Accelerated Superstructure Replacement and Rehabilitation of US Route 1 over I-95 (Br 00037)

Stamford, Connecticut

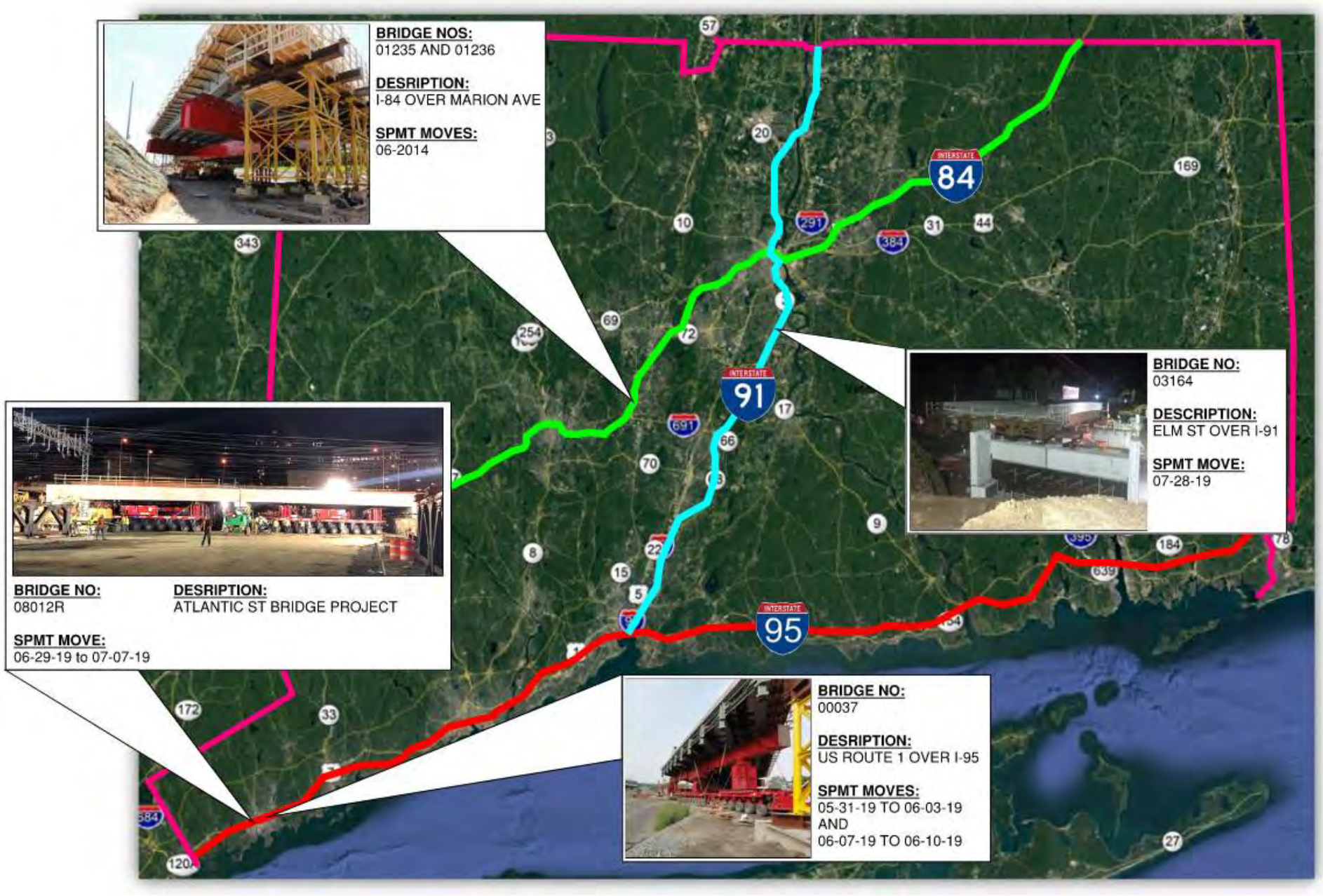
Presented to:
ABC-UTC Monthly Webinar
December 17th, 2020

Accelerated Bridge Construction in Connecticut

ABC in Connecticut

— 85 ABC projects since 2012
— 10 projects in construction
— 31 projects in design (PD or FD)
— 11 contract processing
— Alternate delivery: design build
  — *1 Parking garage*
  — *2 Resurfacing by Contract (RBC)*
  — *2 Multi-Bridge Replacement*

ABC in Connecticut (Use of SPMTs)



Moving Forward

— Utilize ABC Decision Matrix to determine appropriate projects for ABC
— Continue to implement ABC techniques
— Work with consultants to analysis ABC techniques wherever feasible
— Thirty-one projects currently in design, more to come

Connecticut Department of Transportation
2800 Berlin Turnpike, PO Box 317546
Newington, CT 06131-7846

Project:	Bridge 00037		
By:	WSP	Checked:	
Date:	9/29/2019		
Page No.	1	of	4

CTDOT ABC Decision Making Process Oct-17

Site Information

Project Description: Superstructure Replacement of US Route 1 over I-95

Prop. ABC Method: SPMTs

Conventional Construction Method: Staged

Roadway on Bridge	US Route 1		
Average Daily Traffic	17000	vehicles per day	
Conventional Construction			
Delay Time (Per Delay Time Sheets)	30.00	minutes	
Construction Impact Duration	540	Days	
Aggregate Impact Time	191250	Person Days	
ABC			
Delay Time (Per Delay Time Sheets)	90.00	minutes	
Construction Impact Duration	6	Days	
Aggregate Impact Time	6375	Person Days	
Roadway Below Bridge	I-95		
Average Daily Traffic	160000	vehicles per day	
Conventional Construction			
Delay Time (Per Delay Time Sheets)	45.00	minutes	
Construction Impact Duration	570	Days	
Aggregate Impact Time	2850000	Person Days	
ABC			
Delay Time (Per Delay Time Sheets)	120	minutes	
Construction Impact Duration		Days	
Aggregate Impact Time	0	Person Days	

Note 1: This factor accounts for the additional delay on the detour route due to congestion. For example, a value of 1.25 equates to a 25% increase in travel time on the detour route.

Segment Congestion Factor

		Conditions at Bridge				
		Non-limited access highway, total ADT < 5,000	Non-limited access highway, total ADT 5,000 - 10,000	Non-limited access highway, total ADT > 10,000	Limited access highway, directional ADT < 25,000	Limited access highway, directional ADT > 25,000
Conditions on Detour Segment	Longer than 2.0 miles, ADT > 8,000 per lane	1.50	1.75	2.00	2.00	2.00
	Longer than 2.0 miles, ADT< 8,000 per lane	1.25	1.50	1.75	2.00	2.00
	0.5 - 2.0 miles, ADT < 3,000 - 8,000 per lane	1.25	1.25	1.50	1.75	2.00
	0.5 - 2.0 miles, ADT < 3,000 per lane	1.00	1.25	1.50	1.50	1.75
	Less than 0.5 mile, ADT < 3,000 per lane	1.00	1.00	1.25	1.50	1.50

Conditions on Detour Segment - Guidance:
ADT per lane = ADT on segment / number of total available lanes on roadway
If length of detour and ADT per lane do not match one of the above categories, use higher value condition

Superstructure Replacement of US Route 1 over I-95 (Br 00037)

Project Facts

- **State Project No.:** 135-325
- **Owner:** Connecticut Department of Transporation (CTDOT)
- **Inspector:** CTDOT District 3
- **Designer:** WSP USA, Inc.
- **CTDOT Liaison:** Close, Jensen & Miller, P.C.
- **Public Involvement:** Fitzgerald & Halliday, Inc.
- **Contractor:** O&G Industries, Inc.
- **Initial Contract Value:** $14.9 million
- **Final Contract Value:** $14.8 million
- **Incidentals:** $2.4 million (State Police - $300k)
- **Delivery Method:** Design Bid Build
- **Construction Start:** May 24, 2018
- **Contract Completion Date:** October 07, 2019
- **Incentives:**
  - **Milestone 1:** Replacement of the span of Bridge No. 00037 over I-95 Northbound (Span 2), $750k
  - **Milestone 2:** Replacement of the span of Bridge No. 00037 over I-95 Southbound (Span 1), $750k

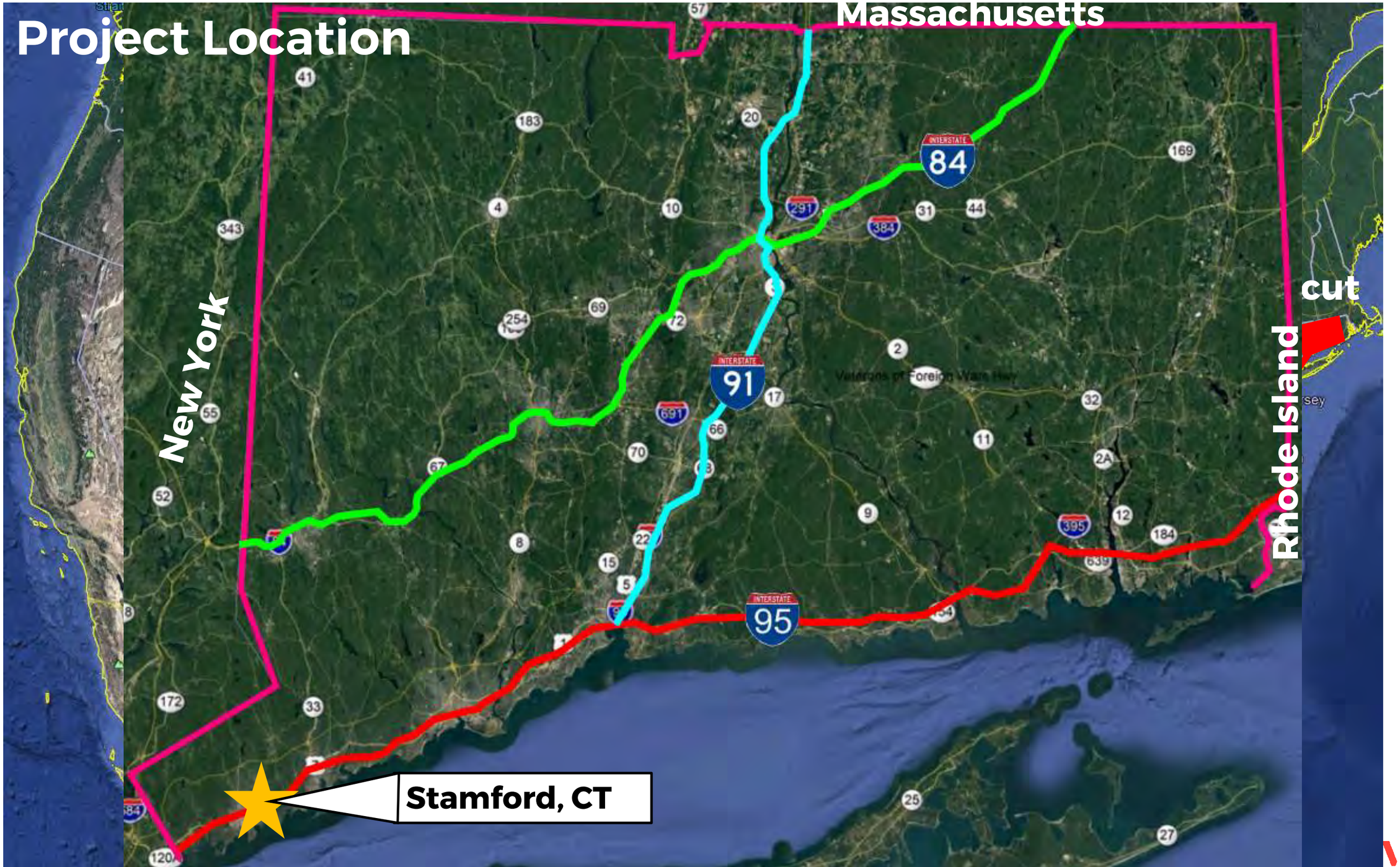
CONNECTICUT DEPARTMENT OF TRANSPORTATION

wsp

O AND G

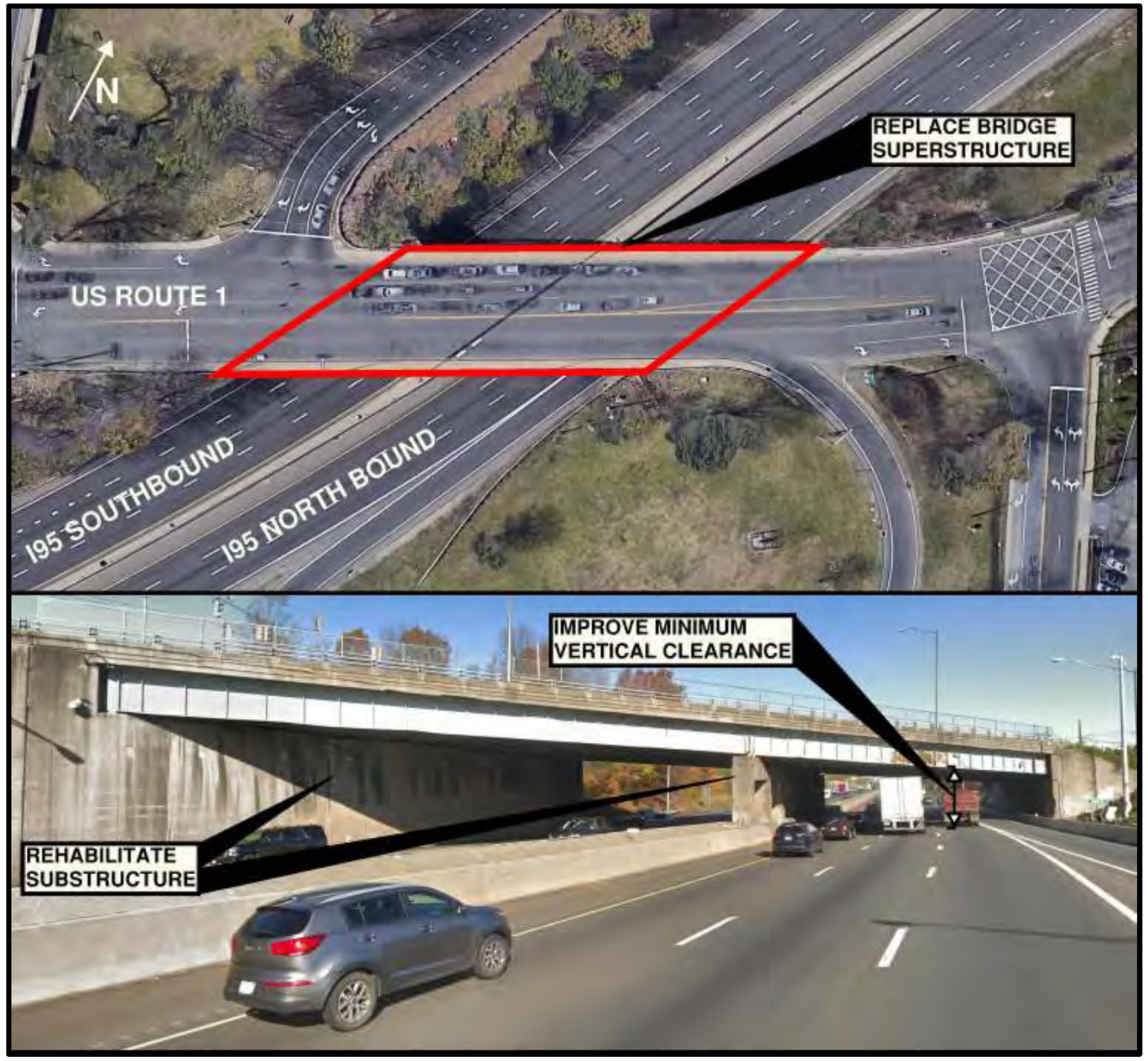
CJM
Close, Jensen and Miller, P.C.
Consulting Engineers, Land Planners and Surveyors

wsp


Project Location
Massachusetts
New York
Rhode Island
cut
Stamford, CT
84
91
95
INTERSTATE
Veterans of Foreign Wars Hwy

Project Scope

- Superstructure replacement of Bridge 00037
- Rehabilitation of substructure
- Improvement of minimum vertical clearance



Bridge Description

Bridge No. 00037:

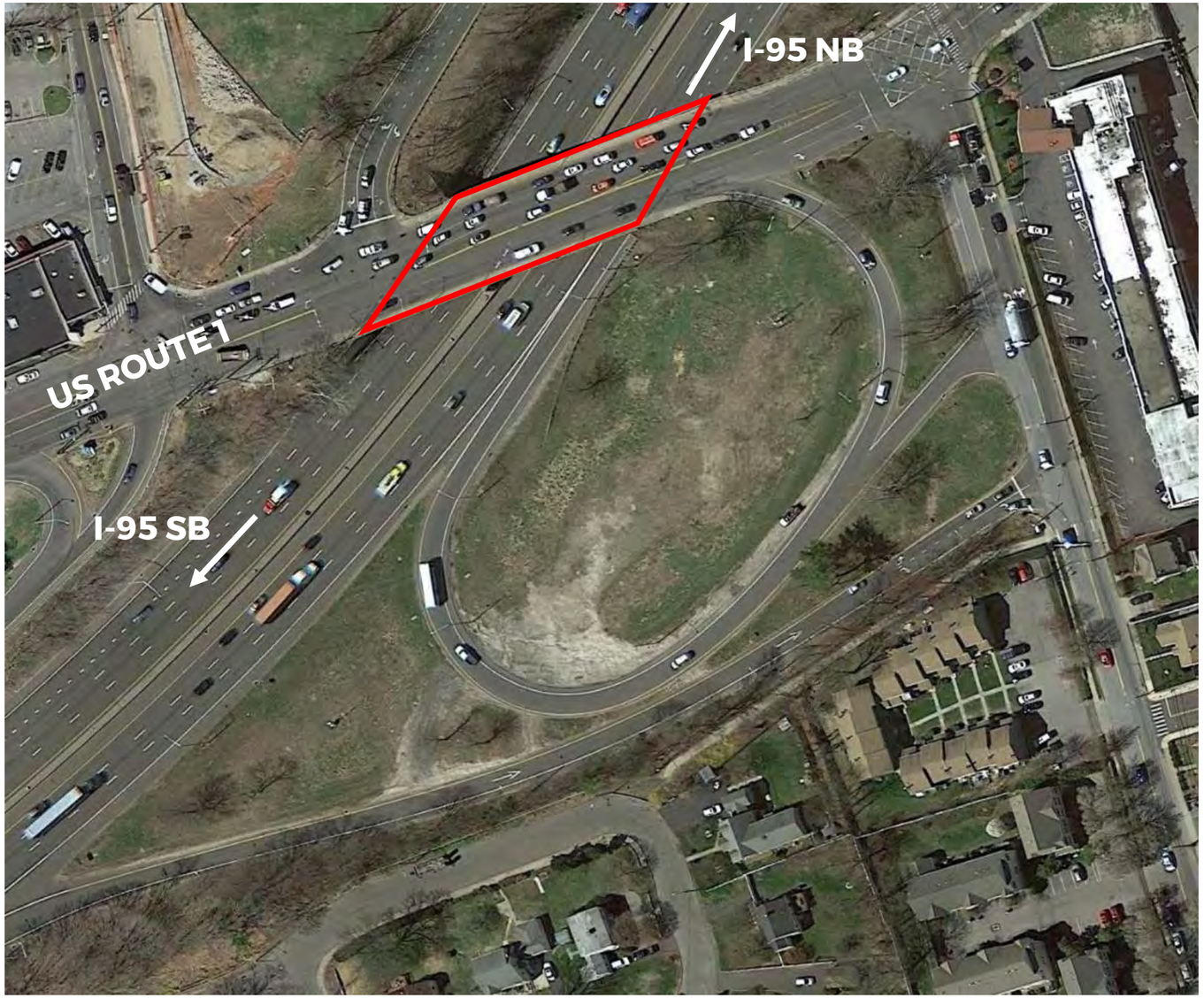
— Within full interchange with I-95 (Exit 9)

— Two-span, ~120’ each (simple), ~55 skew

— Five traffic lanes, and two sidewalks

— Gas, water, and electric utilities carried by bridge

Bridge Description



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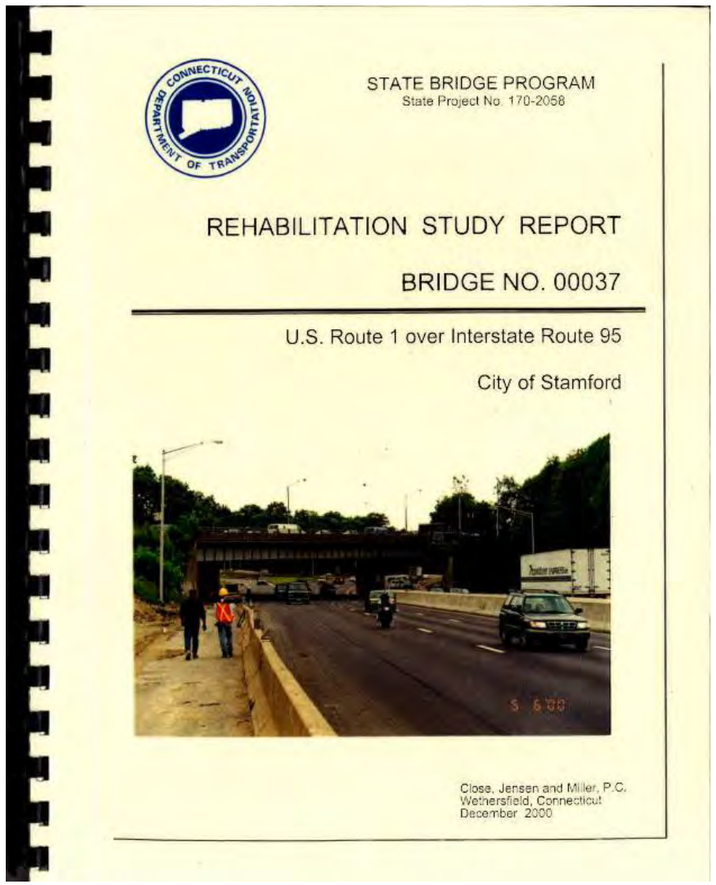
Project History

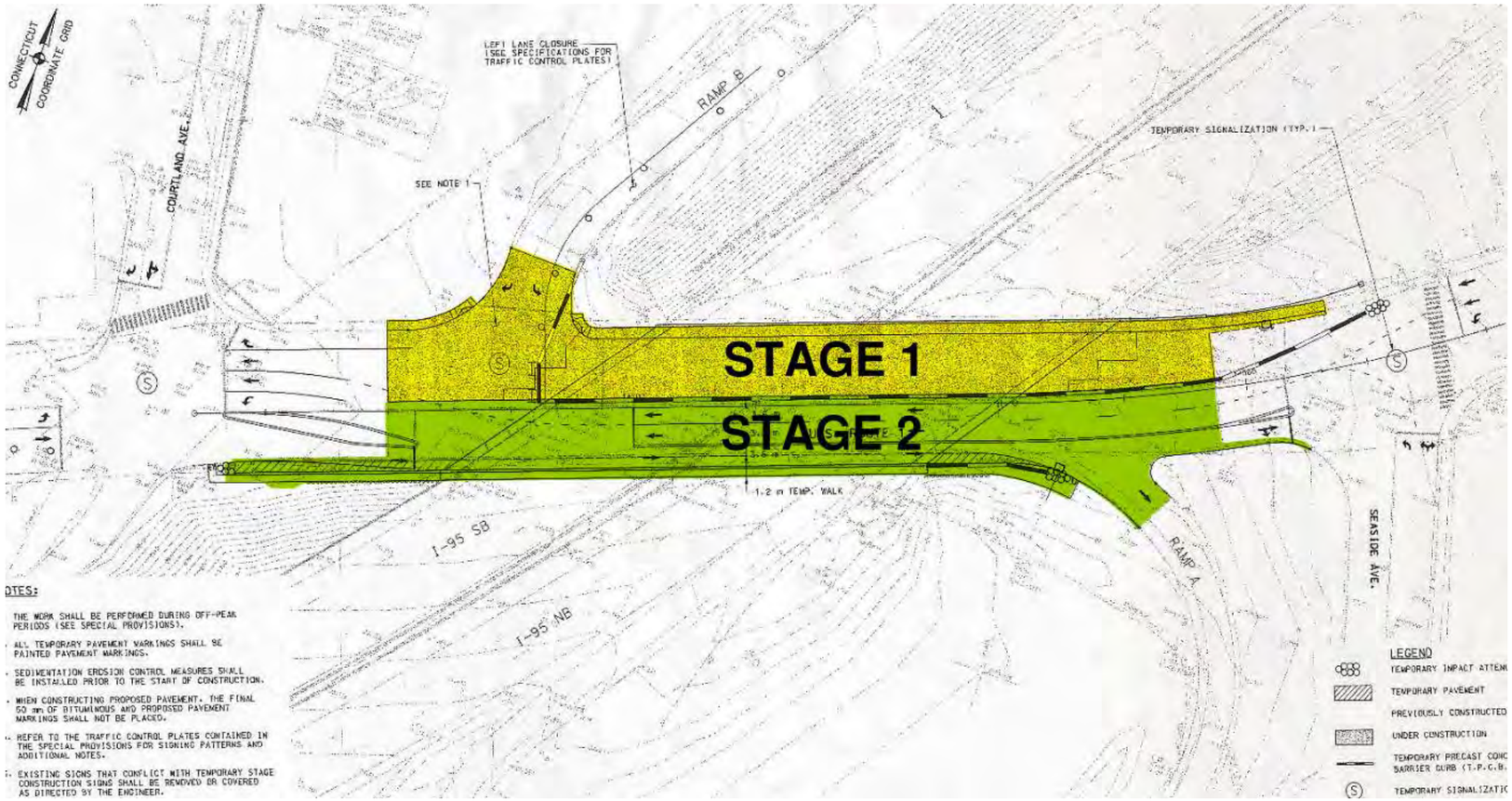
2000

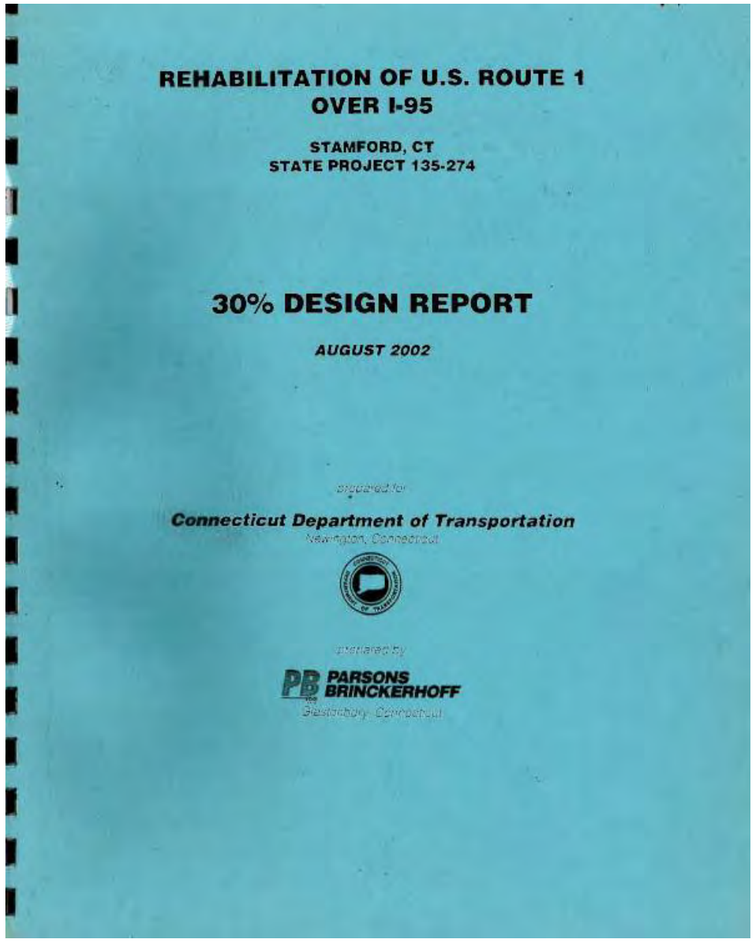


- Existing bridge structurally deficient
- Alternative A
  - *Deck replacement*
  - *Superstructure raise*
  - *Field painting*
- Alternative B
  - *Superstructure replacement*
  - *Substructure rehabilitation*

Project History

2000 2002





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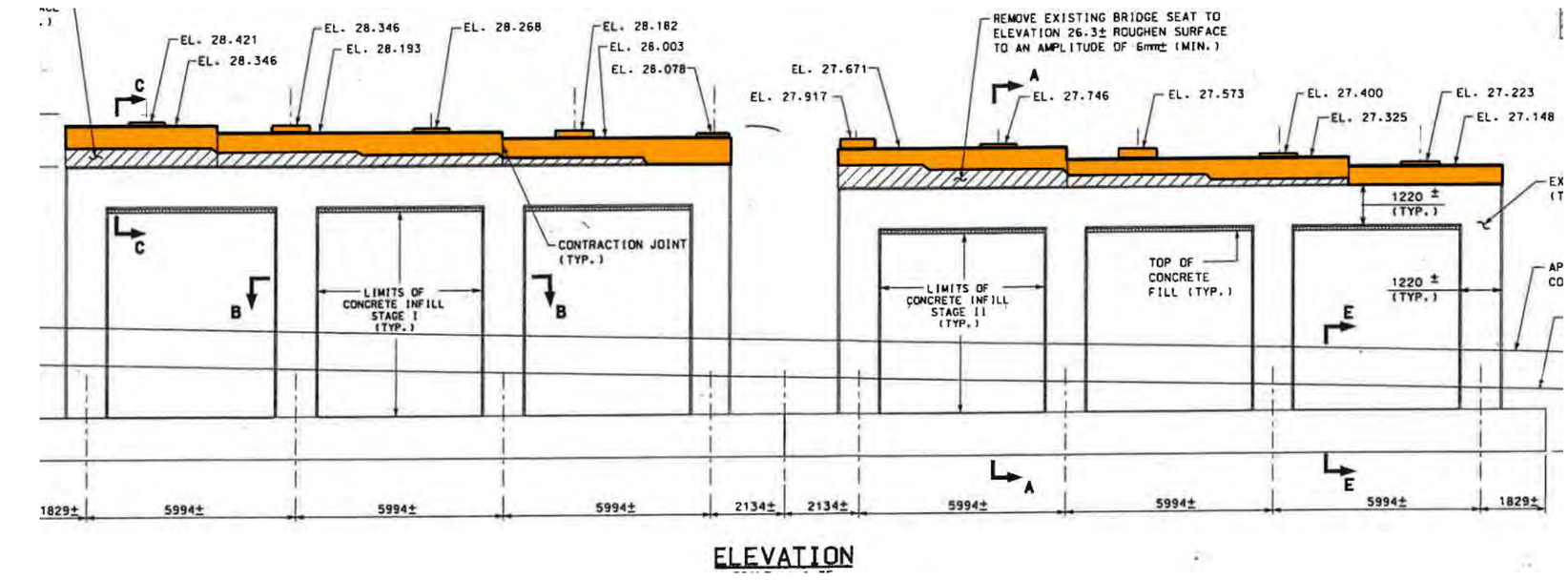


ELEVATION

— Two stages

— Two-span continuous

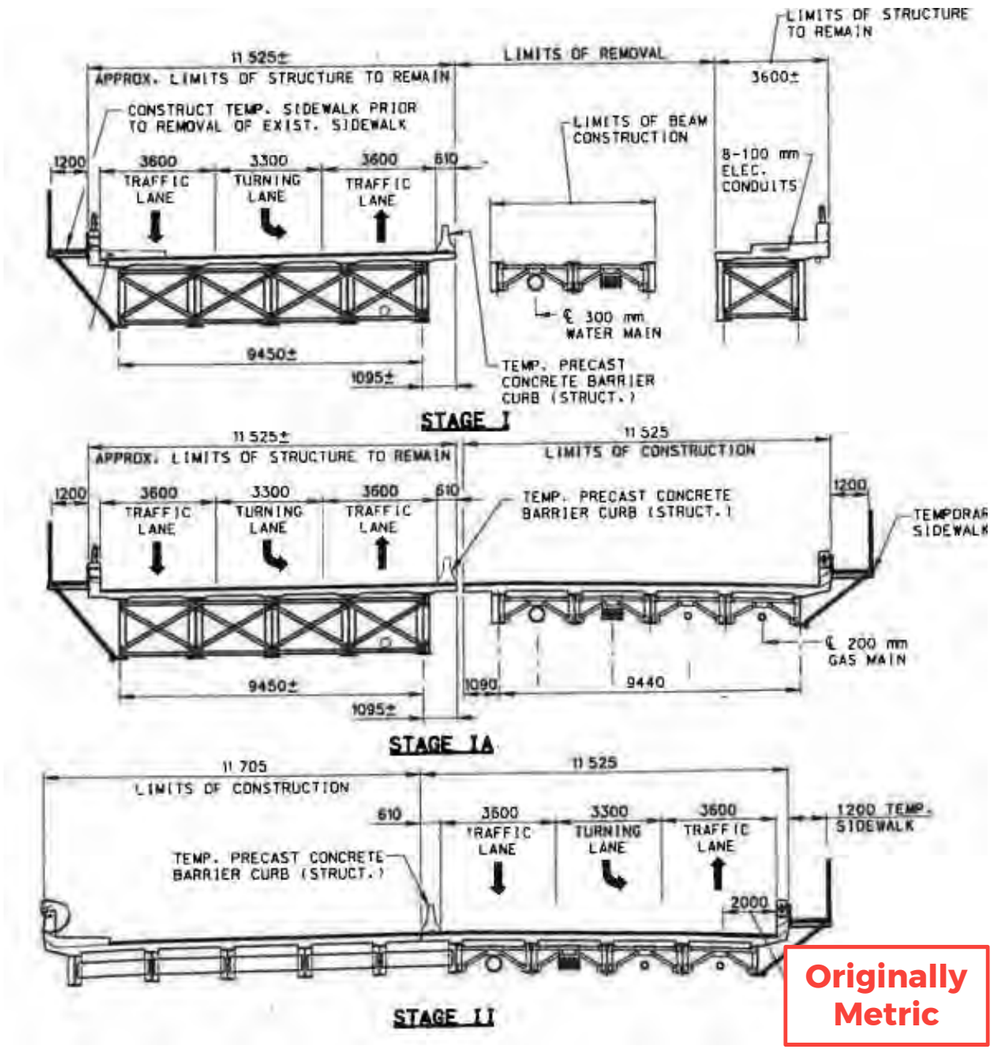
— W36

— Profile raise

— Bridge seat modification

Project History

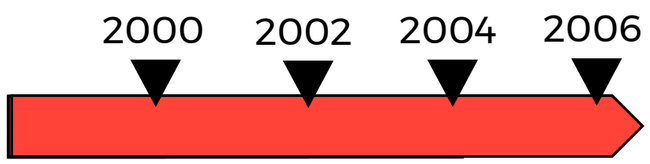
2000 2002 2004



Originally Metric

- Concerns with staging
- Anticipated heavy congestion
  - *Route 1: 17,000 vehicles/day*
  - *I-95: 160,000 vehicles/day*
- Staging determined not feasible
- Project put on hold

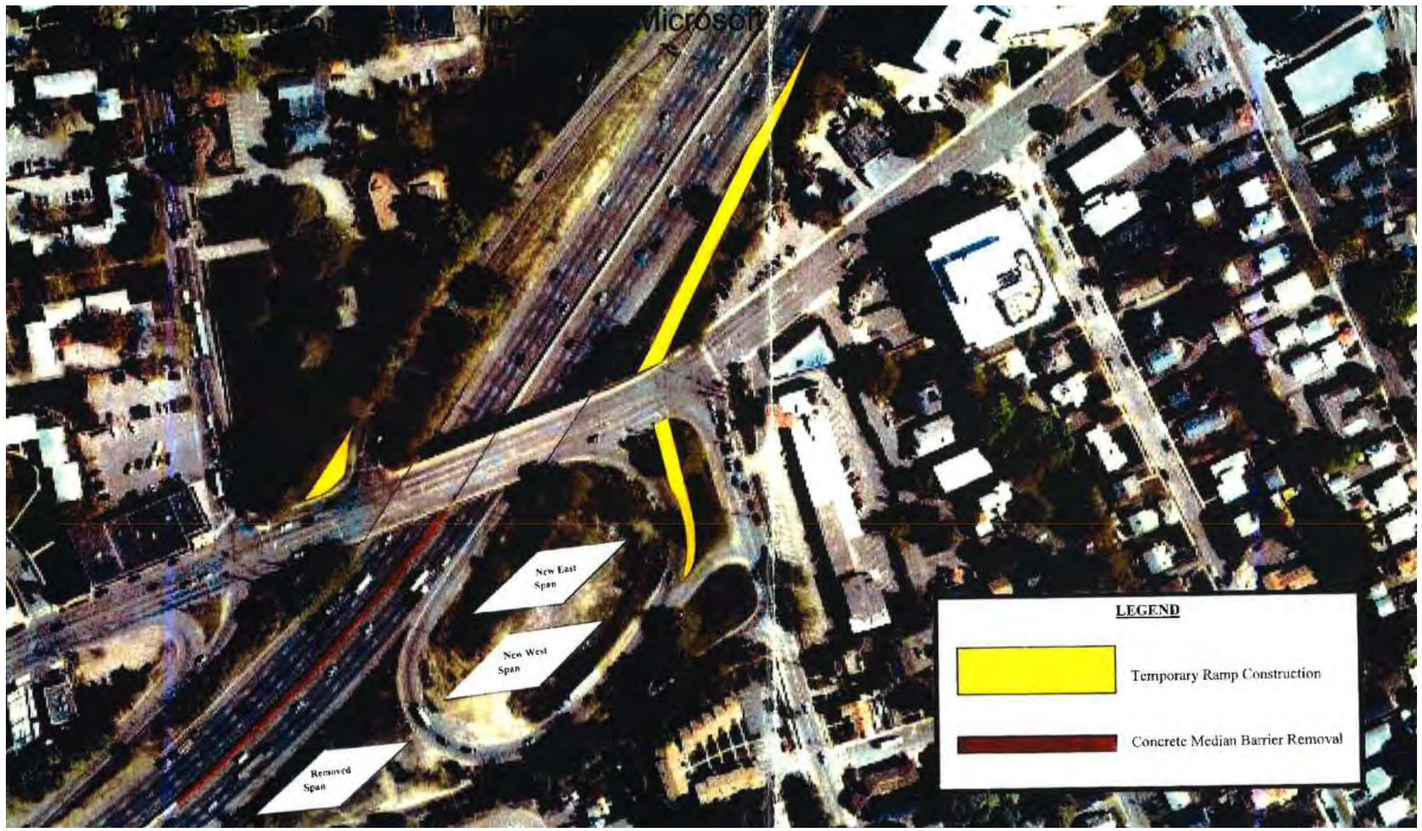
Project History



- Alternative staging investigated
- Aimed to meet needs of City
- Five stages, three seasons of construction
- Determined not to be feasible
- Project put on hold

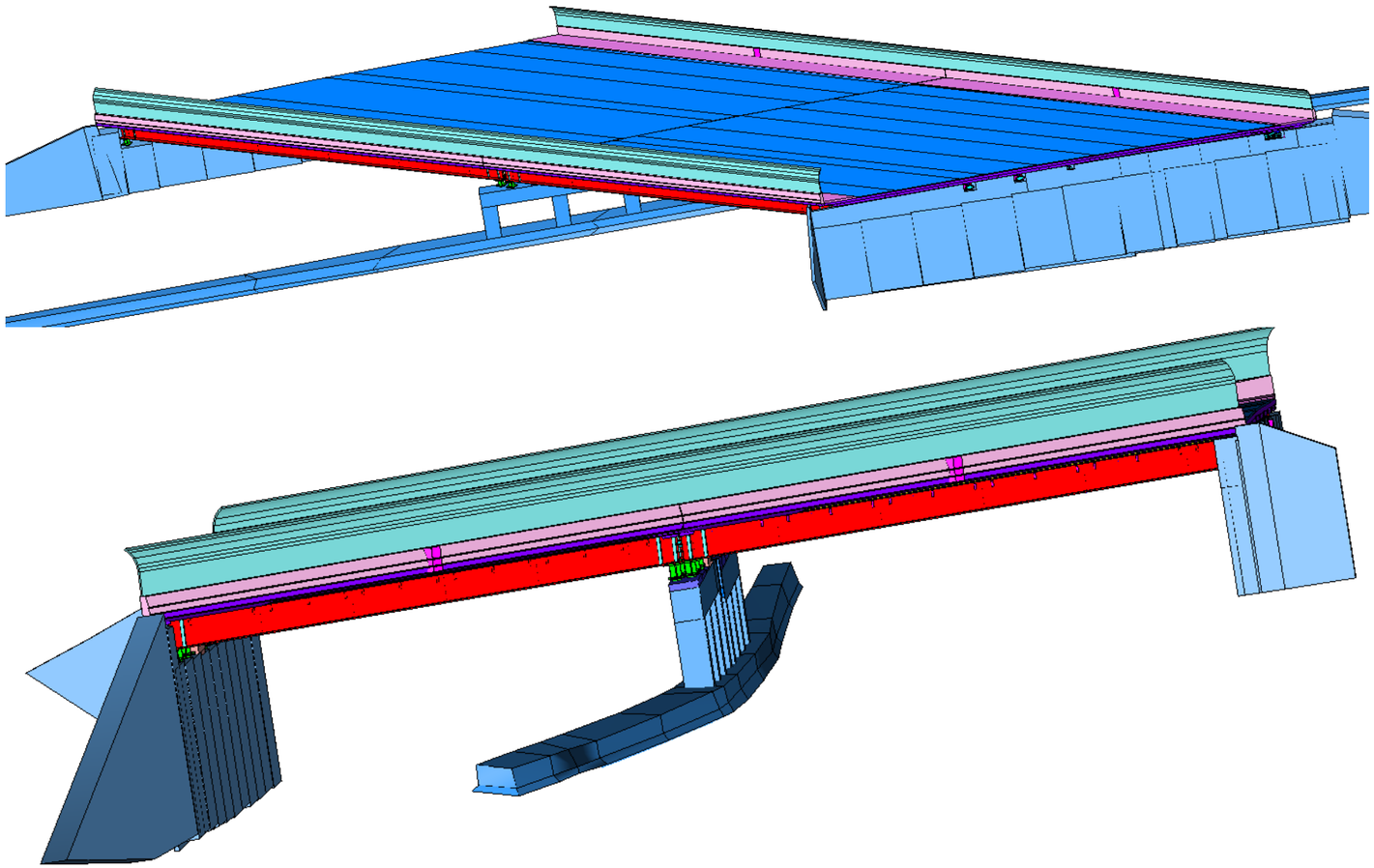
Project History

2000 2002 2004 2006 2014



- **Project returns!**
- Superstructure replacement
- Accelerated construction techniques to be used (SPMTs)
- Temporary utility bridge
- 56-hour weekend closure of I-95
- Detour of Route 1
- Construction of I-95 bypass ramps
- Pilot 3D CAD Model/Refined 3D Bridge Analysis

Project History



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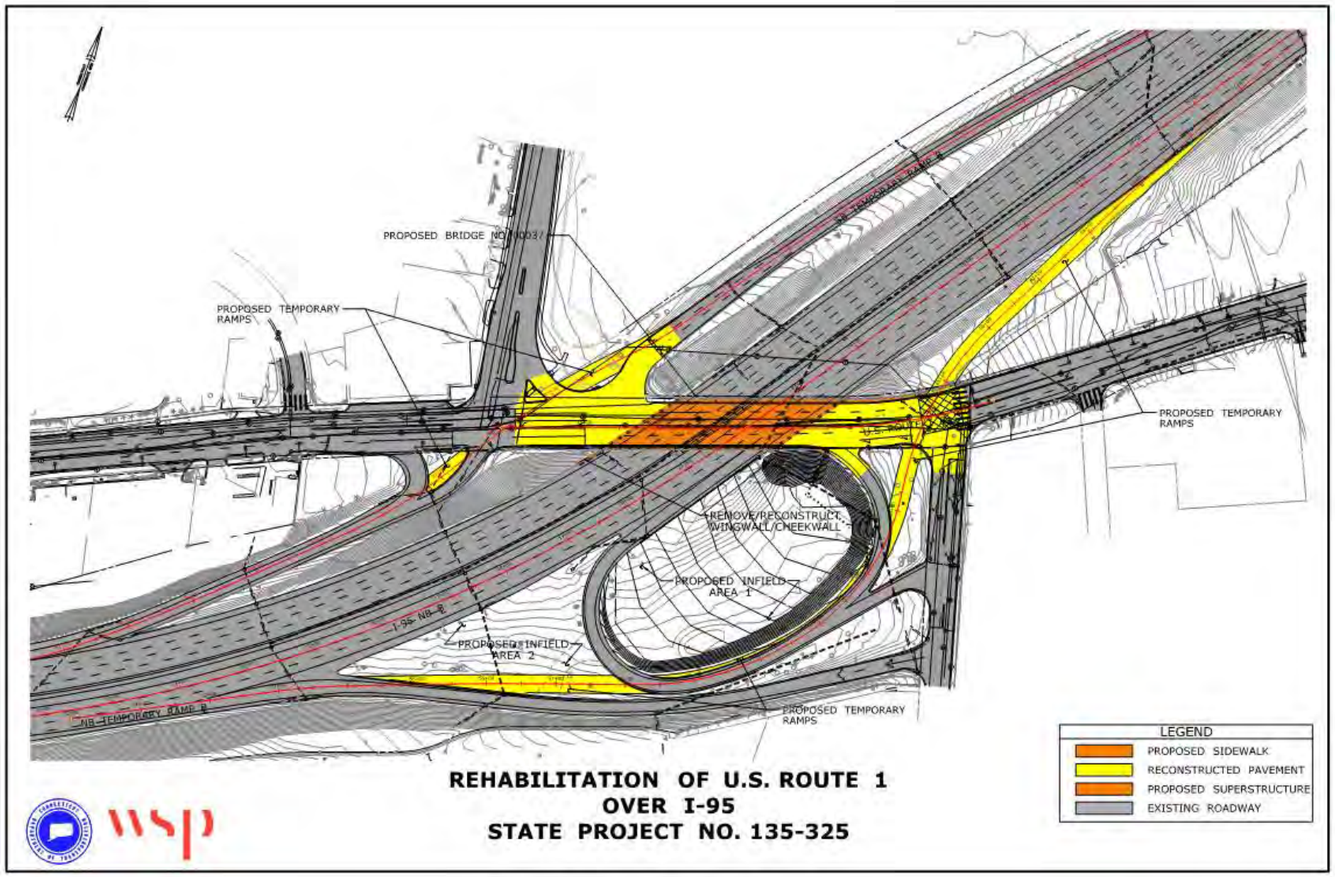
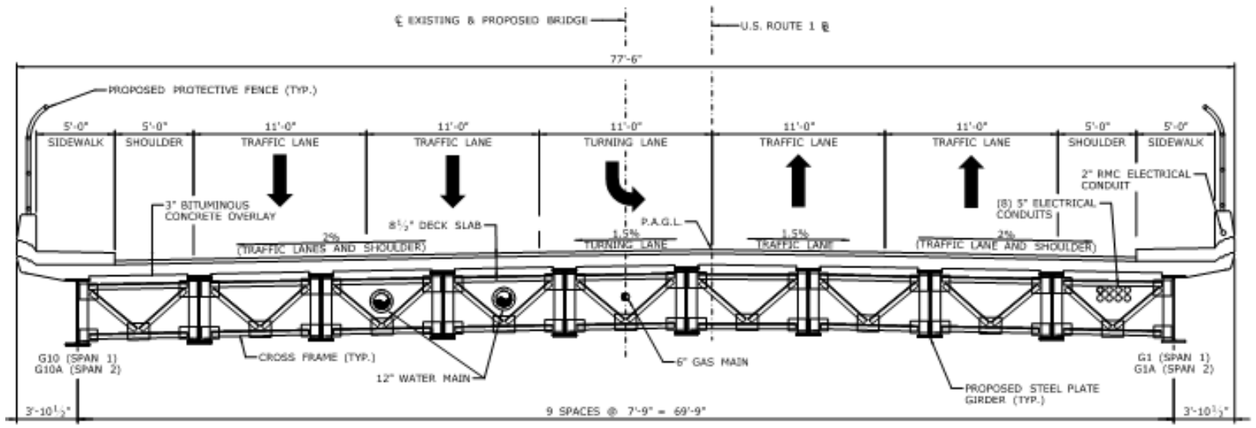


Design completed!

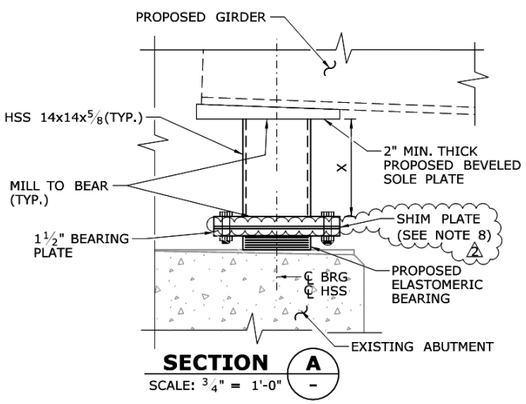
- Superstructure replacement
- Utilization of SPMTs
- Two 56-hour weekend closures of I-95 and Rte 1
- Construction of I-95 bypass ramps
- Detour of Route 1
- Temporary relocation of utilities
- Relocation/replacement of IMS
- English Units

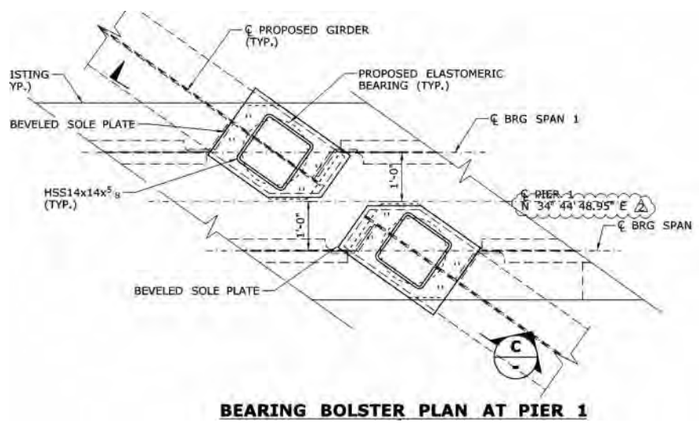
Project History

2000 2002 2004 2006 2014 2018



TYPICAL PROPOSED BRIDGE SECTION



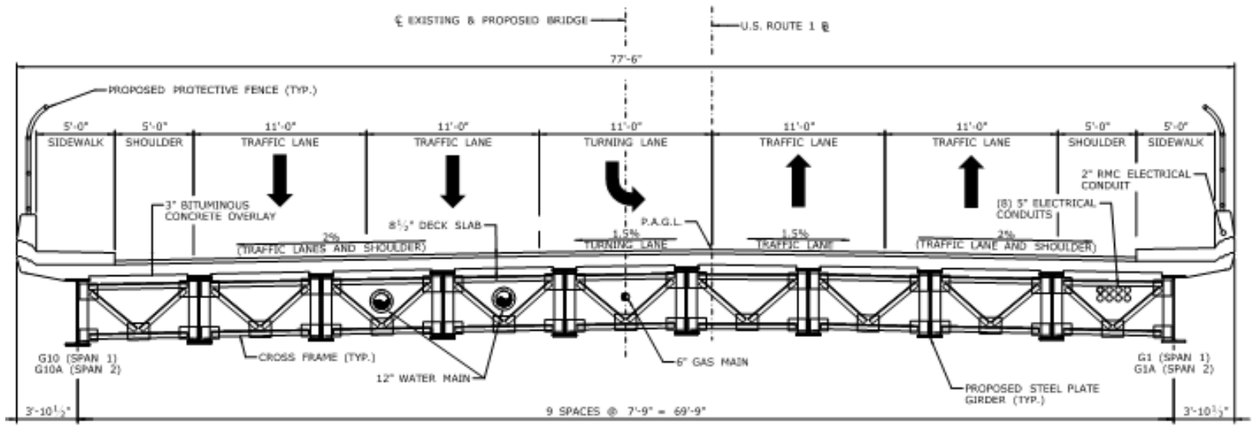


BEARING BOLSTER PLAN AT PIER 1

- Two ~120’ simple spans, 77.5’ width
- Girder depth ~4’, MVC=16’-7”
- Grade 50T2 steel, painted
- Utilized steel bolsters, Elastomeric bearings
- Preformed Silicone Seal Jt. at Pier & Abutment
- Precast Approach Slabs
- Two NB lanes, two SB lanes, one turn lane
- 5’ sidewalks each fascia
- Pedestrian fencing
- Gas, water, and electrical utilities

Project History

2000 2002 2004 2006 2014 2018



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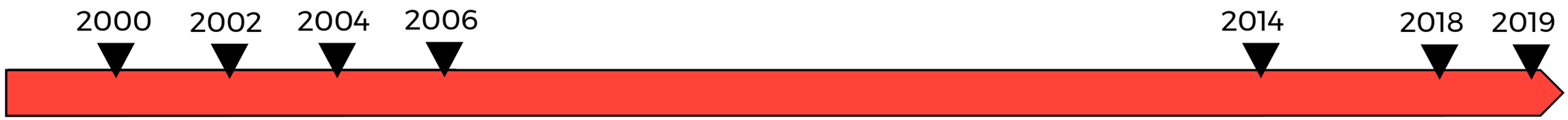
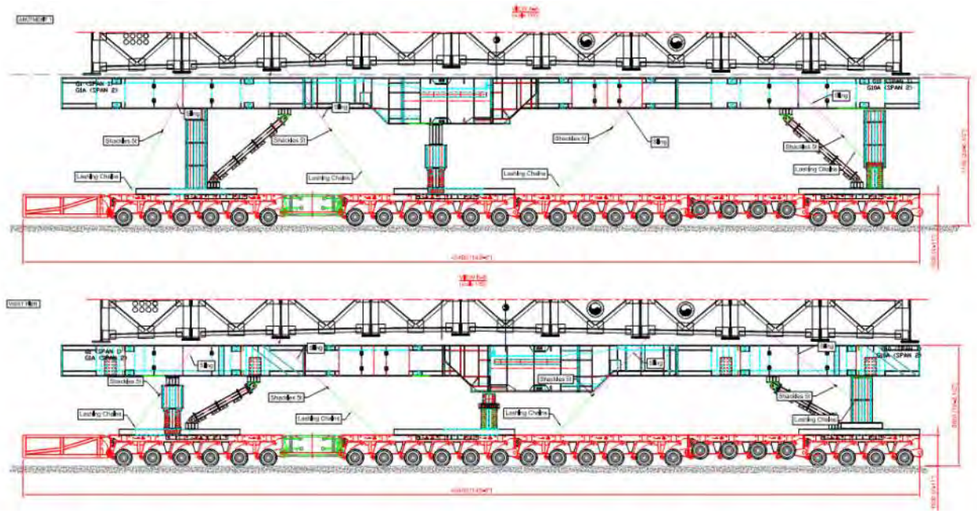


Construction Complete!

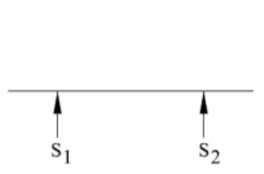
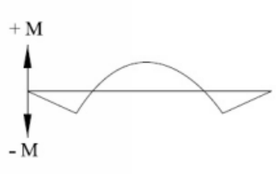
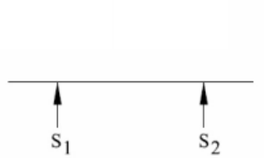
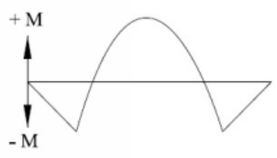
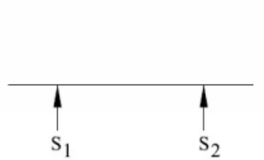
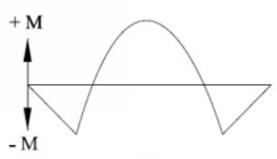
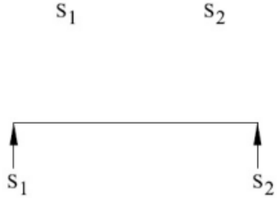
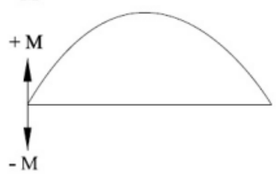
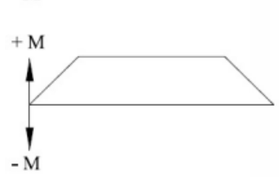
Utilization of SPMTs

- SPMTs = self propelled modular transporters
- Superstructure Weight ~ 850 Tons
- Design considerations
- Travel path limitations
- Laydown areas and temporary supports



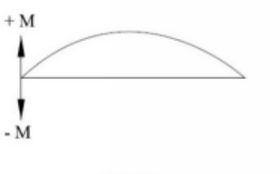
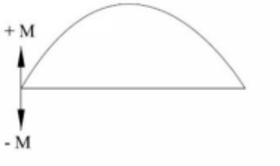
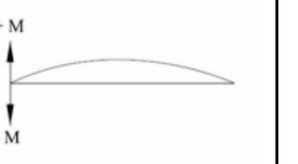
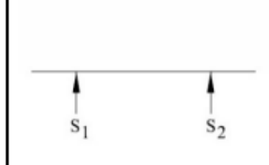
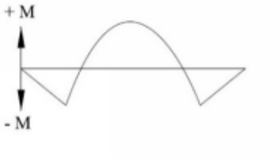
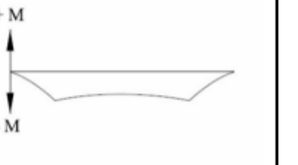
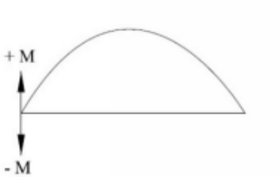
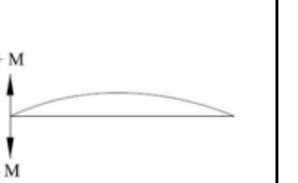
Utilization of SPMTs

– Design Considerations

Construction Stage	System Support Sketch	System Moment Diagram	Deck Moment Diagram
Girder & Deck Placement			
Composite Dead Loads			
After lift by SPMT			
After Setting			

Source: AASHTO Guide Specifications for ABC

Casting supports align with SPMT pick Location

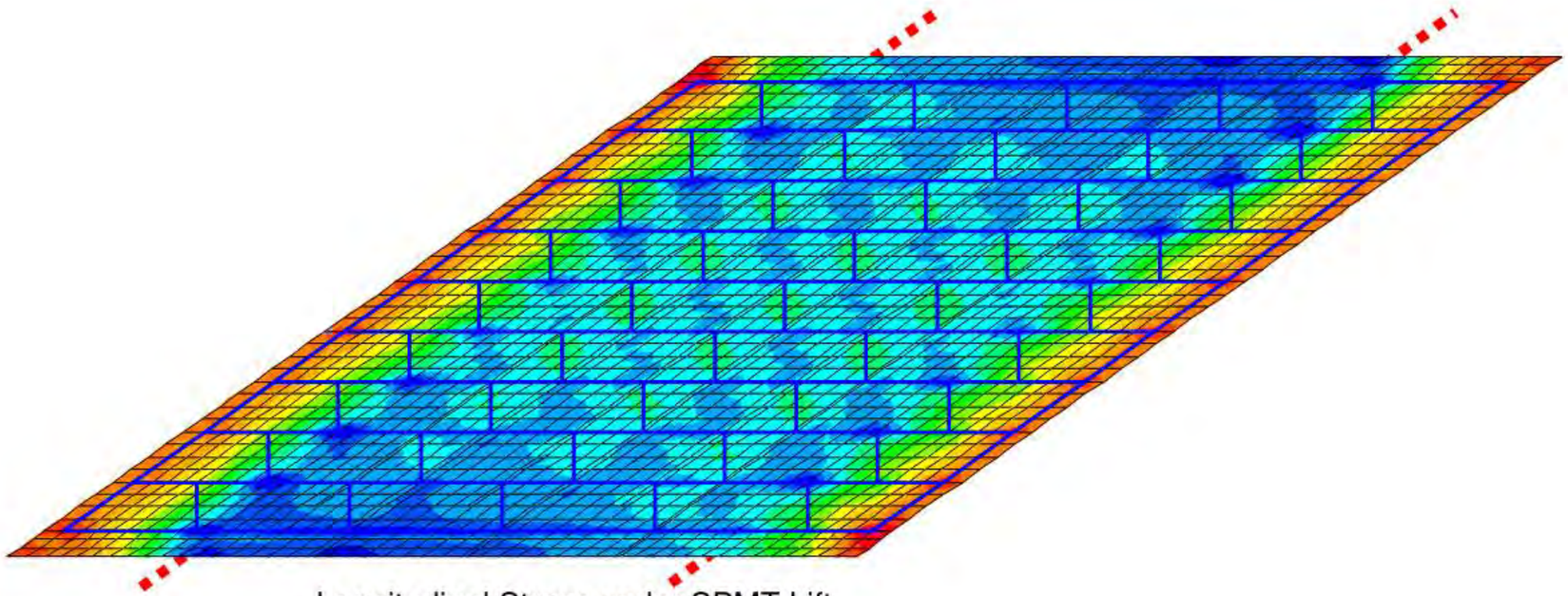
Construction Stage	System Support Sketch	System Moment Diagram	Deck Moment Diagram
Girder & Deck Placement			
Composite Dead Loads			
After lift by SPMT			
After Setting			

Source: AASHTO Guide Specifications for ABC

Casting supports DO NOT align with SPMT pick location

Utilization of SPMTs

– Design Considerations



Longitudinal Stress under SPMT Lift

Utilization of SPMTs

– Design Considerations

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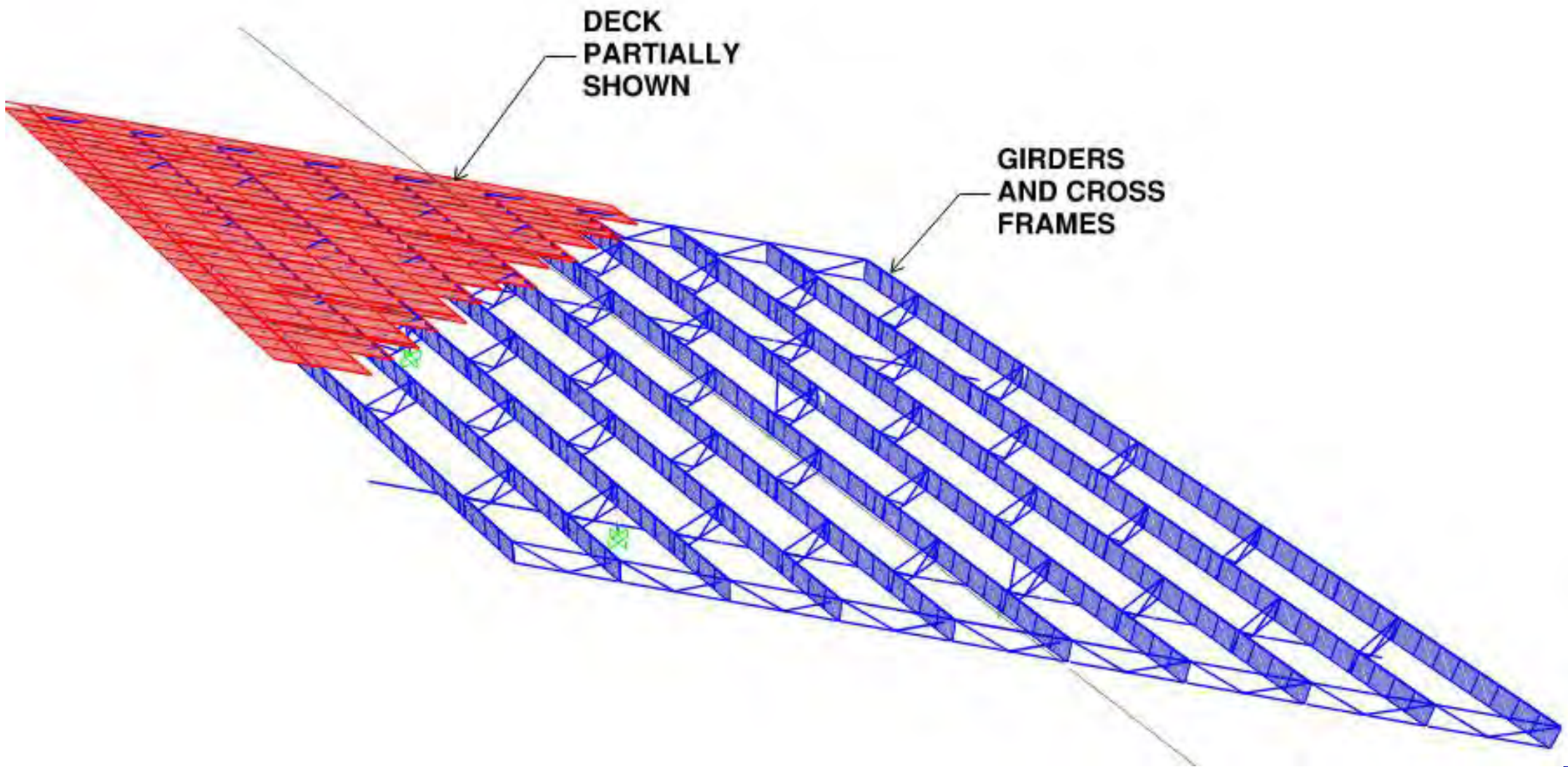
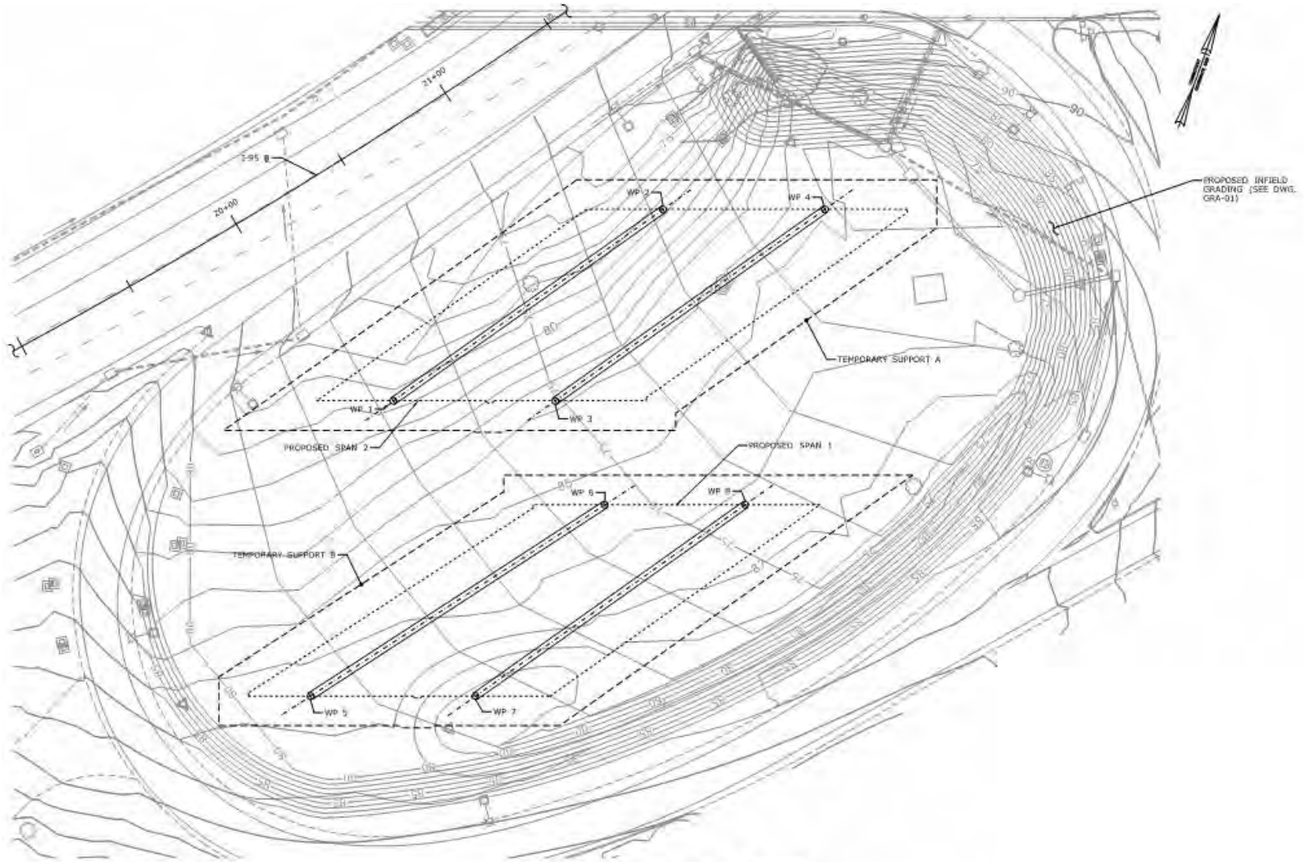
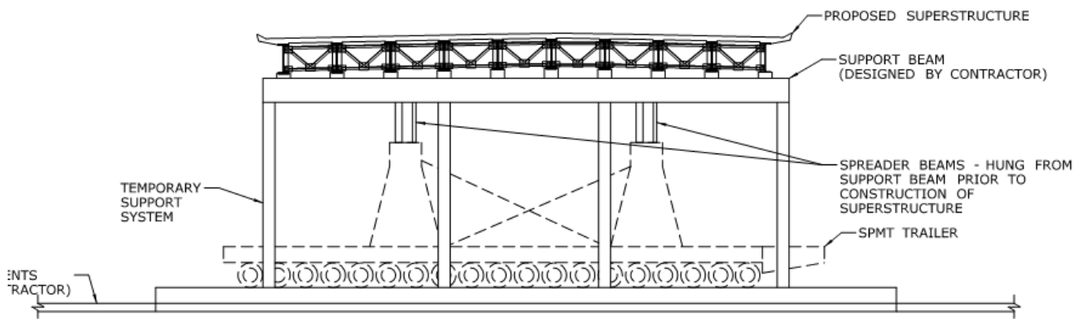


Utilization of SPMTs

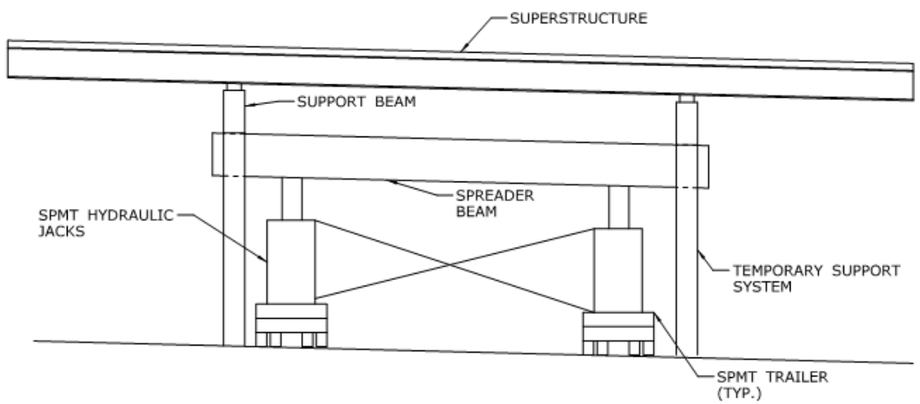
– Laydown areas and temporary supports



TEMPORARY SUPPORT LAYOUT



CONCEPTUAL TEMPORARY SUPPORT



Utilization of SPMTs

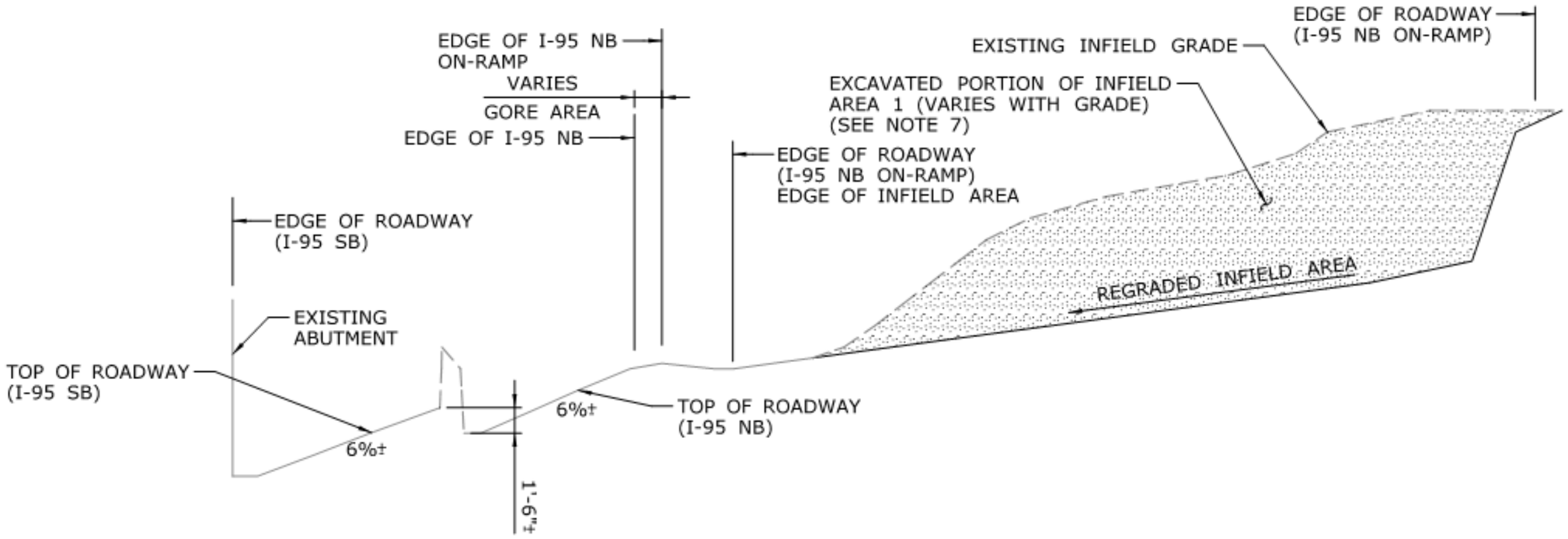
– Laydown areas and temporary supports

Utilization of SPMTs

– Travel path limitations

Utilization of SPMTs

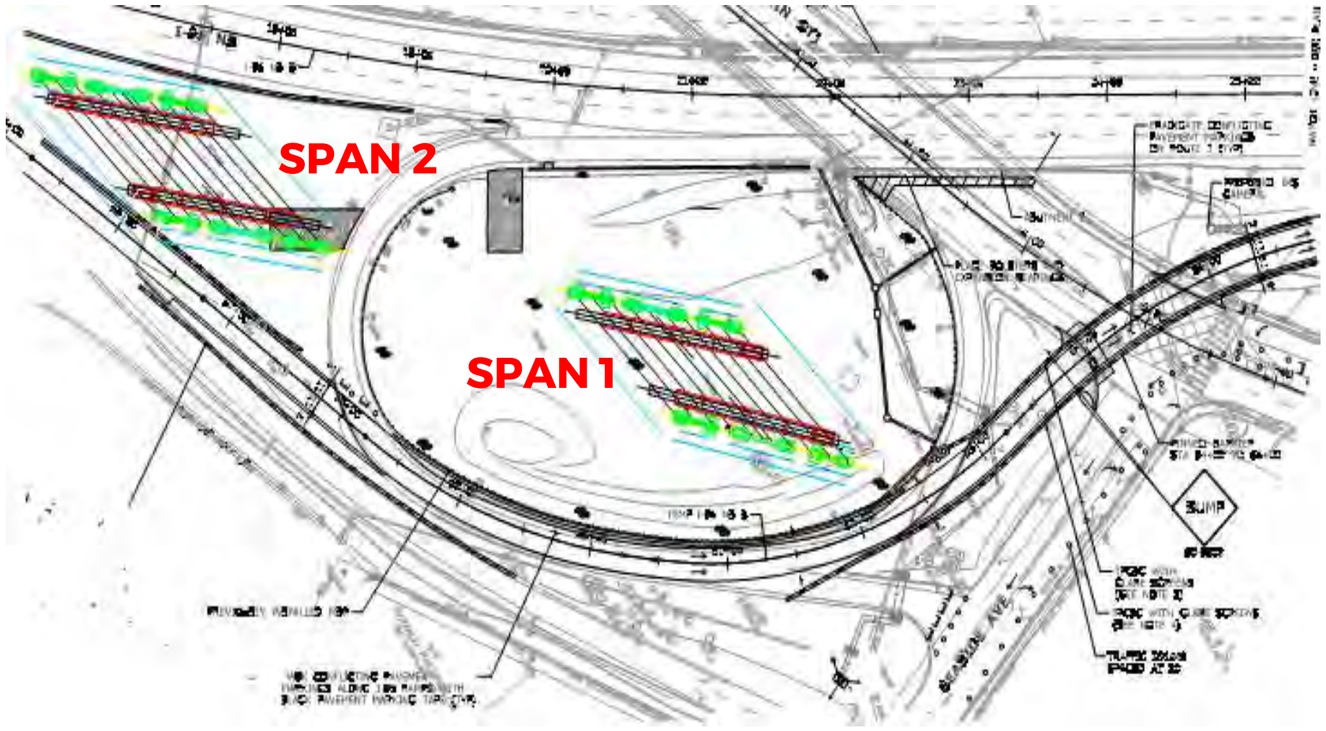
– Travel path limitations

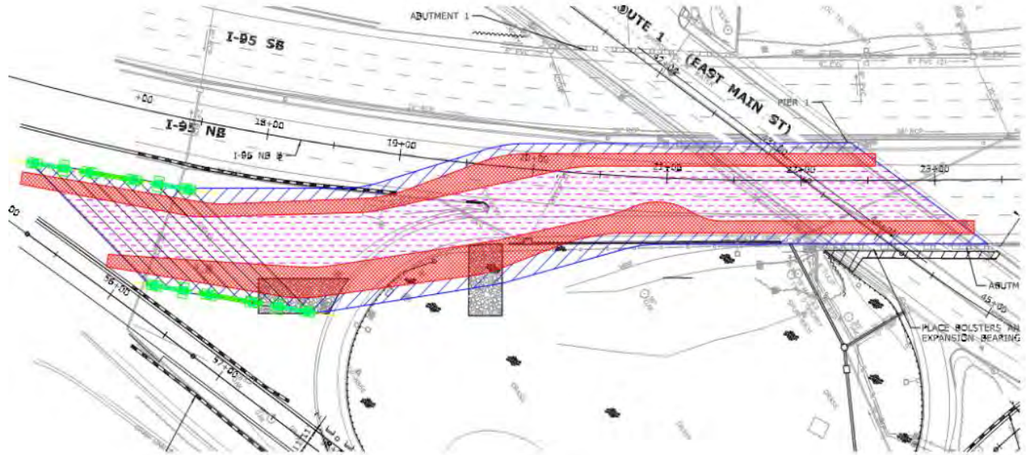


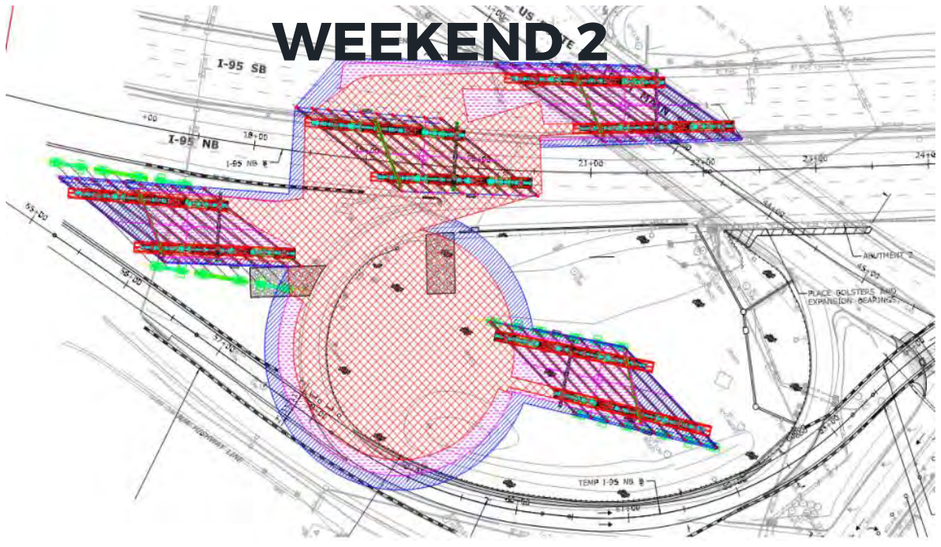
SECTION AT I-95 EXISTING ROADWAY

Utilization of SPMTs

– Travel path limitations

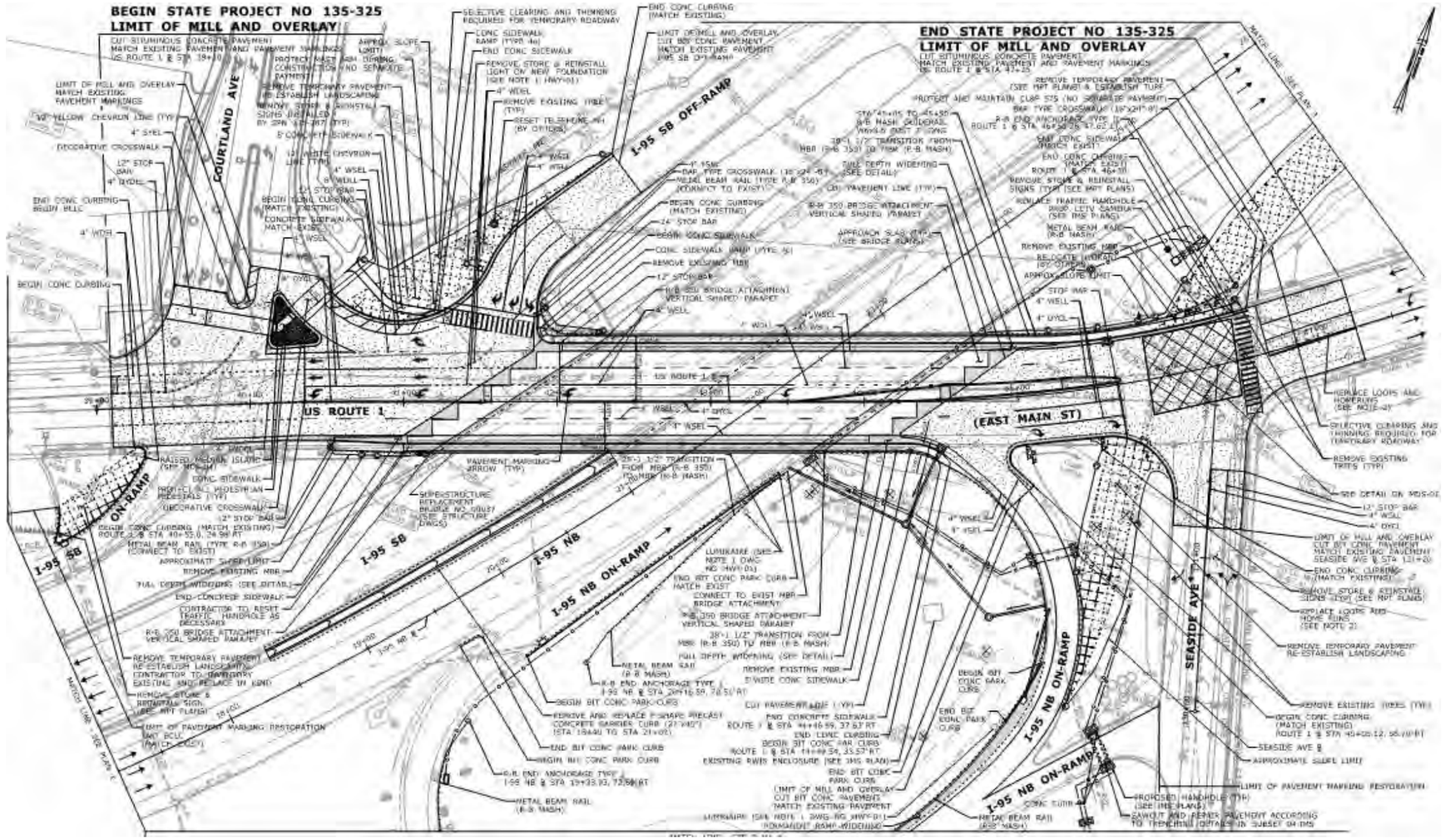






Roadway Impacts

- Traffic volumes:
  - *Route 1 – 17,000 veh/day*
  - *I-95 – 160,000 veh/day*
- Statewide signage
- Pedestrian detour
- I-95 Exit 9 detour
- Route 1 detour
- I-95 bypass ramps



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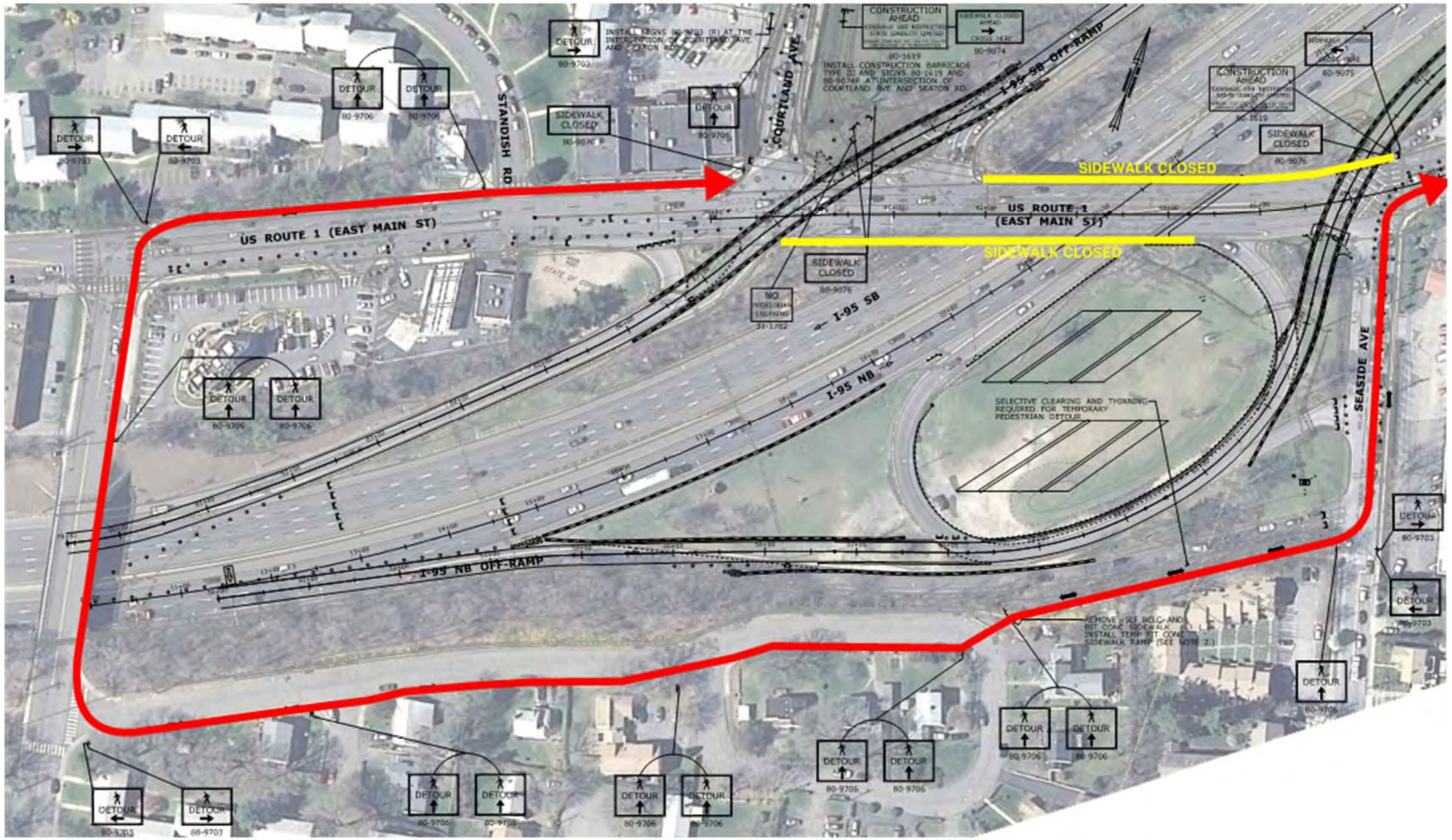

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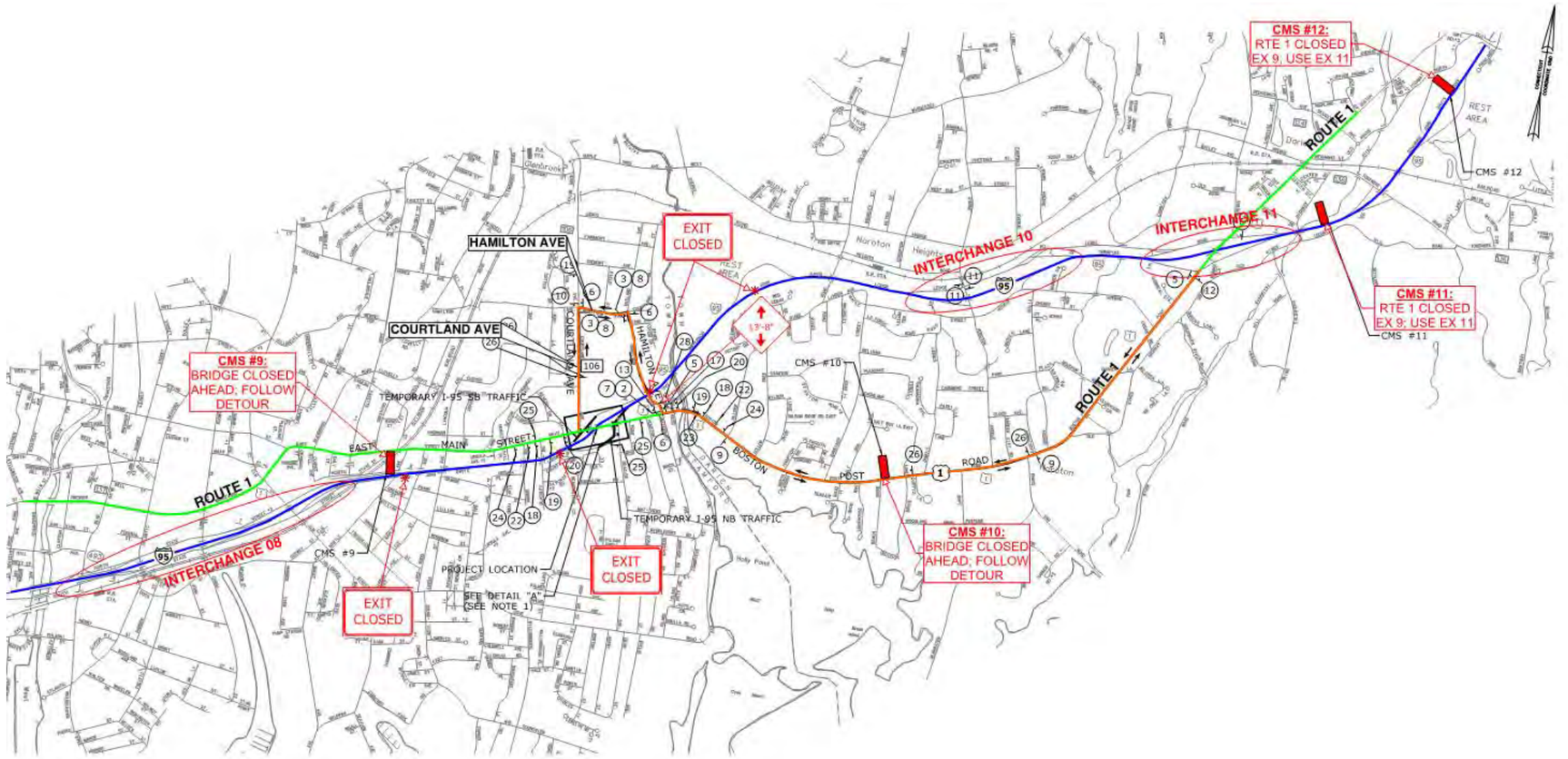

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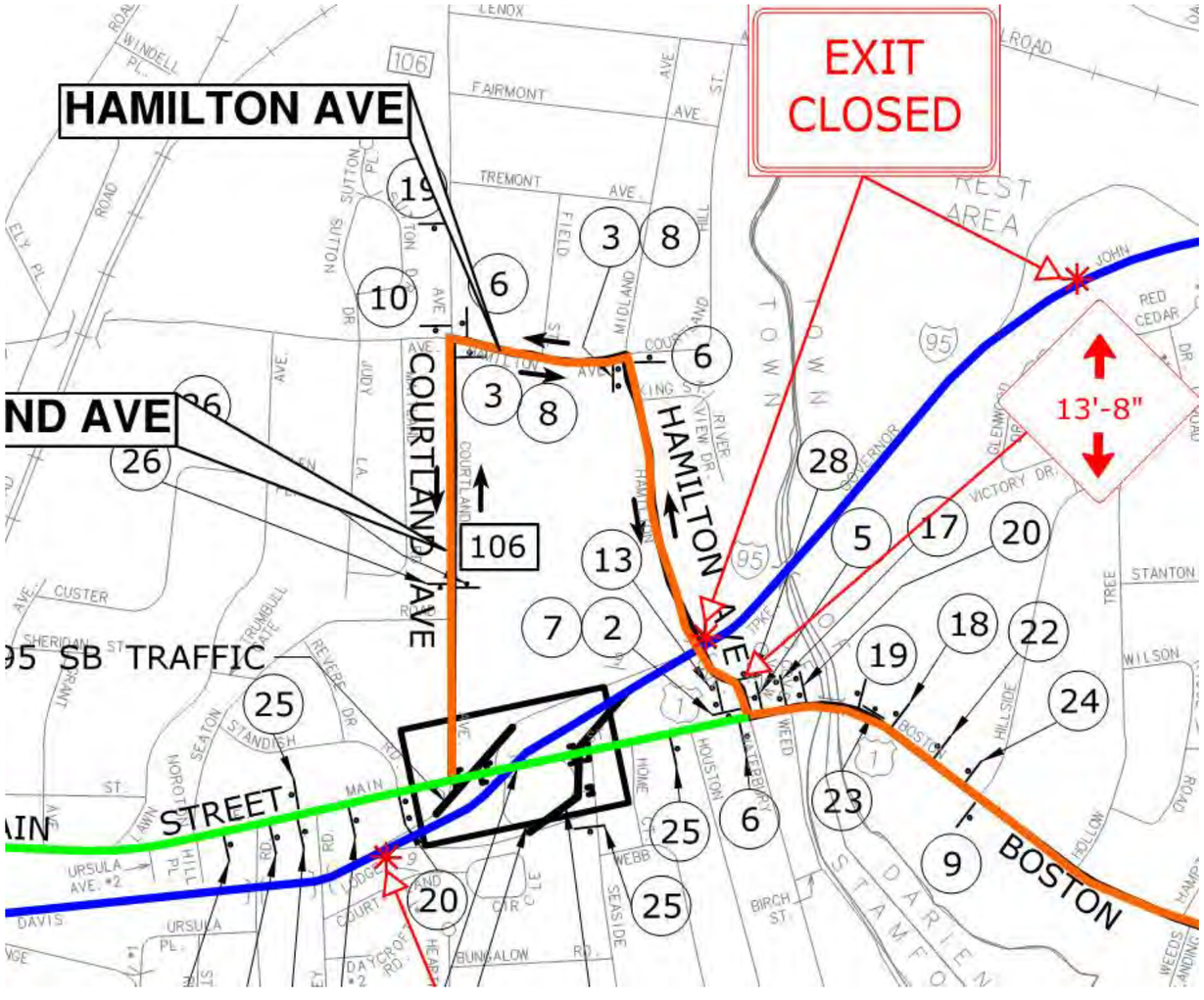

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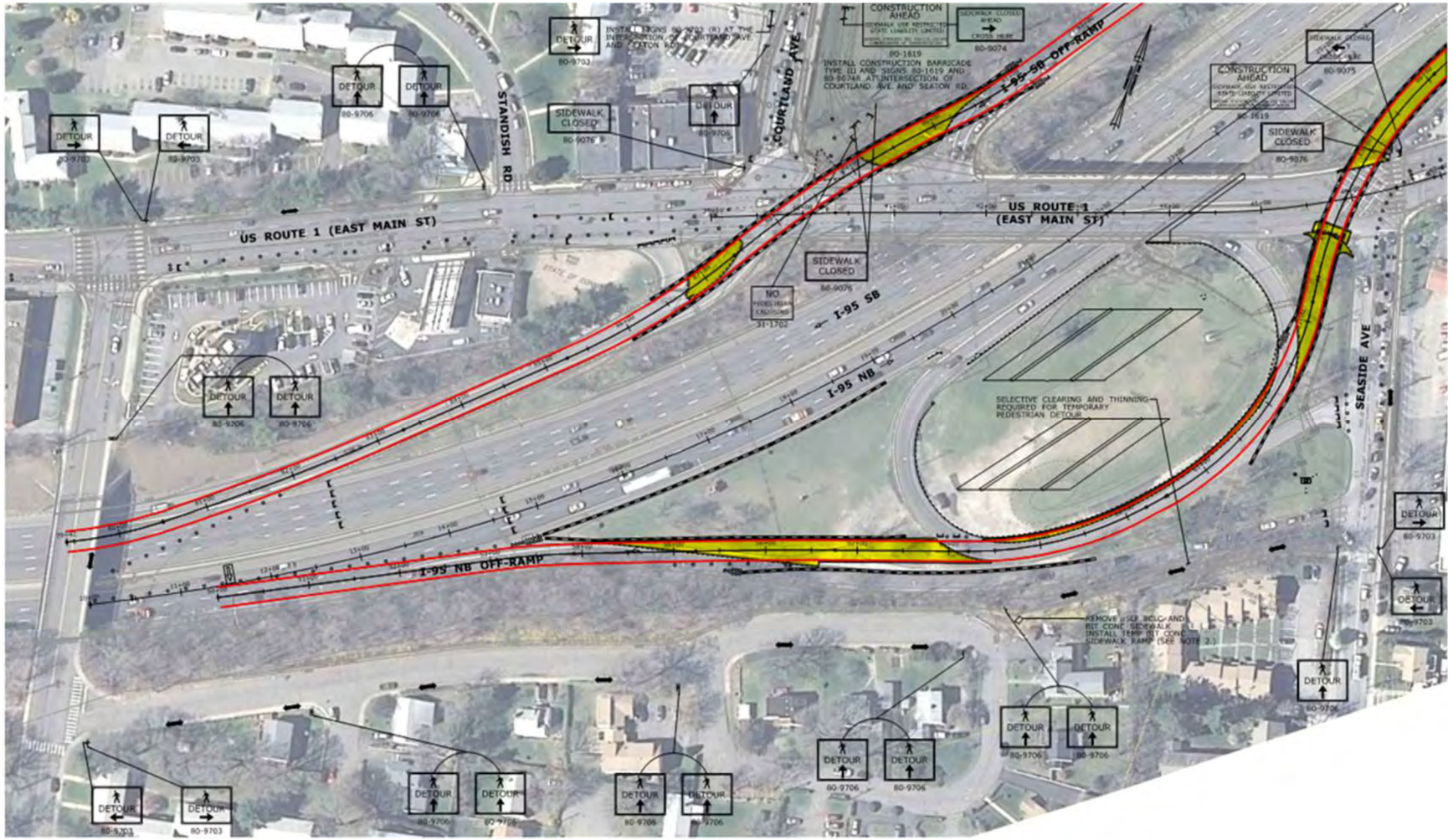
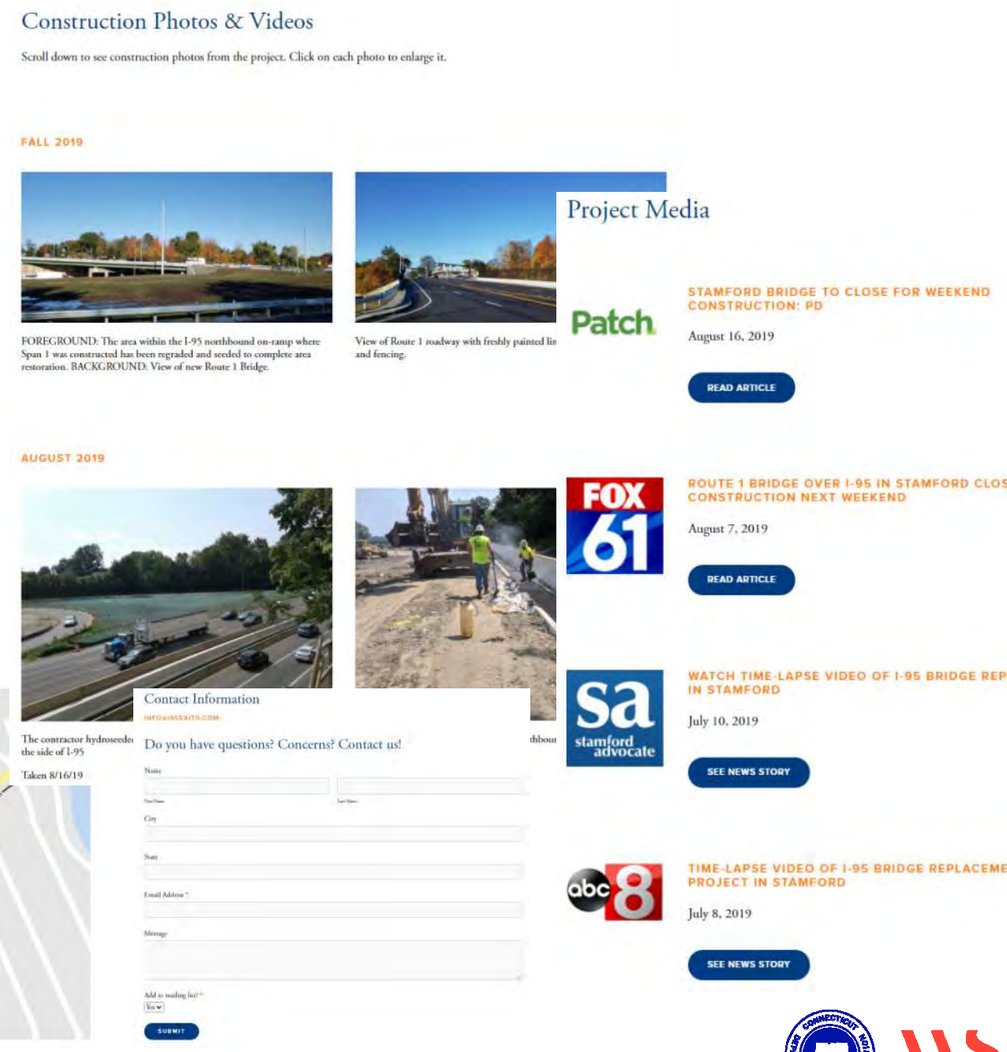
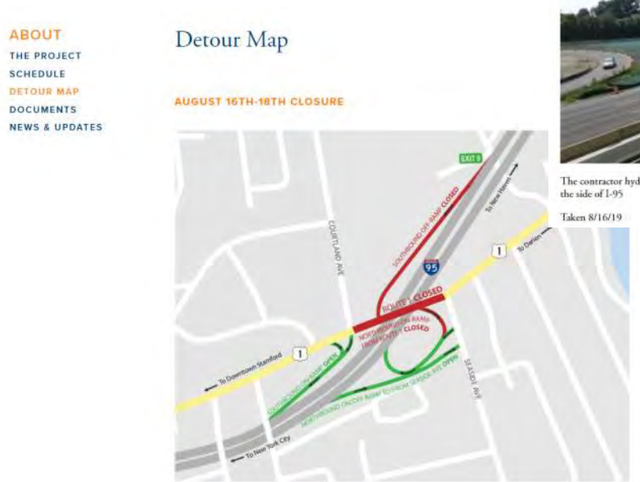


Public Involvement/Outreach Practices

7	Community/stakeholder meetings held
58	Route 1 businesses visited
257	Phone calls, emails, and website contact form entries from the public
87,335	Unique website visitors
68,569	Live stream viewers on construction weekends
18	Social media partners
150,000+	Social media impressions
25	Media outlets that provided coverage
64	Media (newspaper & television) articles/reports

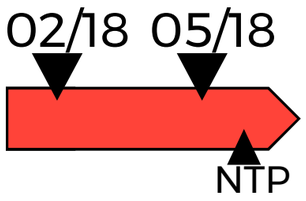
Public Involvement/Outreach Practices





https://www.i95exit9.com/gallery

Construction Timeline



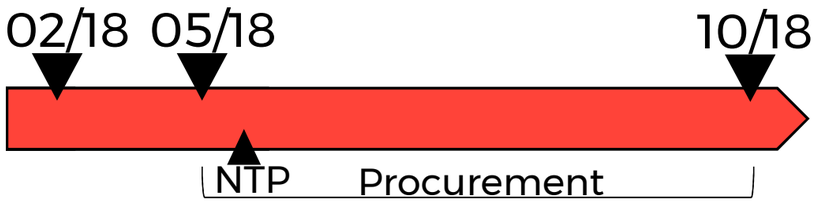
DCD – 02/21/2018

CONTRACT FORMATION		
FDP		13-Dec-17
Processing and Estimating	14-Dec-17	21-Feb-18
DCD		21-Feb-18
Prepare Bid Package	22-Feb-18	28-Feb-18
Advertise		28-Feb-18
Bid Period	1-Mar-18	28-Mar-18
Bid Date		28-Mar-18
Award Period	29-Mar-18	4-May-18
Award		4-May-18
Award to NTP Period	5-May-18	24-May-18
NTP - Construction		24-May-18

Award – 05/04/2018

Notice to Proceed – 05/24/2018

Construction Timeline



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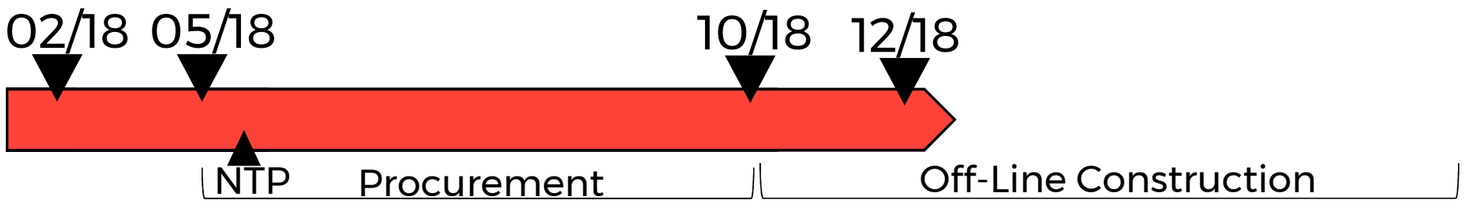

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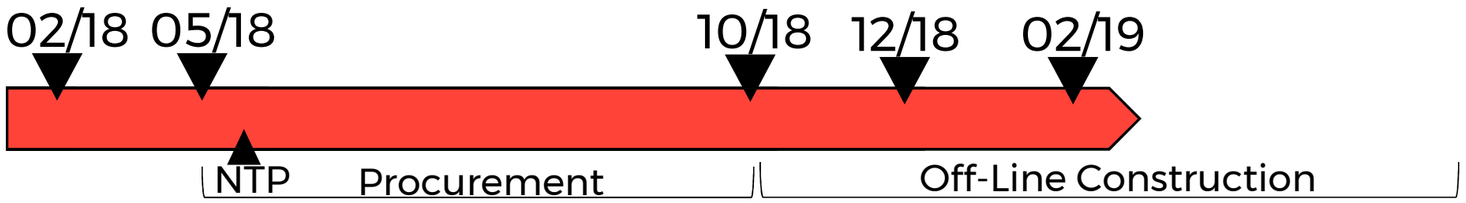

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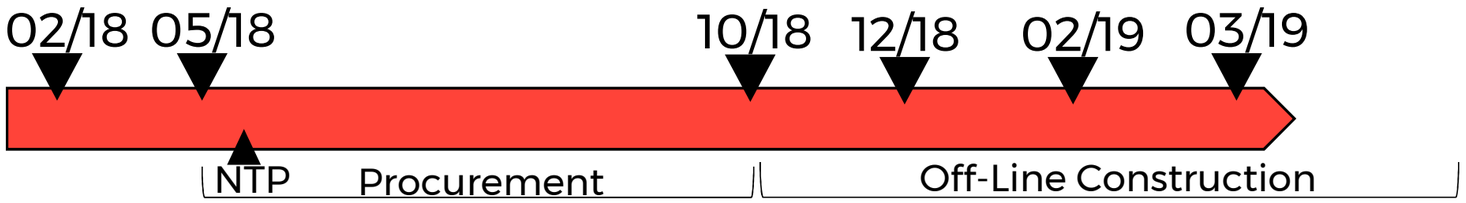

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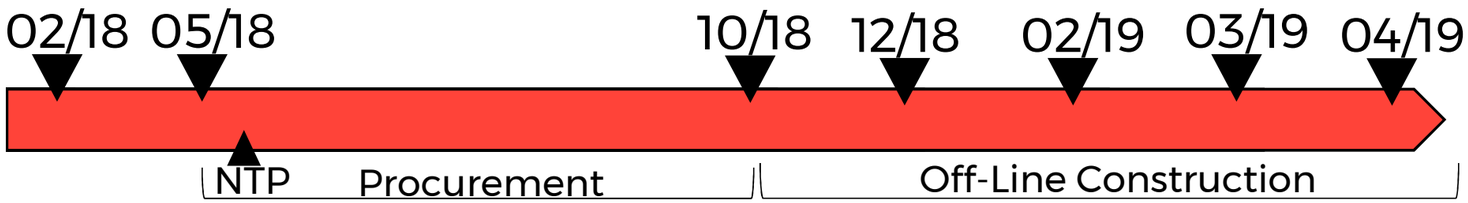

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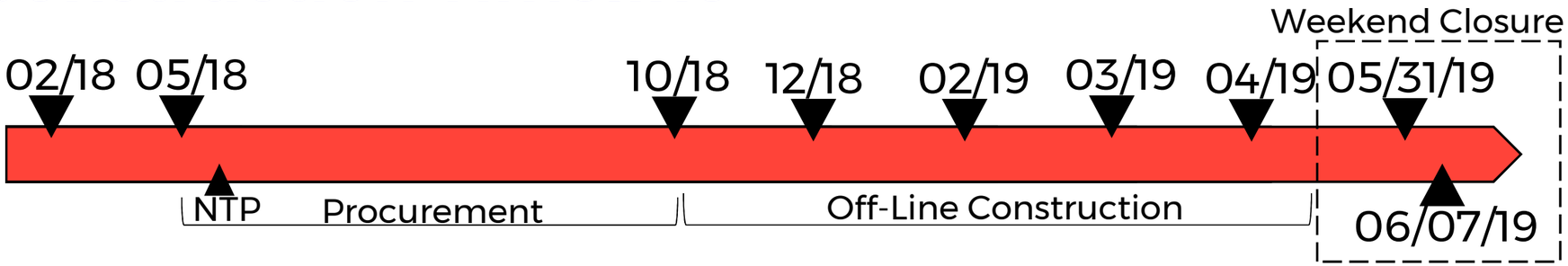


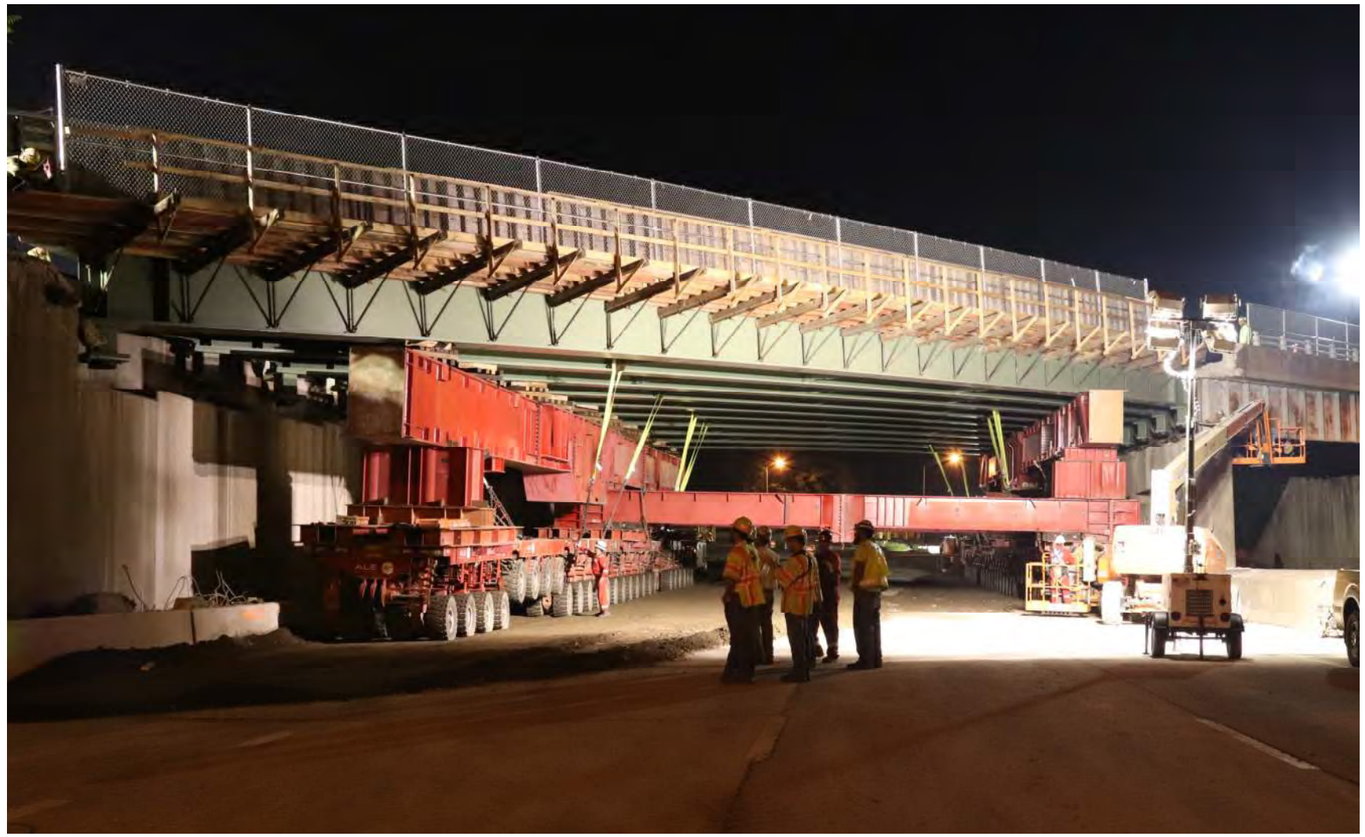
Weekend Closures Begin

Weekend Closure Demolition

Weekend Closure Demolition

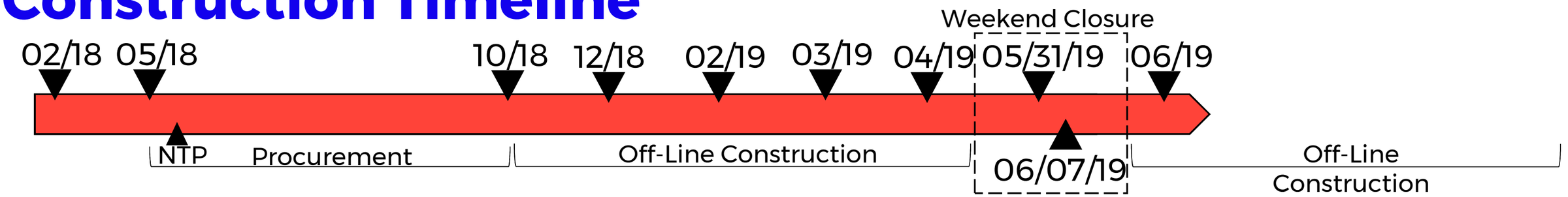
Weekend Closure Demolition

Weekend Closure SPMT Move



Weekend Closure Final Location

Construction Timeline



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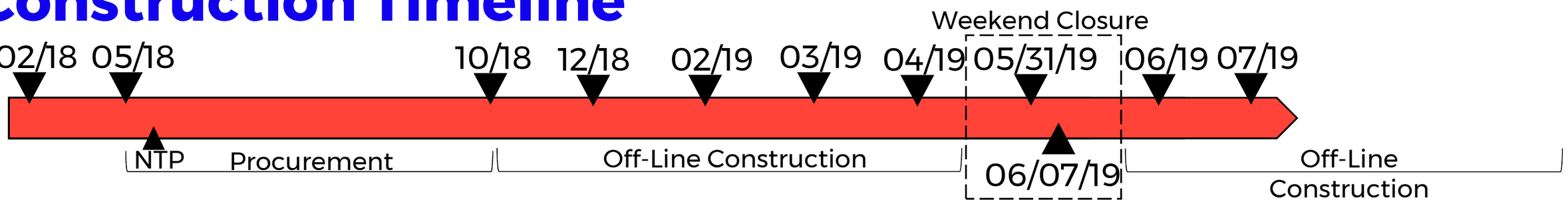

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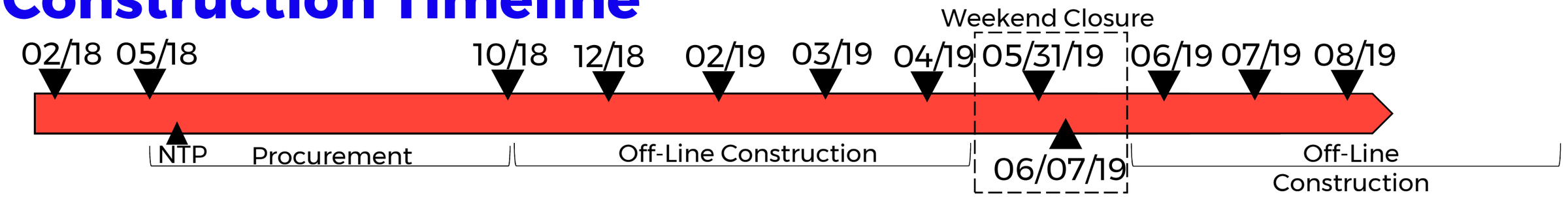

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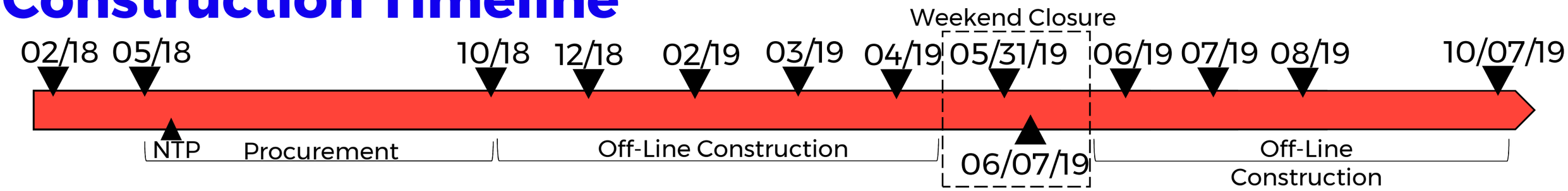


Time Lapse Video

Filmed and Produced

Peter Venoutsos (CTDOT)

Aerial Footage

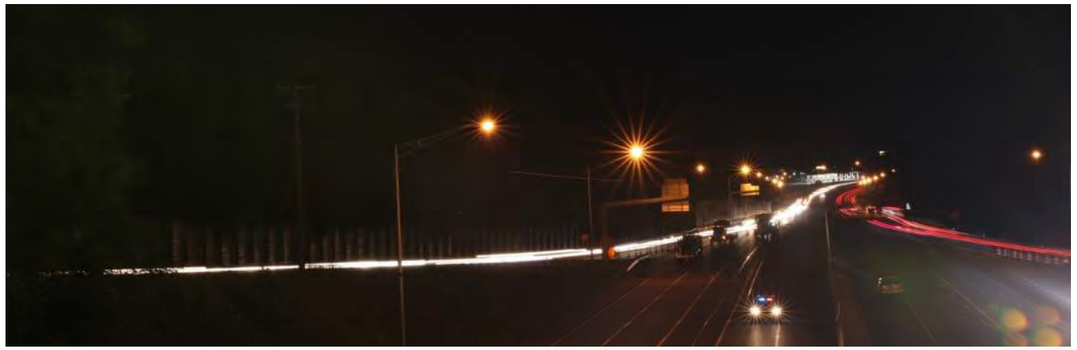
Vitalij Staroverov (CTDOT)

Eric Tallarita (CTDOT)

https://www.i95exit9.com/gallery

Project Successes

- 50% traffic reduction
- 2.5 mile maximum delay
- No major accidents
- I-95 reopened early both weekends
- Use of ABC Techniques
- Lessons Learned
  - *Survey Coordination*
  - *Geometry Control*
  - *SPMT Travel Path Preparation*



"Stamford Bridge Replacement on I-95 an Example of Efficiency and Innovation" - Governor Lamont

"My husband who is a civil engineer was amazed at the speed of the project. As a layperson, finishing early on both weekends was mind boggling. Great job! "

"Excellent planning and execution."

"Everyone did an amazing job! Virtually no impact what so ever."

Thank You

Accelerated Bridge Construction

I-95 Exit 9 Stamford