Construction



NOTE:

APPROXIMATE VEHICULAR BRIDGE DEPTH IS 3.43 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure X
Alternative No. 2 *Rolled Beam* *Vehicular Bridge*
AECOM *Typical Section*

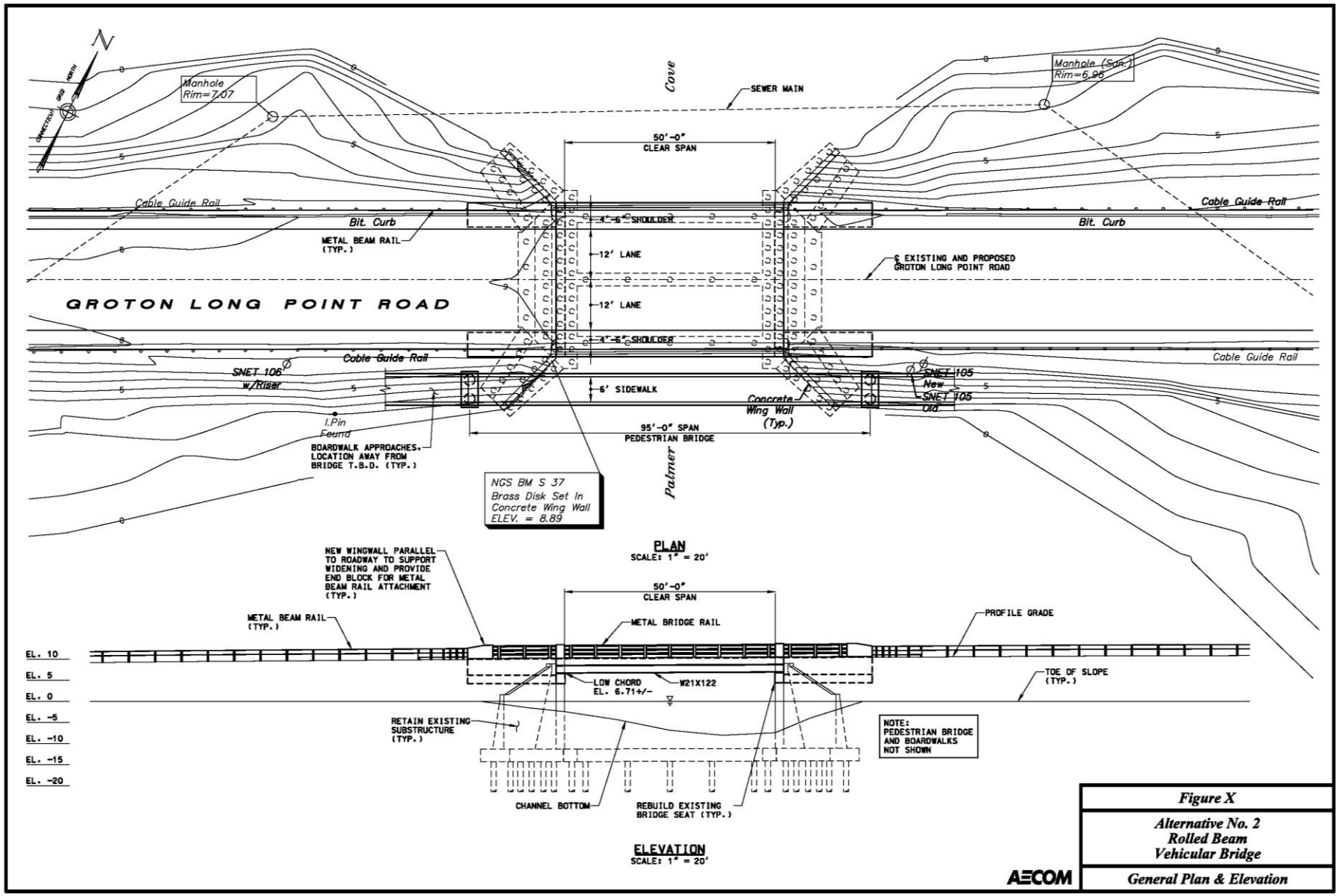
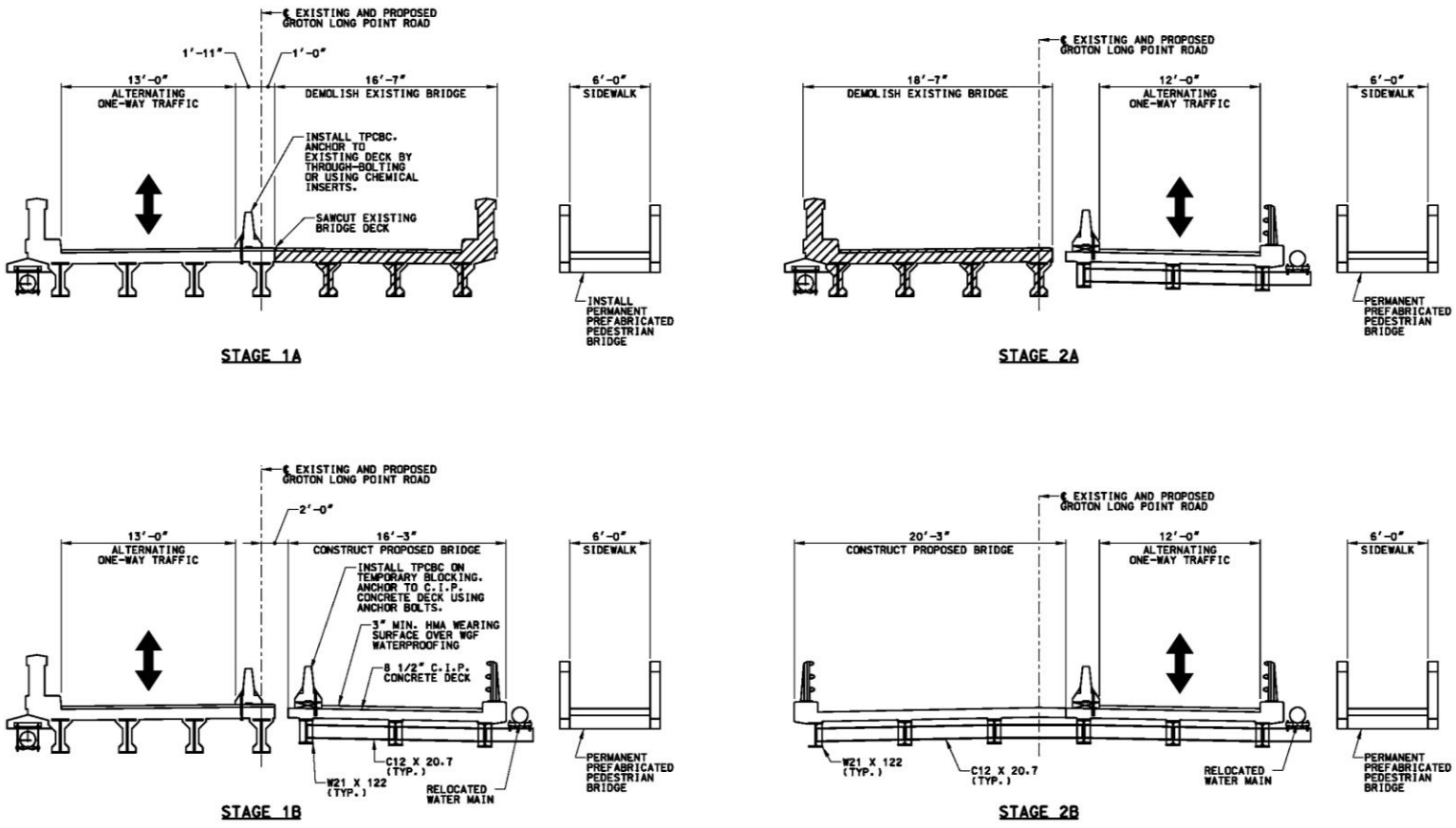


Figure X

Alternative No. 2
Rolled Beam
Vehicular Bridge

AECOM

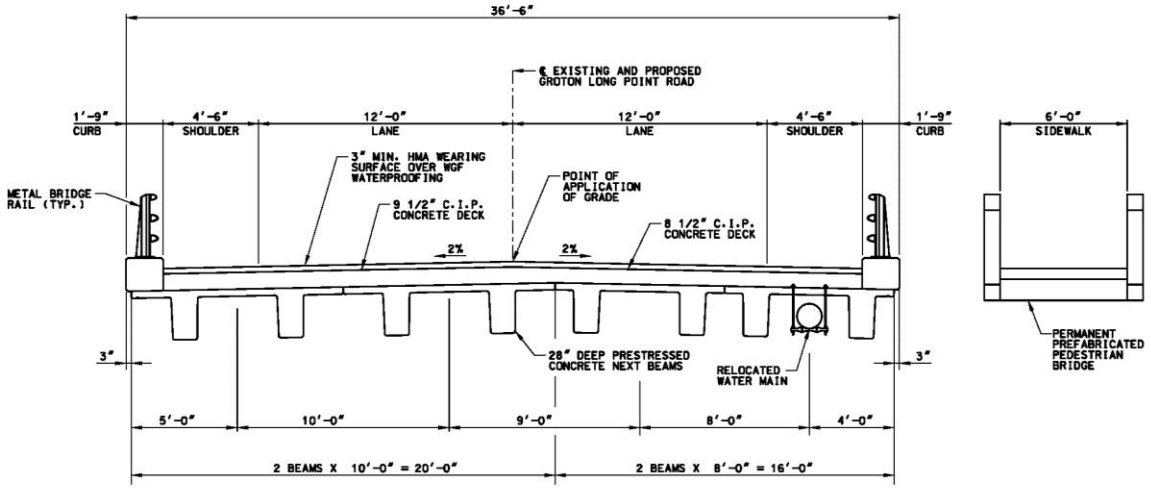
General Plan & Elevation



STAGE CONSTRUCTION

SCALE: 1/8" = 1'-0"

Figure X
Alternative No. 2 Rolled Beam Vehicular Bridge
AECOM *Stage Construction*

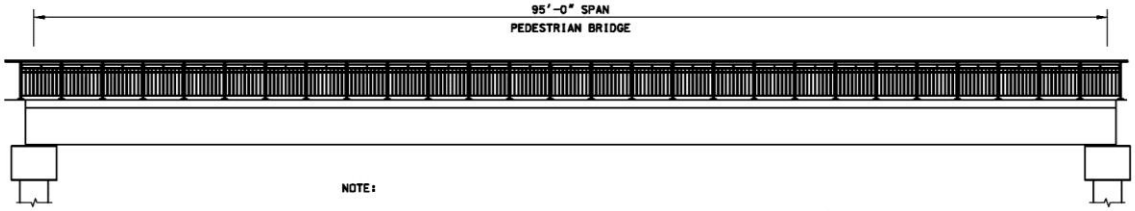


NOTE:

APPROXIMATE VEHICULAR BRIDGE DEPTH IS 3.86 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

TYPICAL SECTION
SCALE: 3/16" = 1'-0"

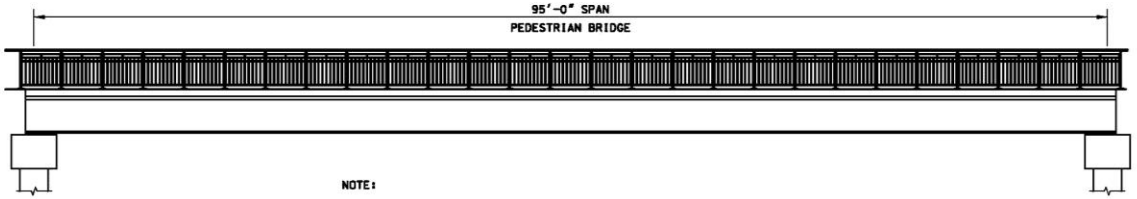
Figure X
Alternative No. 3 *NEXT Beam* *Vehicular Bridge*
AECOM *Typical Section*



NOTE:

APPROXIMATE PEDESTRIAN BRIDGE DEPTH IS 4.125 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

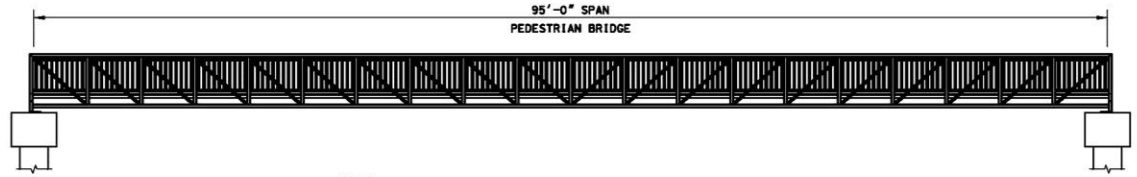
ALTERNATIVE 1: BOX BEAM – ELEVATION
SCALE: 1" = 10'



NOTE:

APPROXIMATE PEDESTRIAN BRIDGE DEPTH IS 4.22 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

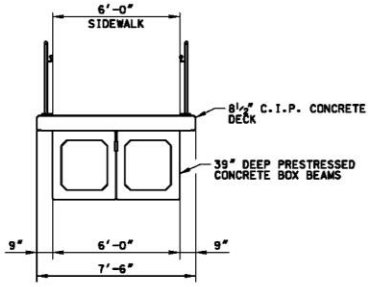
ALTERNATIVE 2: ROLLED BEAM – ELEVATION
SCALE: 1" = 10'



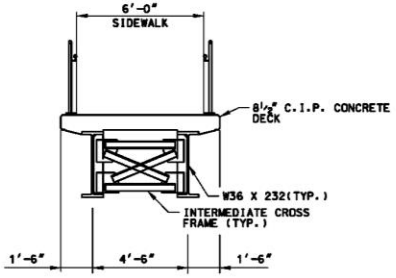
NOTE:

APPROXIMATE PEDESTRIAN BRIDGE DEPTH IS 2 FEET (MEASURED FROM POINT OF APPLICATION OF GRADE TO THE BOTTOM OF LOW CHORD ELEVATION).

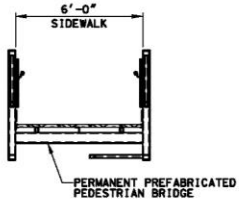
ALTERNATIVE 3: PONY THRU PREFABRECATED TRUSS – ELEVATION
SCALE: 1" = 10'



TYPICAL SECTION
SCALE: 3/16" = 1'-0"



TYPICAL SECTION
SCALE: 3/16" = 1'-0"



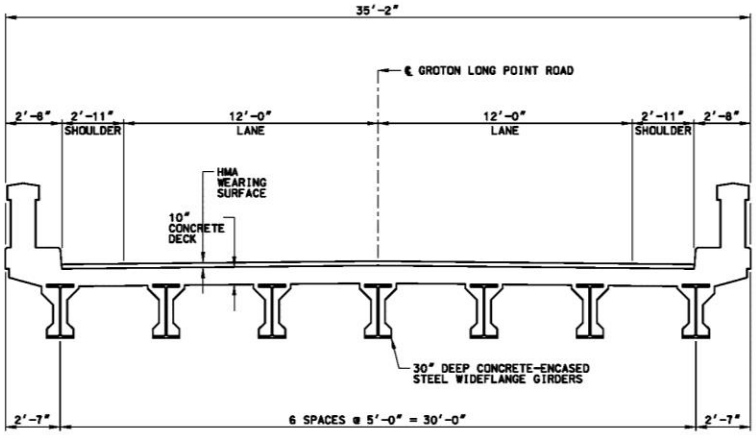
TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure X

Pedestrian Bridge Alternatives

AECOM

Bridge Sections and Elevations



TYPICAL SECTION
SCALE: 3/16" = 1'-0"

Figure X
Existing Bridge
Typical Section

AECOM