To: Connecticut Department of Transportation

From: HNTB Team

Date: October 17, 2018

Re: Reconstruction of Interstate 84/Route 8 Interchange "Mixmaster" – Fiscally Constrained Alternatives

Executive Summary

Overview:

The current Rehabilitation Project (Project Nos. 151-312/313/326) is intended to add 25 years of service life to the Mixmaster structures until the interchange can be replaced under Project No. 151-331. Under the Rehabilitation Project, decks on the Route 8 mainline structures are being replaced or rehabilitated, while decks on the Interstate 84 mainline structures are simply being rehabilitated. Steel strengthening and substructure repairs, as well as other improvements such as parapet replacements, are also being performed throughout the Mixmaster under the Rehabilitation Project. In response to CTDOT's concerns that they may be operating in a fiscally constrained environment for the foreseeable future, HNTB was tasked with defining a potential rehabilitation project to be completed by 2045, in lieu of full replacement. The Interstate 84 mainline structures are the focus of these "Fiscally Constrained Alternative" Options. In the design year of 2045, the original 7 ¼" thick concrete decks on Interstate 84 will be over 75 years old and are expected to need replacement.

The Fiscally Constrained Alternative (FCA) Workshop was held in mid May 2018. The purpose of this workshop was to focus on strategies for the replacement of the concrete decks on the mainline structures within the interchange, particularly Interstate 84, in the design year. The workshop was attended by HNTB experts on bridge design and accelerated construction, as well as other disciplines such as urban planning, scheduling, and cost estimating. Several options were developed at the workshop that have been investigated further, graphically represented and cost estimated. Some of these Options have been modeled using Bentley Concept Station.

Of the options evaluated during the May workshop, five (5) primary options for rehabilitation of the Interstate 84 structures have been further developed along with four (4) supplemental options for rehabilitation of the Route 8 structures. The options for Interstate 84 are represented as Options A through E.

- Option A includes a new Interstate 84 Eastbound structure along with removal of the existing, elevated Eastbound structure and rehabilitation of the existing Westbound structure. Both bounds of Interstate 84 traffic will be maintained on the new Eastbound structure while Westbound structure is modified.

- Option B includes a CD roadway adjacent to the current structure along with replacement of the superstructure on simple spans with modular super units and replacement of the deck with precast panels on the fracture critical spans. Work is to be performed during weekends only while traffic is diverted onto the CD roadway.
- Option C includes a CD roadway along with a new cast in place concrete deck using staged construction for one lane of Interstate 84 Westbound traffic while the remaining Westbound traffic and all Eastbound interstate traffic is diverted onto the CD roadway.
- Option D includes widening of the existing Interstate 84 structures by adding new pier columns to the north, extending the cap girders and rehabilitation of the remaining substructures. Traffic will be spilt in numerous stages to allow for the concrete deck replacement.
- Option E includes an accelerated bridge construction (ABC) option utilizing lateral slides for the replacement of the existing fracture critical Interstate 84 Eastbound spans. This option requires a CD roadway with enough width that allows for a short-term diversion of all lanes of Interstate 84 traffic onto CD roadway during the demolition and lateral slides.

The schedules and cost estimates for all options will be considered as CTDOT looks at the feasibility to replace or rehabilitate the Mixmaster Interchange by 2045.

Additionally, a Life Cycle cost analysis was completed for each FCA Interstate 84 option and compared against the Life Cycle cost for full replacement of the Interstate 84 mainline structure.

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1.0 Introduction

Overview:

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The Fiscally Constrained Alternative (FCA) Workshop was held in mid May 2018. The purpose of this workshop was to focus on strategies for the replacement of the concrete decks on the mainline structures within the interchange, particularly Interstate 84, in the design year. The workshop was attended by HNTB experts on bridge design and accelerated construction, as well as other disciplines such as urban planning, scheduling, and cost estimating. Several options were developed at the workshop that have been investigated further, graphically represented and cost estimated. Some of these Options have been modeled using Bentley Concept Station.

The cost estimates will be considered as CTDOT looks at the feasibility of various options to replace or rehabilitate the Mixmaster Interchange in 2045.

Options Overview:

Interstate 84

Option A: Construct a new upper Interstate 84 Eastbound parallel to the existing mainline that can support five (5) lanes of bidirectional, interstate traffic in the interim condition while the existing upper structure (Interstate 84 Eastbound) is demolished and concrete decks are replaced on the existing lower structure (Interstate 84 Westbound). In the interim condition, movable barrier will be utilized to favor the traffic flow in the AM and PM peak hours.

Option B: On Interstate 84 Eastbound and Westbound, replace the concrete decks on fracture critical spans with Precast Decking and the simple spans with Modular Super Units. Construct a Collector/Distributor (C/D) Roadway or Frontage Road for traffic management during construction. This road will supplement the local roadway connections upon completion of the project.

Option C: On Interstate 84 Eastbound and Westbound, construct the decks approximately half at a time while maintaining one lane of traffic including ramp traffic on Interstate 84 Westbound (lower deck). Construct a C/D Roadway or Frontage Road for traffic management during construction. This road will supplement the local roadway connections upon completion of the project.

Option D: Interstate 84 Eastbound and Westbound are to be widened to one side of the existing structures. The three (3) lane portions will be widened twenty-four (24) feet while the four (4) and five (5) lane portions will be widened twelve (12) feet. New substructure is to be constructed so that the existing structures can be widened. The existing cap girders will need to be extended/strengthened, with several of the cap girders requiring substantial extensions. The additional cap girder extension, beyond that needed for the widening, is primarily due to conflicting roadway and track network immediately adjacent to existing pier columns. The portion of the existing column between the lower and upper levels and the existing parapets will be removed. The existing concrete decks will then be replaced in stages, simultaneously while maintaining existing traffic.

Option E: On Interstate 84 Eastbound and Westbound, complete span replacements for the non-redundant spans. These span replacements are to be completed using Accelerated Bridge Construction (ABC) techniques utilizing weekend closures. This option works as an addition onto Option B but the entire non-redundant span will be replaced rather than just replacing the concrete deck. The C/D Roadway or Frontage Road will be constructed for traffic management during construction. This road will supplement the local roadway connections upon completion of the project.

Route 8

These options are to supplement or modify the estimates for the options above. The focus of this White Paper is the replacement of the concrete decks on the Interstate 84 mainline bridges.

Option F: On Route 8 Southbound and Northbound, replace the decks on fracture critical spans with Precast Decking and the simple spans with Modular Super Units. This approach is similar to the replacement of decks on five spans with Precast Decking (exodermic system) being performed on Route 8 Southbound in the current Rehabilitation Project (#151-326). A Temporary Bypass will be constructed to handle Route 8 Northbound traffic during construction.

Option G: Route 8 Southbound and Northbound, to become boulevards. Within the limits of the project, these existing limited access highways will become surface level roadways with traffic controlled intersections. Connections to and from Interstate 84 will occur on the north side of the interstate.

Option H: Route 8 Southbound to be constructed to the west of the existing over existing Southbound Riverside Street. This will unstack Route 8 south of Interstate 84.

Option I: On Route 8 Southbound and Northbound, complete span replacements for the non-redundant spans. These span replacements are to be completed using ABC techniques. Route 8 Northbound and Southbound will be detoured using the local roadway network.

Existing Conditions:

Overview:

The study area examined includes the Interstate 84 mainline from the Route 64 overpass (Milepost 30.4) to the Hamilton Avenue overpass (Milepost 34.2). This section of the freeway includes exits 17 through 23 and the Eastbound C/D Roadway off exit 23. The study area also includes Route 8 mainline from the Seventh Street overpass (Milepost 29.0) to the Route 73 exit ramp (Milepost 31.2). This section of the freeway includes exits 30 through 35 (See Figure 1).

The interchange was designed and constructed in the 1960s to fit within the existing topography and site constraints. Along the Interstate 84 corridor from the western study limit, the existing topography slopes to the east. In the vicinity of Highland Avenue, there is a ridge line and the ground descends very rapidly to the Naugatuck River valley. On the narrow west side of the valley, Riverside Street is a local collector road; on the wider east side, are former factory sites and a railyard. There are high embankments containing the river on both banks.

Interstate 84 continues easterly, descending to the south of the city center, reaching its lowest point at the South Elm Street overpass near the Mad River crossing. The topography then begins to climb as it progresses to the east following the Mad River valley, turning to the southeast around Holy Land before heading east at the eastern study limit.

Route 8 is a north-south oriented limited access highway that parallels the Naugatuck River on its west side through the study limits. South of Interstate 84, Route 8 is a stacked viaduct, northbound over southbound due to the narrow width between the historic cemetery and the Naugatuck River.

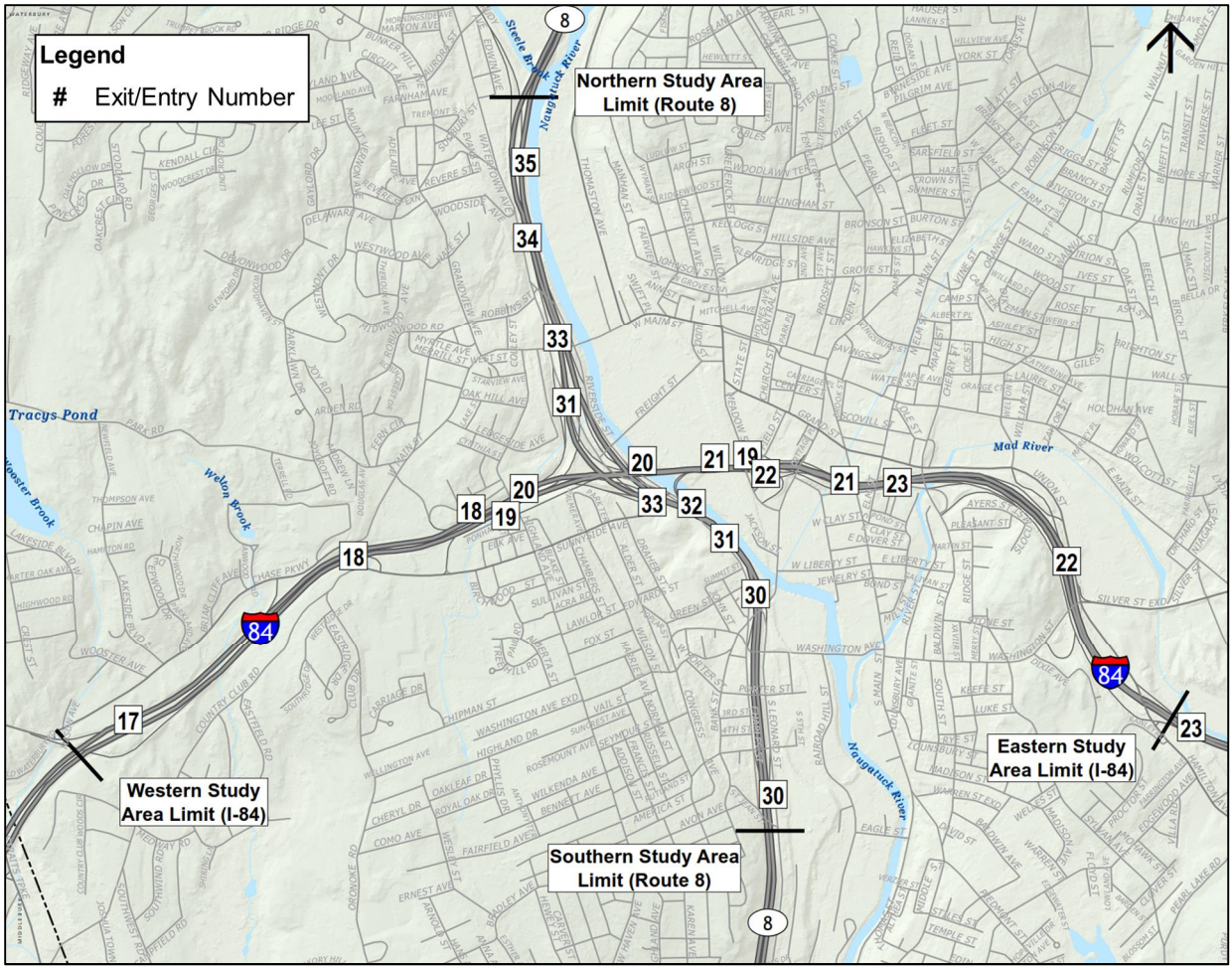


Figure 1

At the center of the study area is the Mixmaster, an elevated, full system interchange. It is a full diamond configuration with four levels. Level 1 is the local road, Riverside Street. Interstate 84 is a stacked viaduct as the two highest levels (Westbound at Level 3 and Eastbound at Level 4) crossing Route 8, local roads, the Naugatuck River and the existing railyard. Route 8, at the Interstate 84 viaduct, is a divided expressway at Level 2 with Riverside Street and other local roads forming Level 1. The Naugatuck River is below Level 1. The system interchange has an equal number of left and right exit ramps but has five left handed with three right handed entrance ramps. The system ramps within the Mixmaster are, on Interstate 84 – Exits 19 and 20 and on Route 8 – Exits 31 and 33.

The service ramps within the study area are, on Interstate 84 – Exits 17, 18, 21, 22 and 23 and on Route 8 – Exits 30, 32, 34 and 35.

The study area has over forty-two (42) bridges including a pedestrian bridge. The Mad River crosses under Interstate 84 on the eastern portion of the study area. Significant features within the study area include numerous culverts located throughout and due to the elevated nature of the interchange, over 100,000 square feet of retaining walls.

The 2017 Average Daily Traffic (ADT) numbers show that Route 8 has a high volume from the north and south to Interstate 84 Eastbound in the morning and returning from Interstate 84 Westbound in the evening. These movements are substantial when compared to the through traffic movements along Route 8 at the interchange. Route 8 Northbound has a through movement ADT of 22,700 vehicles and an ADT of 11,400 vehicles exiting to Interstate 84 Eastbound. Route 8 Southbound has a through movement ADT of 14,700 vehicles and an ADT of 17,000 vehicles exiting to Interstate 84 Eastbound. Interstate 84 meanwhile has a substantial through traffic movement (ADT 134,900 total vehicles east of the interchange and 99,300 total vehicles west of the interchange).

Waterbury does not have an extensive roadway network near the core interchange, which limits options for detours for the mainlines. Starting north and moving south, Waterbury has four local street crossings of the Naugatuck River. These local crossings are: West Main Street, Freight Street, Bank Street, and Washington Avenue. The rail line that crosses each of these roadways also restricts the vertical clearance, ranging from 12'-2" to 13'-7".

There are two major local north-south roadways through Waterbury on the west side of the Naugatuck River, Riverside Street and further to the west on top of the ridge, Highland Avenue. Charles Street/South Leonard Street, Riverside Street and Watertown Avenue are the local streets that run along and under the Route 8 viaduct through the study limits.

Closer to the interchange, Waterbury is extending and improving Jackson Street on the east side of the river to provide better north-south connectivity to the proposed Central Business District between Bank and West Main Streets. The proposed Central Business District, centered around Freight Street, lies to the north and east of the interchange bordered by the Naugatuck River to the west, Interstate 84 viaduct to the south, Meadow Street to the east and West Main Street to the north. (See Appendix A)

For detours in the north-south direction, the current rehabilitation project (#151-326) has a 28-million-dollar bypass being constructed so the concrete deck on the upper level, thirty-six span Route 8 Northbound structure (#03190A) can be replaced. The local roadway network could not support a detour for the length of time required to complete the bridge work. Replacement of five (5) concrete deck spans on the Route 8 Southbound structure (#03190B), are using ABC techniques with weekend closures requiring extensive coordination and detours. There will be detours for the local roadways and for the Route 8 Southbound traffic to keep them separated.

In the east-west direction, there are no simple detours for Interstate 84. There are no state routes within the vicinity that can handle this amount of traffic. The existing topography limits the use of local roadway network where the roadways have steep grades, the rail line creates vertical clearance issues, there are limited crossings of the Naugatuck River and there is a lack of direct access to and from the interstate. A detour will need to be constructed for some of the Options that follow. It is proposed to construct a C/D Roadway that will handle interstate traffic during the rehabilitation then remain upon completion to function as intended.

Existing Structures:

There are two types of structure framing systems within the interchange, simple span, and girder-floor beam-stringer (GFS) systems. The GFS systems are used on the mainline structures to cross the larger topographical features. On the stacked structures, the simple spans can also rest on cap girders. Substructure units are spread footings on bedrock or piles, with the majority on piles, and are shared in the areas on the mainlines where there are stacked structures. This feature restricts widening of the lower levels due to the location of the upper level columns. It also restricts the widening of the upper levels. Any widening will need to include new substructure units.

Cost Comparison Analysis:

Within the Governor's "Let's Go CT" call to action, the projected cost on the Replacement of the Interstate 84/Route 8 "Mixmaster" Interchange was estimated at 7 billion dollars in Year 2045. This cost was based on Alternate 6-8 from the previous 2010 Interchange Study. This cost covered the full interchange replacement in the Year 2045. Also included were a rehabilitation of all forty-two of the bridges within the study area by the Year 2025 and early local improvement projects.

The study area limits of the previous study match the limits of the FCA study. To do a fair cost comparison between Alternates 6-8 and the FCA Options, the cost estimation should follow the same procedures.

The FCA options will review the 42 bridges within the study area, categorize and cost estimate them. The bridges that are to be rehabilitated will also have 25% of their bearings replaced and all the structural steel painted. Other remaining significant features including retaining walls and culverts within the study area will be rehabilitated. New features with the FCA options will be included within the cost estimates. These cost estimates will use 2017 costs to achieve present day costs for the improvements then escalating at 3.5% per year to arrive at the Year 2045 costs.

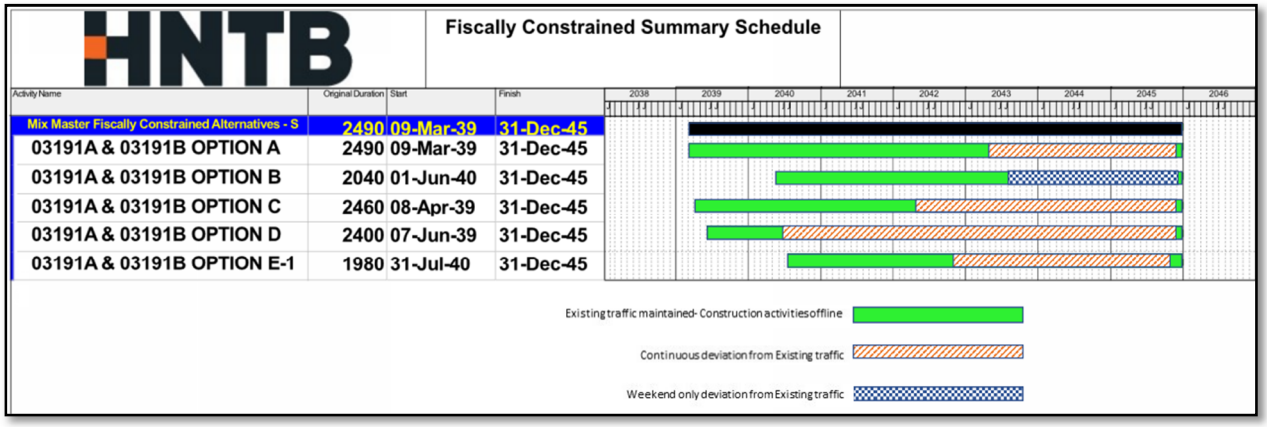
The HNTB Team performed a cost verification on the original Alternate 6-8 cost estimate (See Appendix C). This cost verification white paper estimated the cost of Alternate 6-8 at 2.23 billion dollars in 2017 dollars and with escalation (3.5%) to 5.14 billion dollars in 2045Options A through D cover the rehabilitation of all structures within the study area and provide costs for the replacement of the concrete decks on Interstate 84. These options meet the objective of the FCA Analysis. Option E analyzes the additional cost to replace the non-redundant spans on Interstate 84. Options F, G and H provide different options for Route 8 which will supplement the cost estimates developed for the Interstate 84 options while Option I includes the additional cost to replace the non-redundant spans on Route 8.

Schedule for Fiscally Constrained Alternative Options:

Detailed schedules were developed for Options A through E of the Fiscally Constrained Alternatives. Although options A through E focus primarily on the Interstate 84 Eastbound and Westbound structures, they represent the longest duration of construction. Therefore, these will control the overall project schedule for the full "Mixmaster" Interchange, as well as additional,

identified improvements within the study limits. The below chart highlights the anticipated schedules for each of the FCA options. The schedules were set for a consistent completion date of 12/31/2045, therefore the various options indicate variable start dates.

See Appendix M for a detailed breakdown of schedules for FCA options.



Risk Register for Fiscally Constrained Alternative Options:

A risk register was developed for the Fiscally Constrained Alternatives. The risk register identifies specific risks that may be common to all options or may be unique to specific options. The risks are ranked according to the perceived level of risk, the phase of the project that the risk may be encountered, as well as a proposed response plan.

See Appendix N for a detailed breakdown of risk register.

Life Cycle Cost Analysis for Options A through E:

As part of the Waterbury Mixmaster Replacement, several Fiscally Constrained Alternatives were developed to present lower cost alternatives to the full replacement of the Mixmaster interchange. While the initial construction costs are easily calculated and comparable, a more comprehensive approach was investigated in order to fully capture the longer-term Operations, Maintenance & Rehabilitation (OM&R) costs associated with each option.

Although the study limits include 62 bridges, the Life Cycle Cost analysis focused specifically on the Interstate 84 Eastbound and Westbound mainline structures only.

Life Cycle Costs were calculated for the following options:
Full Replacement Alternate 8 (from the 2010 study) and the Fiscally Constrained Alternatives (FCA) Options A, B, C, D, and E.

A full breakdown of the Life Cycle Cost analysis is included in the Appendix O.

Life Cycle Cost Results Summary:

Total Present Day Costs - Bridge Nos. 03191A & 03191B			
	Initial Construction	**OM&R Costs***	**Total Present day (2018) Cost**
Full Replacement	$130,500,000	$30,300,000	$160,800,000
FCA – Option A	$179,200,000	$35,400,000	$216,700,000
FCA – Option B	$129,400,000	$58,700,000	$188,100,000
FCA – Option C	$80,200,000	$58,700,000	$138,900,000
FCA – Option D	$123,200,000	$55,100,000	$178,200,000
FCA – Option E	$134,800,000	$49,000,000	$183,700,000

*OM&R Costs are present day dollars required for future preservation expenditures at indicated milestones assuming a rate of return which keeps pace with inflation.

2.0 Option A: New Interstate 84 Eastbound

Overview: Construct a new upper Interstate 84 Eastbound parallel to the existing mainline that can support five (5) lanes of bidirectional, interstate traffic in the interim condition while the existing upper deck (Interstate 84 Eastbound) is demolished and concrete decks are replaced on the existing lower deck (Interstate 84 Westbound). In the interim condition, movable barrier will be utilized to favor the traffic flow in the AM and PM peak hours.

This option was looked at in four (4) scenarios.

Option A-1 Interstate 84 Eastbound to the north of existing at Level 4

Option A-2 Interstate 84 Eastbound to the north of existing at Level 3

Option A-3 Interstate 84 Eastbound to the south of existing at Level 4

Option A-4 Interstate 84 Eastbound to the south of existing at Level 3

Review of Option A-1, Interstate 84 Eastbound to the north of existing at Level 4. This option was reviewed with fatal flaws appearing during the construction phase. The transition on the eastern end of bringing Interstate 84 Westbound traffic to Level 4 was not feasible.

Review of Option A-2, Interstate 84 Eastbound to the north of existing at Level 3. Being at Level 3, the Interstate 84 traffic was flowing contrary to standard operations (eastbound on the left) which would require the traffic to be braided at the east and west ends to match existing. Additionally, all the system ramps would need to be reconstructed with cross unders or flyovers which would add cost to the Option. This option has many fatal flaws and was not pursued further.

Review of Option A-3, Interstate 84 Eastbound to the south of existing at Level 4. This option is being moved forward as this appears to function in the temporary and permanent conditions.

Review of Option A-4, Interstate 84 Eastbound to the south of existing at Level 3. This option is similar to Option A-3. While this will unstack the viaduct, and provide a more aesthetically pleasing structure with conventional lane arrangement, this will require the reconstruction of multiple system ramps to keep the Mixmaster functioning. This will also affect service ramps on the south side of the interchange. This option was not pursued further.

2.1 Challenges for Option A-3

Structural Challenges

1. Construction of a parallel structure at the required elevation.
2. Modifications to the existing retaining walls at the west and east ends of the existing Eastbound bridge.
3. Placement of substructure units due to existing roadways and other features.

Highway Challenges

1. The Maintenance and Protection of Traffic phase with the movable barrier.

2. Detours required for system and service ramps that are inaccessible due to construction.
3. The crossovers at the east and west ends of the project for Interstate 84 Westbound during construction.
4. Reconstruction of system and service ramps due to the new Interstate 84 Eastbound bridge and alignment.

2.2 Review of Staging for Option A

The construction staging for this Option is straight forward but has many challenges.

- Construct offline, the new Interstate 84 Eastbound to the south of the existing structures at Level 4.
- Shift all traffic to the new structure. This includes Interstate 84 Westbound with crossover maneuvers at each end and the installation of the movable barrier on the proposed five (5) lane temporary section.
- Remove the upper level of the existing, stacked Interstate 84 Eastbound
- Replace the concrete deck spans on the lower level – Interstate 84 Westbound.
- Then reopen Interstate 84 Westbound in its original configuration with the new new Interstate 84 Eastbound restriped for the final alignment.

In the interim condition, the new Interstate 84 Eastbound roadway can carry bidirectional traffic while the existing structures are under construction. This condition will consist of five (5) eleven-foot lanes with two-foot shoulders and a movable barrier. The movable barrier will be utilized to benefit the majority flow of traffic – three (3) lanes in the eastbound direction during the AM peak hour shifting to three (3) lanes in the westbound direction during the PM peak hour. This changeable lane will need to be 17 feet in width to accommodate the eleven-foot lane, two-foot shoulders and the barrier. The minimum width, curb to curb, of the new Interstate 84 Eastbound will be 65 feet. (See Appendix E)

Impacts to System Ramps

The following system ramps will be impacted due to the construction of the new Interstate 84 Eastbound on the south side of the existing structures:

TR 805 – Interstate 84 Eastbound to Route 8 Southbound
TR 806 – Interstate 84 Eastbound to Route 8 Northbound
TR 807 – Route 8 Southbound to Interstate 84 Westbound
TR 808 – Route 8 Northbound to Interstate 84 Westbound
TR 809 – Route 8 Southbound to Interstate 84 Eastbound
TR 810 – Interstate 84 Westbound to Route 8 Northbound
TR 811 – Route 8 Northbound to Interstate 84 Eastbound
TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 809 and TR 811 will need multiple spans of the existing bridges reconstructed to connect with Interstate 84 Eastbound.

TR 805 will need portions reconstructed as Interstate 84 Eastbound is relocated to the south. TR 805 is on embankment, relocation is achievable.

TR 806 will not be impacted but will be closed during the construction.

TR 810 and TR 812 will be closed during the reconstruction of Interstate 84 Westbound.

TR 808 and TR 812 will need to be reviewed as the new Interstate 84 Eastbound Structure will need to span over these roadways.

TR 807 will not be impacted by construction during this option.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, south of the interchange. (See Appendix D)

Interstate 84 Eastbound to Route 8 Southbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound

Interstate 84 Eastbound to Route 8 Northbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8

Interstate 84 Westbound to Route 8 Southbound

- Reverse direction utilizing the U-Turn on Interstate 84
- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound

Interstate 84 Westbound to Route 8 Northbound

- Reverse direction utilizing the U-Turn on Interstate 84
- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8

Route 8 Southbound to Interstate 84 Eastbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Southbound to Interstate 84 Westbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound

Route 8 Northbound to Interstate 84 Eastbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Northbound to Interstate 84 Westbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound

Impacts to Service Ramps

Service ramps will be impacted due to the construction of a new Interstate 84 Eastbound structure located to the south of the existing. The following ramps will be impacted:

Interstate 84 Eastbound Exit 18 on ramp from Highland Avenue will either need to be reconstructed or could be eliminated.

Interstate 84 Eastbound Exit 21 off ramp will need to be reconstructed.

Interstate 84 Eastbound Exit 22 off ramp will need to be reconstructed.

Interstate 84 Eastbound Exit 21 on ramp will need to be reconstructed.

Interstate 84 Westbound Exit 21 on ramp (left) will need to be reviewed to determine if there will be impacts.

Impacts to Local Roads

The construction of the new Interstate 84 Eastbound and ramps will span over the local roads but there will be disruption during this construction but the impacts to the local roads will be minimal. With the reconstruction of several service ramps, detours using local roads will be utilized to complete connections.

Impacts to the Naugatuck River

New substructure units will need to be placed near or in the river so the new Interstate 84 Eastbound structure can be built. If possible, these units will be located to minimize the environmental impacts and oriented to minimize disruption to the flow.

2.3 Cost for Option A

The cost for Option A was completed using the procedure defined for this FCA analysis. The feature element of this option, the new Interstate 84 Eastbound structure, was cost estimated separately. This bridge is a long, elevated structure that will be sixty-five feet wide curb to curb.

The cost for Option A in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.39 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 3.12 billion dollars in the Year 2045. (See Appendix L).

The cost for the core of the interchange with Option A in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.19 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.72 billion dollars in the Year 2045. (See Appendix L). The core of the interchange will include Interstate 84 and Route 8 with the limits to include the eight (8) system ramps and the interchange 21 and 22 service ramps off of Interstate 84, as well as, the interchange 32 service ramps off of Route 8. These limits include Bridges 03190A/B/C/D/E/F, 03191A/B/C/D/E/F/G/H/I, 03192, 03193, 03194, 03198, 3200 and 3209.

3.0 Option B: Precast Decking (fracture critical spans) & Modular Super Units (simple spans) with a C/D or Frontage Roadway parallel for traffic management

Overview

On Interstate 84 Eastbound and Westbound, replace the decks on the fracture critical spans with precast decking and the simple spans with modular super units. No traffic will be allowed on the structures while this work is occurring. This work will occur during night time or weekend closures. Construct a temporary C/D Roadway for traffic management during construction. Upon completion of this project, the C/D Roadway can be converted to a Frontage Road to supplement the local roadway connections.

3.1 Challenges

Structural Challenges

1. Working on an elevated structure.
2. Challenging precast concrete panel layout with tapers, skews, and curves.
3. Lifting heavy precast modular super units.
4. Limited staging areas.
5. Periodic closures of the Interstate required as these units cannot be lifted over live traffic.
6. Placement of substructure units due to existing roadways and other features for the construction of the C/D Roadway.

Highway Challenges

1. Crossover maneuvers for Interstate 84 Westbound.
2. Detours for system and service ramps inaccessible due to construction.

3.2 Review of Staging for Option B

C/D Roadway

Construct the C/D Roadway for Interstate 84 - south of the existing facility. This C/D Roadway will diverge from Interstate 84 Eastbound near the Highland Avenue overpass. Exit 19 will diverge from the C/D Roadway for access to Route 8 Southbound and Sunnyside Avenue. The C/D Roadway will cross over Bridge 03190F, TR 808 (Route 8 Northbound to Interstate 84 Westbound). Then begin descending crossing over Route 8, Riverside Street, and the Naugatuck River. The roadway will cross under the ramps, TR 811 (Route 8 Northbound to Interstate 84 Eastbound) and TR 812 (Interstate 84 Westbound to Route 8 Southbound), continuing easterly crossing over Jackson Street, the Railyard, active Metro North rail line and Meadow Street. The C/D Roadway will cross over Bank Street then reconnect with Interstate 84 in the vicinity of the

South Main Street underpass. Interstate 84 Eastbound Exit 21 will be reconfigured to provide access to Bank Street with return access off Meadow Street.

Upon completion of the project, the C/D Roadway after Meadow Street can continue descending and match grade at Bank Street. The C/D Roadway then becomes a Frontage Road continuing easterly to South Main Street to match the existing Frontage Road. (See Appendix F)

Staging for Option B

During the nighttime or weekend work windows, detour all Interstate traffic, two lanes in each direction, to the C/D Roadway. Remove the existing decking within the allowable limits set forth for the closure period. Replace the decking with full width precast deck sections and/or temporary grid deck on the fracture critical spans. Replace the spans with modular super units on the simple spans. Perform closure pours. Once the concrete has cured, reopen Interstate 84 in both directions. Return the C/D Roadway to its intended function with a single lane reconnecting to Interstate 84 Eastbound near the South Elm Street overpass.

For use as a detour for Interstate 84 traffic (Eastbound and Westbound), the C/D Roadway will need to carry two lanes of traffic in each direction. Crossovers will be constructed in the median between the Eastbound and Westbound barrels. On the western end, the crossover will be constructed to the west of the Highland Avenue overpass. On the eastern end, the crossover will be constructed in the vicinity of the South Elm Street overpass.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, south of the interchange. These are described in the section below.

This option will have the mainlines open during the peak hours. Construction will occur during the off-peak hours when the C/D Roadway will be utilized to manage the traffic.

Impacts to System Ramps

The System Ramps will be impacted by the construction during Option B as follows:

TR 806 – Interstate 84 Eastbound to Route 8 Northbound

TR 809 – Route 8 Southbound to Interstate 84 Eastbound

TR 810 – Interstate 84 Westbound to Route 8 Northbound

TR 811 – Route 8 Northbound to Interstate 84 Eastbound

TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 805, TR 807, and TR 808 will remain operational and are vital in maintaining connections within the interchange

TR 806 will be closed during construction but will remain operational at all other times

TR809 will be closed during construction but will remain operational at all other times.

TR810 will be closed during construction but will remain operational at all other times.

TR811 and TR 812 will need portions reconstructed to allow the construction of the C/D Roadway. Following this, these turning roadways will be closed during the periods of construction on Interstate 84 but will remain operational at all other times.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, south of the interchange. (See Appendix D)

Interstate 84 Eastbound to Route 8 Southbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound

Interstate 84 Eastbound to Route 8 Northbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8

Interstate 84 Westbound to Route 8 Southbound

- Reverse direction utilizing the U-Turn on Interstate 84
- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound

Interstate 84 Westbound to Route 8 Northbound

- Reverse direction utilizing the U-Turn on Interstate 84
- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8

Route 8 Southbound to Interstate 84 Eastbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Southbound to Interstate 84 Westbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound

Route 8 Northbound to Interstate 84 Eastbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Northbound to Interstate 84 Westbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound

Impacts to Service Ramps

Service ramps will be impacted due to the construction of Option B. The following ramps will be impacted:

Interstate 84 Eastbound Exit 18 on ramp from Highland Avenue will either need to be reconstructed upon completion of the project or could be eliminated.

Interstate 84 Eastbound Exit 21 off ramp will be reconstructed onto the C/D Roadway.

Interstate 84 Eastbound Exit 22 off ramp will be closed permanently with this Option. However, access will be from the C/D Roadway during construction and from the Frontage Road upon completion of the project.

Interstate 84 Eastbound Exit 21 on ramp will be reconstructed onto the C/D Roadway.

Interstate 84 Westbound Exit 21 on ramp (left) will need to be investigated further to determine if there will be impacts.

Impacts to Local Roads

The impacts to the Local Roads will be concentrated in the Bank/Meadow Street area with the construction of the C/D Roadway. These impacts will include the closure of Interstate 84 Eastbound Exit 22 and the subsequent detours that will be required along local roads from Exit 21. With the reconstruction of other service ramps, detours using local roads will be utilized to complete connections during construction.

Impacts to the Naugatuck River

New substructure units will need to be placed near or in the river so the C/D Roadway can be built. If possible, these units will be located to minimize the environmental impacts and oriented to minimize disruption to the flow.

3.3 Cost for Option B

The cost for Option B was completed using the procedure defined for this analysis. The feature element of this option was the use of precast decking units for the non-redundant spans and the modular super units on the simple spans for Interstate 84 Eastbound and Westbound. For this reason, these bridges were cost estimated separately.

The cost for Option B in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.35 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 3.04 billion dollars in the year 2045. (See Appendix L).

The cost for the core of the interchange with Option B in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.16 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.66 billion dollars in the Year 2045. (See Appendix L). The core of the interchange will include Interstate 84 and Route 8 with the limits to include the eight (8) system ramps and the interchange 21 and 22 service ramps off of Interstate 84, as well as, the interchange 32 service ramps off of Route 8. These limits include Bridges 03190A/B/C/D/E/F, 03191A/B/C/D/E/F/G/H/I, 03192, 03193, 03194, 03198, 3200 and 3209.

4.0 Option C: Partial Width Deck with a C/D or Frontage Roadway parallel for traffic management

Overview

Option C requires long term lane closures on Interstate 84 Eastbound and Westbound. One lane of Interstate 84 Westbound traffic including ramp traffic will be maintained on the existing structure throughout the construction. This option constructs the decks in a minimum of two stages, approximately half of the deck width in each stage. A C/D Roadway will be constructed for traffic management during the lane closures. Upon completion of the project, the C/D Roadway can be converted to a permanent Frontage Road to supplement the local roadway connections.

4.1 Challenges

Structural Challenges

1. Working on an elevated structure.
2. Placement of substructure units due to existing roadways and other features for the construction of the C/D Roadway.

Highway Challenges

1. Detours required for system and service ramps that are inaccessible during the construction.
2. Long term lane closures of Interstate 84 and capacity of the detours to handle the traffic causing excessive delays and congestion.

4.2 Review of Staging for Option C

C/D Roadway

Construct the C/D Roadway for Interstate 84 - south of the existing facility. This C/D Roadway will diverge from Interstate 84 Eastbound in the vicinity of the Highland Avenue overpass. Exit 19 will diverge from the C/D Roadway for access to Route 8 Southbound and Sunnyside Avenue. The C/D Roadway will cross over Bridge 03190F, Route 8 Northbound to Interstate 84 Westbound (TR 808). Then begin descending crossing over Route 8, Riverside Street, and the Naugatuck River. The roadway will cross under the ramps, TR 811 Route 8 Northbound to Interstate 84 Eastbound and TR 812 Interstate 84 Westbound to Route 8 Southbound, continuing easterly crossing over Jackson Street, the Railyard, and Meadow Street. The C/D Roadway will cross over Bank Street then reconnect with Interstate 84 near the South Main Street underpass. Interstate 84 Eastbound Exit 21 will be reconfigured to provide access to Bank Street with return access off Meadow Street.

Upon completion of the project, the profile of the C/D Roadway after Meadow Street will be lowered to match the grade at Bank Street with the Frontage Road continuing easterly to South Main Street to match the existing Frontage Road.

In order to be used as a detour for Interstate 84 traffic (Eastbound and Westbound), the C/D Roadway will need to carry two lanes of traffic in each direction. Crossovers will be constructed in the median between the Eastbound and Westbound barrels. On the western end, the crossover will be constructed to the west of the Highland Avenue overpass. On the eastern end, the crossover will be constructed in the vicinity of the South Elm Street overpass. In the westbound direction, one lane of through/ramp traffic will be maintained on the existing structure. (See Appendix F)

Staging for Option C

Open C/D Roadway as the detour route and begin lane reductions, two lanes in each direction, on Interstate 84. Install the appropriate signing and traffic control to split Interstate 84 Westbound traffic for one lane of through/ramp traffic to be maintained on the existing structure (#03191B). Detour all Eastbound traffic and remaining Westbound traffic to the C/D Roadway, two lanes in each direction. Reconstruct the concrete decks on both structures in a minimum of two stages. Reopen Interstate 84 in both directions. Convert the C/D Roadway to a Frontage Road.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, north and south of the interchange. These are described in the section below.

Impacts to System Ramps

The System Ramps will be impacted by the construction during Option C as follows:

TR 806 – Interstate 84 Eastbound to Route 8 Northbound

TR 809 – Route 8 Southbound to Interstate 84 Eastbound

TR 810 – Interstate 84 Westbound to Route 8 Northbound

TR 811 – Route 8 Northbound to Interstate 84 Eastbound

TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 805, TR 807, and TR 808 will remain operational and are vital in maintaining connections within the interchange.

TR 806 will be closed during construction.

TR809 will be closed during construction.

TR810 will be closed during construction of the northern portion of the Westbound bridge but will remain operational during the other stage.

TR811 and TR 812 will need portions reconstructed to allow the construction of the C/D Roadway. Following this, TR 811 will be closed during construction. TR812 will be closed during construction of the southern portion of the Westbound bridge but will remain operational during the other stage.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, north and south of the interchange. (See Appendix D)

Interstate 84 Eastbound to Route 8 Southbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound

Interstate 84 Eastbound to Route 8 Northbound

- Use TR 805 – Interstate 84 Eastbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8

Interstate 84 Westbound to Route 8 Southbound (when TR 812 is closed)

- Use TR 810 Interstate 84 Westbound to Route 8 Northbound
- Reverse direction utilizing the U-Turn on Route 8 north of the interchange

Interstate 84 Westbound to Route 8 Northbound (when TR 810 is closed)

- Use TR 812 Interstate 84 Westbound to Route 8 Southbound
- Reverse direction utilizing the U-Turn on Route 8 south of the interchange

Route 8 Southbound to Interstate 84 Eastbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Southbound to Interstate 84 Westbound

- Use TR 807 – Route 8 Southbound to Interstate 84 Westbound

Route 8 Northbound to Interstate 84 Eastbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound
- Reverse direction utilizing the U-Turn on Interstate 84

Route 8 Northbound to Interstate 84 Westbound

- Use TR 808 – Route 8 Northbound to Interstate 84 Westbound

Impacts to Service Ramps

Service ramps will be impacted by the construction of Option C. The following ramps will be impacted:

Interstate 84 Eastbound Exit 18 on ramp from Highland Avenue will either need to be reconstructed or could be eliminated.

Interstate 84 Eastbound Exit 21 off ramp will be reconstructed onto the C/D Roadway

Interstate 84 Eastbound Exit 22 off ramp will be closed permanently with this Option. However, access will be from the C/D Roadway during construction and from the Frontage Road upon completion of the project.

Interstate 84 Eastbound Exit 21 on ramp will be reconstructed onto the C/D Roadway.

Interstate 84 Westbound Exit 21 on ramp (left) will need to be investigated further to determine if there will be impacts. One of the Interstate 84 Westbound Exit 21 on ramps will remain open at all times.

Impacts to Local Roads

The impacts to the Local Roads will be concentrated in the Bank/Meadow Street area with the construction of the C/D Roadway. These impacts will include the closure of Interstate 84 Eastbound Exit 22 and the subsequent detours that will be required along local roads from Exit 21. With the reconstruction of other service ramps, detours using local roads will be utilized to complete connections during construction.

Impacts to the Naugatuck River

New substructure units will need to be placed near or in the river so the C/D Roadway can be built. If possible, these units will be located to minimize the environmental impacts and oriented to minimize disruption to the flow.

4.3 Cost for Option C

The cost for Option C was completed using the procedure defined for this analysis. The feature element of this option was partial width, staged construction of the Interstate 84 Eastbound and Westbound bridges. For this reason, these bridges were cost estimated separately.

The cost for Option C in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.22 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.73 billion dollars in the year 2045. (See Appendix L).

The cost for the core of the interchange with Option C in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.03 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.35 billion dollars in the Year 2045. (See Appendix L). The core of the interchange will include Interstate 84 and Route 8 with the limits to include the eight (8) system ramps and the interchange 21 and 22 service ramps off of Interstate 84, as well as, the interchange 32 service ramps off of Route 8. These limits include Bridges 03190A/B/C/D/E/F, 03191A/B/C/D/E/F/G/H/I, 03192, 03193, 03194, 03198, 3200 and 3209.

5.0 Option D: Interstate 84 Widening

Overview:

Interstate 84 Eastbound and Westbound are to be widened to north side of the existing structures. This overbuild will require no long-term closures of lanes on Interstate 84 Eastbound or Westbound. Construction will be to the north of the existing bridges at the different levels. New substructure units will be constructed so that the existing decks can be widened. The placement of these foundations is very challenging, especially, at the core of the four-level interchange. Additional challenges include the existing framing layout of the structures with the spans over the railyard and the Naugatuck River. This condition requires additional full height supports with substructure in the Naugatuck River along with extensive modification to the framing system to provide additional strength to the existing framing system.

Through traffic will remain in place with temporary allowable lane closures as needed for construction. Due to the temporary/long term closures of system ramp movements, a U-turn movement will be constructed on Interstate 84, west of the interchange. This movement will be for westbound vehicles to reverse direction and access Route 8 in either the Northbound or Southbound directions and for Route 8 Northbound and Southbound vehicles to access Interstate 84 Eastbound.

5.1 Challenges

Structural Challenges

1. Working on an elevated structure.
2. Extension/strengthening of the existing cap girders or replacement. Length of the cap girders. See Section 5.3 below for more information.
3. Locations of two girder framing systems without a steel cap girder at the column support, nine (9) locations on the Eastbound bridge and five (5) locations on the Westbound bridge. These locations will require substructure and additional framing.
4. Modifications to the existing hammerhead piers to become bent type piers.
5. Modifications to the existing retaining walls at the west and east ends of the existing Eastbound bridge.
6. Removal of the portion of the existing column.
7. Existing girder-floor beam-stringer spans.
8. Placement of substructure units due to existing roadways and other features. This can require excessively long cap beams.
9. Structural modifications required to adapt adjacent ramp structures.

10. Vertical clearance limits the size of structural members that can be used on the structures.

Highway Challenges

1. The Maintenance and Protection of Traffic phase with split traffic.
2. Detours required for system and service ramps that are inaccessible during the construction.
3. The proposed bridge widening matching the existing roadways on the east and west ends of the project.
4. Reconstruction of system and service ramps due to the widening of the existing bridges.

5.2 Review of Staging for Option D

Existing Conditions

Interstate 84 Eastbound, in the direction of travel, enters the core of the system interchange as a two-lane expressway with 3'11" shoulders supported by retaining walls on each side before the eastern abutment of Bridge 03191A. This forty-six-span, 3,766-foot-long bridge (Bridge 03191A) is the upper level of the stacked expressway. The two-lane section of Interstate 84 Eastbound is approximately 1,350 feet long. The easterly Exit 18 on-ramp from Highland Avenue is a taper style ramp that enters the expressway on Bridge 03191A; continuing easterly the Route 8 Southbound on-ramp (TR 809) is a left-hand, single lane add (although designed as a two lane add). Interstate 84 Eastbound has three through lanes although the bridge can support four through lanes with a curb-to-curb width of 55'-10". Route 8 Northbound on-ramp (TR 811) forms a short auxiliary lane (approximately 500 feet) on the right that ends at the Exit 21 off-ramp. This section of the bridge has four lanes but can support five through lanes with a curb-to-curb width of 67'-10". Approximately 800 feet easterly, the Exit 22 off-ramp, diverges from the expressway to Downtown Waterbury. At this point, the structure is dropping a lane as the curb-to-curb width decreases from 55'-10" to 43'-10". Interstate 84 Eastbound continues as a three-through-lane section as it reaches the western abutment. Retaining walls exist on each side as Interstate 84 Eastbound descends to become a divided expressway, paralleling Interstate 84 Westbound.

Interstate 84 Westbound, in the direction of travel, enters the core of the system interchange as a three-lane expressway with 3'-11" shoulders supported by a retaining wall on the south side. This thirty-span, 2,455-foot-long bridge is the lower level of the stacked expressway. Approximately 200 feet west of the abutment auxiliary lanes begin on each side. The Exit 21 on-ramps are local, split ramps from Bank Street that enter on the left- and right-hand sides of the expressway. The Bank Street entrance ramp on the left-hand side forms an auxiliary lane that ends at the Exit 19 left-hand off-ramp (TR 812) to Route 8 Southbound. This short auxiliary lane, approximately 600 feet, has the exiting westbound traffic merging. The bridge has five lanes and a curb-to-curb width of 67'-10". The Bank Street entrance ramp on the right-hand side forms an auxiliary lane that ends at the Exit 20 off-ramp (TR 810) to Route 8 Northbound. The bridge has four lanes and a curb-to-curb width of 55'-10". This auxiliary lane has a weave for the local traffic entering the westbound through lane and the westbound traffic exiting to Route 8 Northbound. Interstate 84 Westbound is a three-lane expressway continuing westerly with a curb-to-curb width of 43'-10".

Review of Staging

The construction staging on the Eastbound and Westbound structures will be discussed separately but due to the work being directly above or below, the deck replacement work must be coordinated to coincide. Option D will have the widening occur to the north side of the structures.

The three (3) lane sections of the bridges will be widened 24'-8" while the four (4) and five (5) lane sections of the bridges will be widened 12'-8". This will maintain a consistent northern gutter line. The western end of Bridge 03191A, Interstate 84 Eastbound, the two-lane section, will be widened to transition to the proposed width and match the northern gutter line.

These bridges will be constructed in Stages. Some stages have substages. (See Appendix G)

Stage 1

Interstate 84 Westbound – all three through lanes together to the south side

This stage has substages. This stage initially has traffic in its existing configuration with the construction occurring to the north of the existing parapet. This work includes constructing new substructure units, extending, and strengthening the existing cap girders for the upper level where required and building new superstructure. The substages affect the four and five lane sections where the auxiliary lane terminates with the system ramp to Route 8 Northbound. All three through lanes and/or auxiliary lanes shift to the south side of the structure, installing temporary precast concrete barrier curb and reducing lane widths to 11'-0" and the shoulders to 2'-0". Construct superstructure to support at least one lane of traffic in the next substage. This construction will require the removal of the existing parapet. The final substage will have the auxiliary lane split from the through traffic. This auxiliary lane carries the Exit 21 on-ramp and the system ramp to Route 8 Northbound.

Interstate 84 Eastbound – all lanes together to the south side

This stage has substages. This stage initially has traffic in its existing configuration with the construction occurring to the north of the existing parapet. This work includes constructing new substructure units, extending, and strengthening the existing cap girders for the upper level where required and building new superstructure. The substages affect the four and five lane sections to keep the construction coincident with the Westbound. All three through lanes and/or auxiliary lanes shift to the south side of the structure installing temporary precast concrete barrier curb and reducing lane widths to 11'-0" and the shoulders to 2'-0". Construct superstructure to support at least one lane of traffic in the next substage. This construction will require the removal of the existing parapet. The final substage will have through traffic split with the far-left lane on the new construction.

Stage 2

Interstate 84 Westbound – traffic will be split

Traffic will be split with one lane of through traffic to the north on the Stage 1 construction, the remaining lanes will remain shifted to the south. In addition, on the four and five-lane sections, the system ramp to Route 8 Northbound will be on the Stage 1 construction.

Interstate 84 Eastbound – traffic will be split

Traffic will be split with two lanes of through traffic to the north on the Stage 1 construction. On the four and five-lane sections, the remaining through lane and the service ramps will remain shifted to the south.

Stage 3

Interstate 84 Westbound – traffic will be split

Traffic will be split with at least two through lanes of traffic to the north on the Stage 1 and 2 Construction, the remaining through lane will remain shifted to the south. In addition, on the four and five-lane sections, the system ramp to Route 8 Northbound will remain on the new construction.

Interstate 84 Eastbound - through traffic on the north side

All through traffic will be to the north on the Stage 1 and 2 Construction. On the four and five-lane sections, the service ramps will remain shifted to the south.

Stage 4

Interstate 84 Westbound – all three through lanes together to the north

All three through lanes of traffic and the system ramp to Route 8 Northbound will be to the north on the new Construction. In addition, on the five-lane section, the system ramp to Route 8 Southbound will remain and be staged constructed to keep it accessible.

Interstate 84 Eastbound – all three through lanes together to the north

All three through lanes of traffic and the service ramps will be to the north on the new Construction.

Impacts to System Ramps

The following system ramps will be impacted due to the widening on the north side of the structures:

TR 805 – Interstate 84 Eastbound to Route 8 Southbound

TR 806 – Interstate 84 Eastbound to Route 8 Northbound

TR 807 – Route 8 Southbound to Interstate 84 Westbound

TR 809 – Route 8 Southbound to Interstate 84 Eastbound

TR 810 – Interstate 84 Westbound to Route 8 Northbound

TR 805 and TR 807 have the potential to be impacted but these roadways are on embankment and can be shifted as needed.

TR 806 at Bridge 3209 may be impacted and would require bridge work but it appears that it may be possible to avoid impacts to the bridge.

TR 809 and TR 810 are 30-foot-wide ramps that will require multiple spans to be reconstructed to reconnect with Interstate 84.

TR 808, TR 811, and TR 812 should not be impacted by this option.

Impacts to Service Ramps

Service ramps will be impacted due to the widening of the structures. These service ramps are located on the south sides at the eastern ends of the structures. The upper level, Bridge 03191A, will be tapering in and veering away from Interstate 84 Westbound. This will look to preserve the northern retaining wall and only have it rehabilitated while the southern retaining wall will be reconstructed. The following ramps will be impacted:

Interstate 84 Eastbound Exit 22 off ramp – will be impacted during construction, requiring reconstruction to remain in service upon completion of the project.

Interstate 84 Eastbound Exit 21 on ramp – will be impacted during construction, requiring reconstruction to remain in service upon completion of the project.

Interstate 84 Westbound Exit 21 on ramp (left) – will be impacted during construction, requiring reconstruction to remain in service upon completion of the project.

Impacts to Local Roads

The impacts to the Local Roads will be minimal. All construction will occur within the Limited Access limits. Bank Street will be minimally impacted with the construction near Exit 21.

Impacts to the Naugatuck River

New substructure units will need to be placed near or in the river so the C/D Roadway can be built. If possible, these units will be located to minimize the environmental impacts and oriented to minimize disruption to the flow.

5.3 Cap Girder Extension and Strengthening Feasibility

The extension and strengthening of the cap girders have challenges due to the existing infrastructure below including existing roadways, railroad and the Naugatuck River. Three cap

girders at Pier 4, at Pier 12 and at Pier 15 are described below. They all support the upper level Bridge 03191A. See Appendix G for drawings.

1. Bridge 03191A, Pier 4, Cap Girder A3C2
   The existing cap girder span configuration is two continuous spans. To widen both Bridge 03191A (upper) and 03191B (lower), the existing north column needs the upper portion removed to provide the space which the widening portion of 03191B (lower) requires. The new third and fourth columns will be added at the north side. The proposed Cap Girder will be three continuous spans with the hinge in the middle span. The proposed cap girder is 122% longer than the existing. The existing cap girder only needs minor strengthening.

2. Bridge 03191A, Pier 12, Cap Girder A7C2
   The existing cap girder span configuration is a simple span with a short cantilever. To widen both Bridge 03191A (upper) and 03191B (lower), the existing north column needs the upper portion removed to provide the space which the widening portion of 03191B (lower) requires. The third new column will be added at north side to support both upper and lower bridges. The proposed Cap Girder will be a simple span which is 62% longer than the existing. The existing cap girder needs to be strengthened.

3. Bridge 03191A, Pier 15, Cap Girder A12C1
   The existing cap girder span configuration is a simple span with a cantilever. To widen both Bridge 03191A (upper) and 03191B (lower), the existing north column needs the upper portion removed to provide the space which the widening portion of 03191B (lower) requires. The third new column will be added at north side to support both upper and lower bridges. The proposed Cap Girder will be a simple span which is 86% longer the existing. A truss support will be added under the cap girder extension. The proposed Cap Girder will be two continuous spans. The existing cap girder only needs minor strengthening.

5.4 Cost for Option D

The cost for Option D was completed using the procedure defined for this analysis. The feature element of this option was the widening and staged construction of the Interstate 84 Eastbound and Westbound bridges. For this reason, these bridges were cost estimated separately.

The cost for Option D in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.37 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 3.08 billion dollars in the year 2045. (See Appendix L).

The cost for the core of the interchange with Option D in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.18 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.71 billion dollars in the Year 2045. (See Appendix L). The core of the interchange will include Interstate 84 and Route 8 with the

limits to include the eight (8) system ramps and the interchange 21 and 22 service ramps off of Interstate 84, as well as, the interchange 32 service ramps off of Route 8. These limits include Bridges 03190A/B/C/D/E/F, 03191A/B/C/D/E/F/G/H/I, 03192, 03193, 03194, 03198, 3200 and 3209.

6.0 Option E: Span Replacements for Non-Redundant Spans (fracture critical spans) with a C/D Roadway or Frontage Road parallel for traffic management

Overview

On Interstate 84 Eastbound and Westbound, complete span replacements for the non-redundant spans. These span replacements are to be completed using ABC techniques. Construct a C/D Roadway or Frontage Road for traffic management during construction. This road will supplement the local roadway connections upon completion of the project. This options supplements Option B in the complete replacement of the non-redundant spans.

6.1 Challenges

Structural Challenges

1. Working on an elevated structure
2. Limited overhead access to lower structure.
3. Demolition techniques will be challenging with the stacked structures.
4. Limited staging areas
5. Closures of the Interstate required as these units cannot be lifted over live traffic
6. Placement of substructure units due to existing roadways and other features for the construction of the C/D Roadway.
7. Challenging framing and skews of the existing structures for ABC techniques.
8. Challenging superstructure to substructure connections.

Highway Challenges

1. Crossover maneuvers for Interstate 84 Westbound
2. Detours required for system and service ramps that are inaccessible during the construction.

6.2 Review of Staging for Option E

This option will require the Staging as established for Option B, utilizing the C/D Roadway, crossovers for Interstate 84 Westbound and the U-Turn movements. (See Appendices D and F)

Staging for Option E

In following ABC techniques, construct the temporary structures that will be required to remove and/or lift and move the new spans into position. Construct the new spans offline. (See Appendix H)

During the nighttime or weekend work windows, detour all Interstate traffic, two lanes in each direction, to the C/D Roadway. Remove the existing span by using the temporary structures to slide it out or demolish with conventional methods. Lift and slide into position the replacement span. Perform closure pours. Once the concrete has cured, reopen Interstate 84 in both directions. Return the C/D Roadway to its intended function with a single lane reconnecting to Interstate 84 Eastbound near the South Elm Street overpass.

For use as a detour for Interstate 84 traffic (Eastbound and Westbound), the C/D Roadway will need to carry two lanes of traffic in each direction. Crossovers will be constructed in the median between the Eastbound and Westbound barrels. On the western end, the crossover will be constructed to the west of the Highland Avenue overpass. On the eastern end, the crossover will be constructed in the vicinity of the South Elm Street overpass.

To maintain the system connections during construction, U-Turn movements will be constructed on Interstate 84, west of the interchange and on Route 8, south of the interchange. These are described in the section below.

This option will have the mainlines open during the peak hours. Construction will occur during the off-peak hours when the C/D Roadway will be utilized to manage the traffic.

Impacts to System Ramps

The System Ramps will be impacted by the construction during Option E, are similar to those in Option B. There are no additional impacts.

Impacts to Service Ramps

Service ramps will be impacted due to the construction of a new Interstate 84 Eastbound structure located to the south of the existing

The following ramps will be impacted.

Interstate 84 Eastbound Exit 18 on ramp from Highland Avenue will either need to be reconstructed or could be eliminated.

Interstate 84 Eastbound Exit 21 off ramp will be reconstructed onto the C/D Roadway

Interstate 84 Eastbound Exit 22 off ramp will be closed permanently with this Option. However, access will be from the C/D Roadway during construction and from the Frontage Road upon completion of the project.

Interstate 84 Eastbound Exit 21 on ramp will be reconstructed onto the C/D Roadway.

Interstate 84 Westbound Exit 21 on ramp (left) will need to be reviewed to determine if there will be impacts

Impacts to Local Roads

The impacts to the Local Roads will be concentrated in the Bank/Meadow Street area with the construction of the C/D Roadway. These impacts will include the closure of Interstate 84

Eastbound Exit 22 and the subsequent detours that will be required along local roads from Exit 21. With the reconstruction of other service ramps, detours using local roads will be utilized to complete connections during construction.

The temporary measures used with the ABC techniques will need to be designed to minimize the impacts to the local roads and the Metro North Railroad tracks. If required, additional detours will be required for the local roadways. Impacts to the railroad tracks will need to be coordinated with Metro North.

Impacts to the Naugatuck River

New substructure units will need to be placed near or in the river so the C/D Roadway can be built. If possible, these units will be located to minimize the environmental impacts and oriented to minimize disruption to the flow.

Non-redundant spans for Interstate 84 Eastbound and Westbound are used to cross over the Naugatuck River. The temporary measures used with the ABC techniques will need to be designed to minimize the impacts to the river, floodplain, and wetlands.

6.3 Cost for Option E

The cost for Option E was completed using the Option B cost as a basis that followed the procedure defined for this analysis. However, the cost of the complete span replacements for the non-redundant spans will replace the costs for the deck span replacements on Interstate 84 Eastbound and Westbound. For this reason, these span replacements were cost estimated separately.

The cost for Option E in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.37 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 3.09 billion dollars in the year 2045. (See Appendix L).

The cost for the core of the interchange with Option E in 2017 dollars including the Alternate 6 bridge rehabilitations, the Alternate 6 improvements, the full rehabilitation of all bridges in 2045, engineering design, minor items, incidentals, and contingencies is 1.18 billion dollars. Using a 3.5% escalation factor, the project cost is estimated to be 2.72 billion dollars in the Year 2045. (See Appendix L). The core of the interchange will include Interstate 84 and Route 8 with the limits to include the eight (8) system ramps and the interchange 21 and 22 service ramps off of Interstate 84, as well as, the interchange 32 service ramps off of Route 8. These limits include Bridges 03190A/B/C/D/E/F, 03191A/B/C/D/E/F/G/H/I, 03192, 03193, 03194, 03198, 3200 and 3209.

7.0 Option F: Precast Decking (fracture critical spans) & Modular Super Units (simple spans) on Route 8 Northbound and Southbound

Overview

For Route 8 Northbound:

On Route 8 Northbound, replace the decks on fracture critical spans with precast decking and the simple spans with modular super units. No traffic will be allowed on the structures while this work is occurring. To maintain traffic during these replacements, construct a Temporary Bypass roadway including a U-turn movement to the north of Interstate 84. This Temporary Bypass roadway will cross over the Naugatuck River (twice) and over Freight Street on temporary bridges. Riverside Street to be combined into a two-lane, bidirectional roadway.

For Route 8 Southbound:

On Route 8 Southbound, use weekend closures and ABC techniques to replace the fracture critical spans with prefabricated bridge elements and the simple spans with modular super units. No traffic will be allowed on the structures while this work is occurring. Route 8 Southbound will be closed and all traffic diverted onto Riverside Street at Exit 32. Route 8 Southbound traffic will be isolated from local traffic. Detours will be established to isolate local traffic from the Route 8 Southbound traffic. Construct a temporary on ramp onto Route 8 Southbound opposite Summit Street.

These methods and detours were used in Project #151-326 which was for the rehabilitation of these two bridges.

7.1 Challenges

Structural Challenges

1. Working on an elevated structure
2. Challenging precast concrete panel layout with tapers, skews, and curves
3. Lifting heavy precast modular super decking units
4. Limited staging areas
5. Closures of Route 8 and/or Riverside Street required as these units cannot be lifted over live traffic

Highway Challenges

1. Lack of detours for Route 8
2. If the properties on the east side of the Naugatuck River are not available, finding a detour for Route 8 Northbound

7.2 Review of Staging for Option F

Route 8 Northbound

A Temporary Bypass will be utilized to relocate Route 8 Northbound while the concrete deck is being replaced. The proposed alignment for this temporary, two lane urban expressway is approximately 3/4-mile-long with three (3) temporary bridges. The alignment from south to north will begin with the Temporary Bypass on existing Route 8 Northbound just north of the Bank Street Overpass. The Temporary Bypass will end on existing Route 8 Northbound approximately 350 feet north of the Freight Street overpass. The Route 8 Northbound Exit 30 On Ramp, and the Route 8 Northbound Exit 32 Off Ramp will be closed.

The first temporary bridge will carry the roadway over the Naugatuck River onto the properties located west of Jackson Street. The Temporary Bypass will continue on fill over these three properties before crossing back over the Naugatuck River under the Turning Roadways carrying Bridges 03190C and 03190D. Then travelling along the footprint of Northbound Riverside Street, going under the Interstate 84 viaduct before climbing to the third temporary bridge over Freight Street. (See Appendix H)

To avoid conflicts with the Temporary Bypass and to maintain local traffic flow, Southbound Riverside Street will temporarily be converted to a bidirectional roadway with one lane in each direction between Sunnyside Avenue and Freight Street. This will temporarily relocate Northbound Riverside Street onto the eastern lane of Southbound Riverside Street. Northbound Riverside Street between Sunnyside Avenue and Freight Street will be utilized for the Temporary Bypass. In addition, new single lane inbound and outbound lanes will be constructed at and within the Exit 35 Right of Way.

To maintain the system connections during construction, a U-turn movement will be constructed on Route 8 to the north of the interchange. This U-turn will allow for connections to Route 8 Southbound and Interstate 84 Eastbound and Westbound.

Impacts to System Ramps

The System Ramps will be impacted by the construction during Option F are as follows:

TR 805 – Interstate 84 Eastbound to Route 8 Southbound
TR 808 – Route 8 Northbound to Interstate 84 Westbound
TR 811 – Route 8 Northbound to Interstate 84 Eastbound
TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 806, TR 807, TR 809, and TR 810 will remain operational and are vital in maintaining connections within the interchange.

TR 805 and TR 812 will be closed during construction but will remain operational at all other times.

TR 808 and TR 811 will be closed during construction but will remain operational at all other times.

Impacts to Service Ramps

Service ramps will be impacted due to the replacement of deck spans on Bridge 03190A (Route 8 Northbound). The following ramps will be impacted.

Route 8 Northbound Exit 30 on ramp from Riverside Street will be closed during this Option.

Route 8 Northbound Exit 32 off ramp to Northbound Riverside Street will be closed during this Option.

Impacts to Local Roads

The impacts to the Local Roads will be concentrated to Riverside Street. Southbound Riverside Street will temporarily be converted to a bidirectional roadway with one lane in each direction between Sunnyside Avenue and Freight Street. This will temporarily relocate Northbound Riverside Street onto the eastern lane of Southbound Riverside Street. Northbound Riverside Street between Sunnyside Avenue and Freight Street will be utilized for the Temporary Bypass. Additional impacts will include the closure of Service Ramps listed above and the subsequent detours that will be required along local roads.

Route 8 Southbound

Bridge No. 03190B will have the entire concrete deck replaced. Weekend closures and ABC methods will be used to replace the deck spans. Route 8 Southbound will be closed and all traffic diverted onto Riverside Street at Exit 32. Route 8 Southbound traffic will be isolated from local traffic. Detours will be established to separate local traffic from the Route 8 Southbound traffic. A temporary on ramp will be constructed onto Route 8 Southbound opposite Summit Street, similar to that used in Project #151-326.

Impacts to System Ramps

The System Ramps that will be impacted by the construction during Option F are as follows:

TR 805 – Interstate 84 Eastbound to Route 8 Southbound
TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 806, TR 807, TR 808, TR 809, TR 810, and TR 811 will remain operational and are vital in maintaining connections within the interchange.

TR 805 and TR 812 will be closed during construction but will remain operational at all other times.

Impacts to Service Ramps

Service ramps that will be impacted due to the replacement of deck spans on Bridge 03190B (Route 8 Southbound). The following ramp(s) will be impacted.

> Route 8 Southbound Exit 32 on ramp from Southbound Riverside Street will be closed during this Option.

Impacts to Local Roads

Riverside Street will be closed to local traffic between Bank Street and West Main Street. A detour will be established using Washington and Highland Avenues and West Main, Meadow, and Bank Streets. Access for local traffic will be maintained for Summit Street. Freight Street will be closed at Northbound Riverside Street and diverted northerly to West Main Street.

7.3 Cost for Option F

This option does not meet the focus of this analysis, replacing the concrete decks on the Interstate 84 bridges. This option is a refinement of the costs by replacing the concrete decks on the Route 8 bridges. These refined costs can replace the associated costs for Bridge 03190A and 03190B in any of the previous options (A through E).

8.0 Option G: Boulevard Concept for Route 8

Overview

Route 8 Southbound and Northbound, limited access highways, to be converted to at-grade boulevards. Within the limits of the project, these existing limited access highways will become surface level roadways with traffic controlled intersections. Connections to and from Interstate 84 will occur on the north side of the interstate.

This option was analyzed with the boulevard on the west and east sides of the Naugatuck River.

8.1 Review of Constructing the Boulevard on the west side of the Naugatuck River:

Construct Route 8 as a boulevard between the Washington Avenue intersection on the south end and West Main Street on the north end. The Boulevard shall be a four-lane split with two lanes in each direction. At grade intersections will be constructed at Washington Avenue, Bank Street, Sunnyside Avenue, Freight Street, and West Main Street. Exit 30 shall remain in service as a ½ interchange on the south end with access to South Leonard Street and from Charles Street. Exit 34, the existing ½ interchange to the north will be utilized during construction but will be removed upon the completion of the Boulevard.

The Boulevard will be constructed in the existing Route 8 footprint on the south end beginning after the 5th Street overpass where it will come off of the embankment to the at grade intersection with Washington Avenue. The overpass at Porter Street will be removed. The Boulevard will not diverge until in front of the existing Riverside Cemetery Chapel, where it will meet existing Southbound and Northbound Riverside Streets. A portion of Riverside Street will need to remain from the Summit Street intersection south to keep these neighborhoods viable.

North of Freight Street the Boulevard split will converge to match with the existing Route 8 alignment at the West Main Street intersection. North of the West Main Street intersection, the Boulevard will climb to match existing Route 8 and become a limited access highway. Watertown Avenue will be reconstructed on the west side to become a bidirectional roadway.

To facilitate connections with Interstate 84, the following is proposed for the System movements:

TR 805 – Interstate 84 Eastbound to Route 8 Southbound – to be modified
TR 806 – Interstate 84 Eastbound to Route 8 Northbound – to remain
TR 807 – Route 8 Southbound to Interstate 84 Westbound – to be modified
TR 808 – Route 8 Northbound to Interstate 84 Westbound – to be removed
TR 809 – Route 8 Southbound to Interstate 84 Eastbound – to be modified
TR 810 – Interstate 84 Westbound to Route 8 Northbound – to remain
TR 811 – Route 8 Northbound to Interstate 84 Eastbound – to be removed
TR 812 – Interstate 84 Westbound to Route 8 Southbound – to be removed

Additional Ramp movements will include an exit ramp off the Northbound Boulevard to an elevated U-Turn structure over West Main Street that will intersect with the Route 8 Southbound movements to Interstate 84 Eastbound (TR 809) and Westbound (TR 807). Interstate 84 Westbound to Route 8 Northbound (TR 810) will include a slip ramp for traffic destined to Route 8 Southbound to join the Boulevard Northbound then maneuver at West Main Street to the Boulevard Southbound. For West Main Street travelers to access Interstate 84, they will need to travel Boulevard Southbound, maneuver at Freight Street to Boulevard Northbound to the elevated U-Turn structure. (See Appendix I)

8.2 Review of Constructing the Boulevard on the east side of the Naugatuck River:

Construct Route 8 as a boulevard using Jackson Street. Route 8 will remain a limited access highway up to the Bank Street overpass. Route 8 will cross the Naugatuck River and intersect with Jackson Street. It will remain on Jackson Street through the Central Business District. There will be at grade intersections with an extended Sunnyside Avenue, Freight Street, and West Main Street. North of the West Main Street intersection, Route 8 will become a limited access highway joining existing Route 8 south of Exit 35.

The connections between Route 8 and Interstate 84 will remain similar to the connections described above with the "Boulevard" west of the Naugatuck River. The ramps to Interstate 84 from the Boulevard will depart from the Northbound direction as this transition back to the limited access highway. The access from Route 8 Southbound will be as an exit ramp off Route 8 before the Southbound barrel begins to transition from the limited access highway.

The transition section that occurs north of West Main Street will require property takings to complete.

The area to the south of Interstate 84 will remain Riverside Street. Although with all the structures removed for Route 8 Northbound, Southbound and the Turning Roadways, the Riverside Street roadways can be reconfigured and access to the river can be reestablished.

The area to the north of Interstate 84 will remain to provide the connections between Route 8 and Interstate 84.

Although the Boulevard east of the Naugatuck River will open more riverfront on the west side of the river, it will put more vehicular traffic through the City's Central Business District. This variant will also require the acquisition of commercial properties to provide the connections to Interstate 84. This option was not advanced further.

8.3 Cost for Option G

This option does not meet the focus of this analysis, replacing the concrete decks on the Interstate 84 bridges. These options take a limited access highway and transform it into a boulevard with traffic control at all intersections with local roads on the west side of Waterbury.

These options will remove multiple bridges including the Route 8 mainline bridges and several turning roadways (system ramps). This will reduce future maintenance costs. These costs can replace the associated costs for the bridges in any of the previous options (A through E).

9.0 Option H: Route 8 Southbound over Riverside Street Southbound

Overview

This option is to construct Route 8 Southbound to the west of its current location, over Riverside Street. This will unstack the Route 8 structures, leaving them offset at different levels. This can be built almost entirely off line but will require some modifications to existing Route 8 Northbound columns. Alignment will be close to the property of the historic Riverside Cemetery.

9.1 Challenges

Structural Challenges

1. Limited staging areas
2. Placement of substructure units due to historic cemetery and the Naugatuck River.

Highway Challenges

1. Roadway alignment to avoid impacts to the historic cemetery, Naugatuck River, and residential buildings.

9.2 Review of Option H

This option has flaws as the horizontal alignment impacts the historic Riverside Cemetery. The existing piers of the Route 8 Northbound bridge force the alignment farther west. No further analysis was performed on this option.

10.0 Option I: Span Replacements for Route 8 Northbound and Southbound (non-redundant spans)

Overview

On Route 8 Southbound and Northbound, complete span replacements for the non-redundant spans. These span replacements are to be completed using ABC techniques. This option supplements Option F but is the complete replacement of the non-redundant spans.

For Route 8 Northbound:

Replacement of the fourteen (14) non-redundant spans, using weekend closures. Detours to be established for Route 8 Northbound.

For Route 8 Southbound:

Replacement of the three (3) span non-redundant section of the structure, using weekend closures. Detours to be established for Route 8 Southbound.

10.1 Challenges

Structural Challenges

1. Working on an elevated structure.
2. Challenging precast concrete panel layout with tapers, skews, and curves.
3. Lifting heavy precast modular super decking units.
4. Limited staging areas with the National historic cemetery and the Naugatuck River.
5. Closures of Route 8 and Riverside Street required as these units cannot be lifted over live traffic.

Highway Challenges

1. Detour for Route 8 Southbound.
2. Detours for system and service ramps inaccessible due to construction.
3. Detour for Route 8 Northbound.

10.2 Review of Staging for Option I

Route 8 Northbound

Route 8 Northbound will need to be detoured. A detour for Route 8 Northbound will need to be developed.

Route 8 Southbound will need to be detoured when lifting/moving the Route 8 Northbound spans into place as this maneuver is not allowed over live traffic. Additionally, Riverside Street will need to be detoured when lifting/moving the spans into place as this maneuver is not allowed over live traffic. A detour for Route 8 Southbound will need to be developed.

Detours in the north-south direction are limited due to the minimal local road network and the existing topographical features in this area. The lack of available detours for the mainline movements will require additional investigation, which may prove Option I unfeasible.

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Impacts to System Ramps

The System Ramps will be impacted by the construction during Option I.

TR 805 – Interstate 84 Eastbound to Route 8 Southbound
TR 808 – Route 8 Northbound to Interstate 84 Westbound
TR 811 – Route 8 Northbound to Interstate 84 Eastbound
TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 805 and TR 812 will be closed during construction but will remain operational at all other times.

TR 808 and TR 811 will be closed during construction but will remain operational at all other times.

Detours will need to be established along the local road network. This limited network will be used for detouring Route 8 Northbound and Southbound at the same time.

Impacts to Service Ramps

The Service Ramps will be impacted by the construction during Option I. Detours will need to be established along the local road network. The following ramps will be impacted.

Route 8 Northbound Exit 30 on ramp from Riverside Street will be closed during this Option.

Route 8 Northbound Exit 32 off ramp to Northbound Riverside Street will be closed during this Option.

This limited local roadway network will be used for detouring Route 8 Northbound and Southbound at the same time.

Impacts to Local Roads

There will be major impacts to the Local Roads in developing detours for Route 8 Northbound and Route 8 Southbound. This option may not be feasible. Riverside Street will need to be detoured when lifting/moving the spans into place as this maneuver is not allowed over live traffic.

Route 8 Southbound

Bridge No. 03190B will have the entire concrete deck replaced. In addition, replace the three (3) span non-redundant section of the structure. Weekend closures and ABC methods will be used to replace the deck spans. Route 8 Southbound will need to be detoured. Additionally, Riverside

Street will need to be detoured when lifting/moving the spans into place as this maneuver is not allowed over live traffic.

Detours in the north-south direction are limited due to the minimal local road network and the existing topographical features in this area. The lack of available detours for the mainline movements will require additional investigation, which may prove Option I unfeasible.

Impacts to System Ramps

The System Ramps will be impacted by the construction during Option I.

TR 805 – Interstate 84 Eastbound to Route 8 Southbound
TR 812 – Interstate 84 Westbound to Route 8 Southbound

TR 806, TR 807, TR 808, TR 809, TR 810, and TR 811 will remain operational and are vital in maintaining connections within the interchange.

TR 805 and TR 812 will be closed during construction but will remain operational at all other times.

Impacts to Service Ramps

Service ramps that will be impacted due to the replacement of deck spans on Bridge 03190B (Route 8 Southbound). The following ramp(s) will be impacted.

Route 8 Southbound Exit 32 on ramp from Southbound Riverside Street will be closed during this Option.

Impacts to Local Roads

There will be major impacts to the Local Roads in developing a detour for Route 8 Southbound. This option may not be feasible. Riverside Street will need to be detoured when lifting/moving the spans into place as this maneuver is not allowed over live traffic.

10.3 Cost for Option I

This option does not meet the focus of this analysis, replacing the concrete decks on the Interstate 84 bridges. This option is a refinement of the costs to replace the concrete deck spans on the Route 8 bridges. However, the major flaws of not having adequate detours for Route 8 Northbound and Southbound make this option unfeasible.

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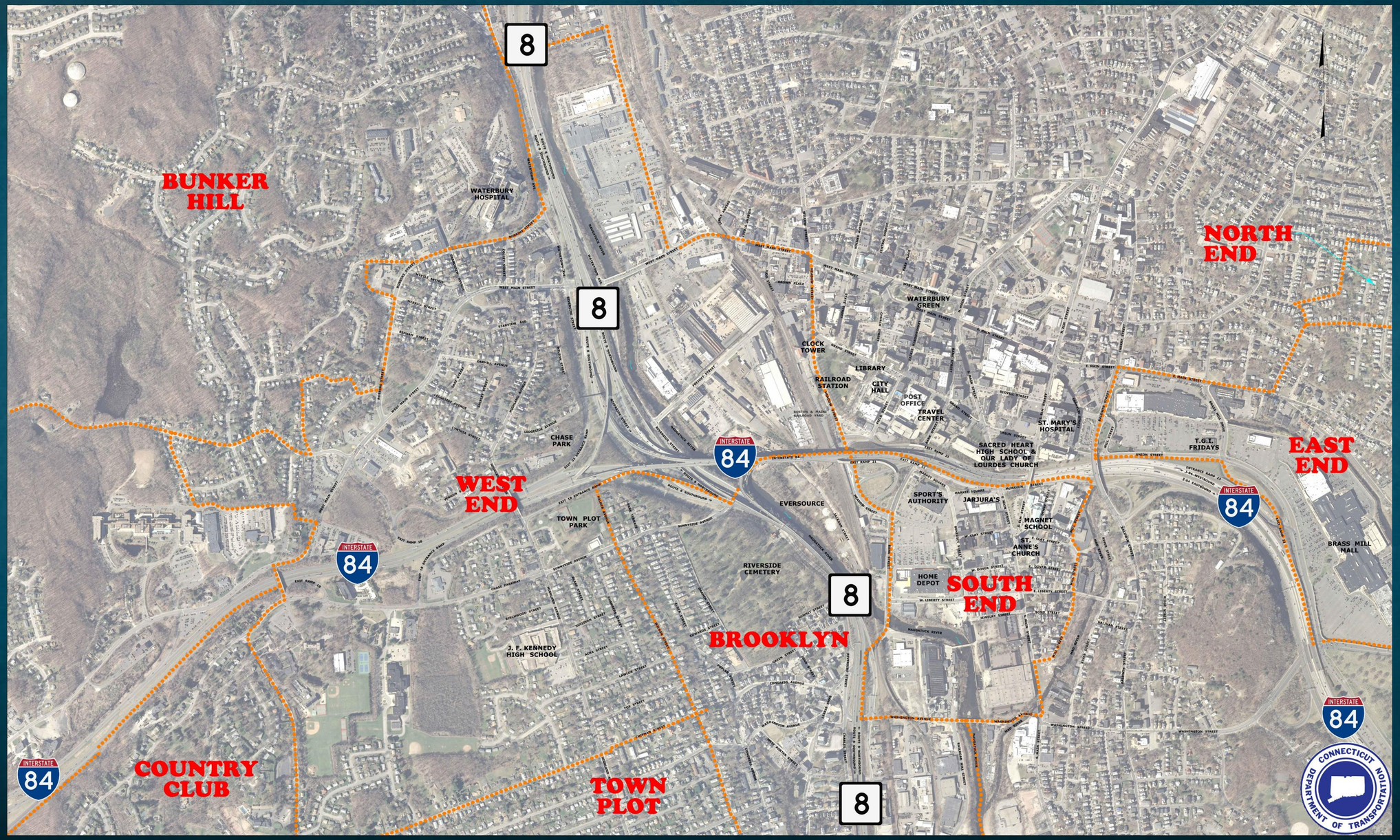
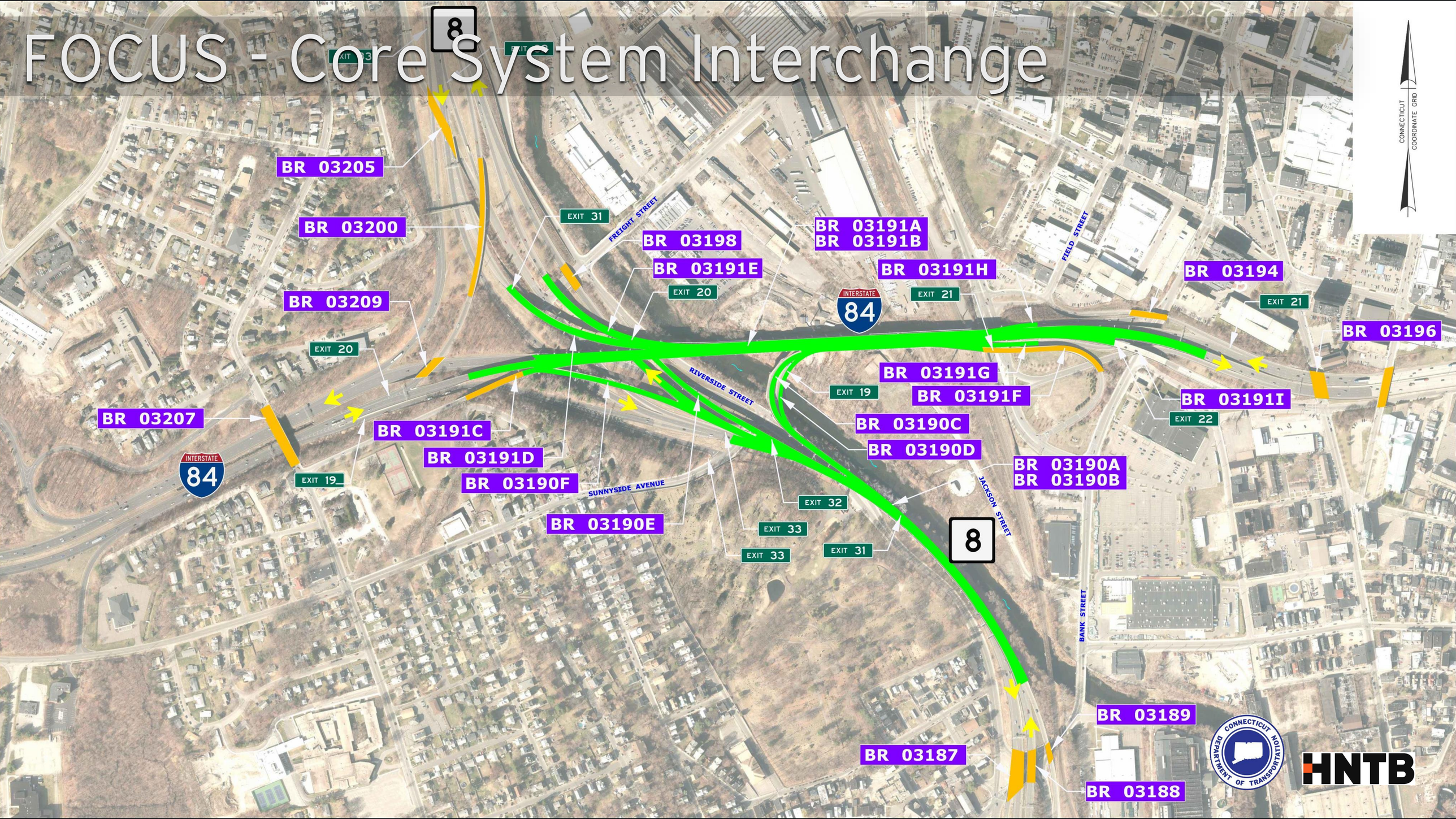
FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX A
Existing Conditions

Project Limits



FOCUS - Core System Interchange

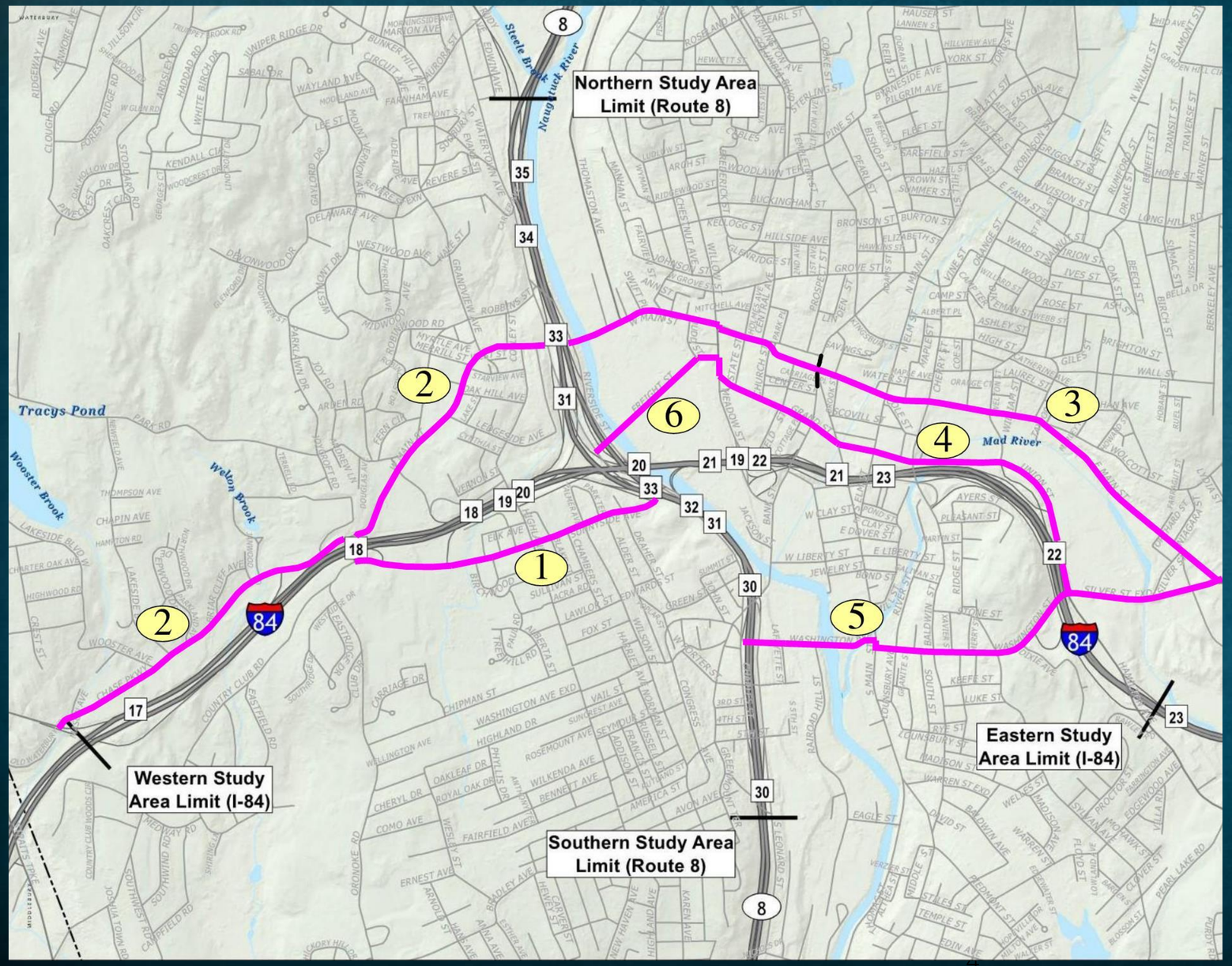


Interchanges



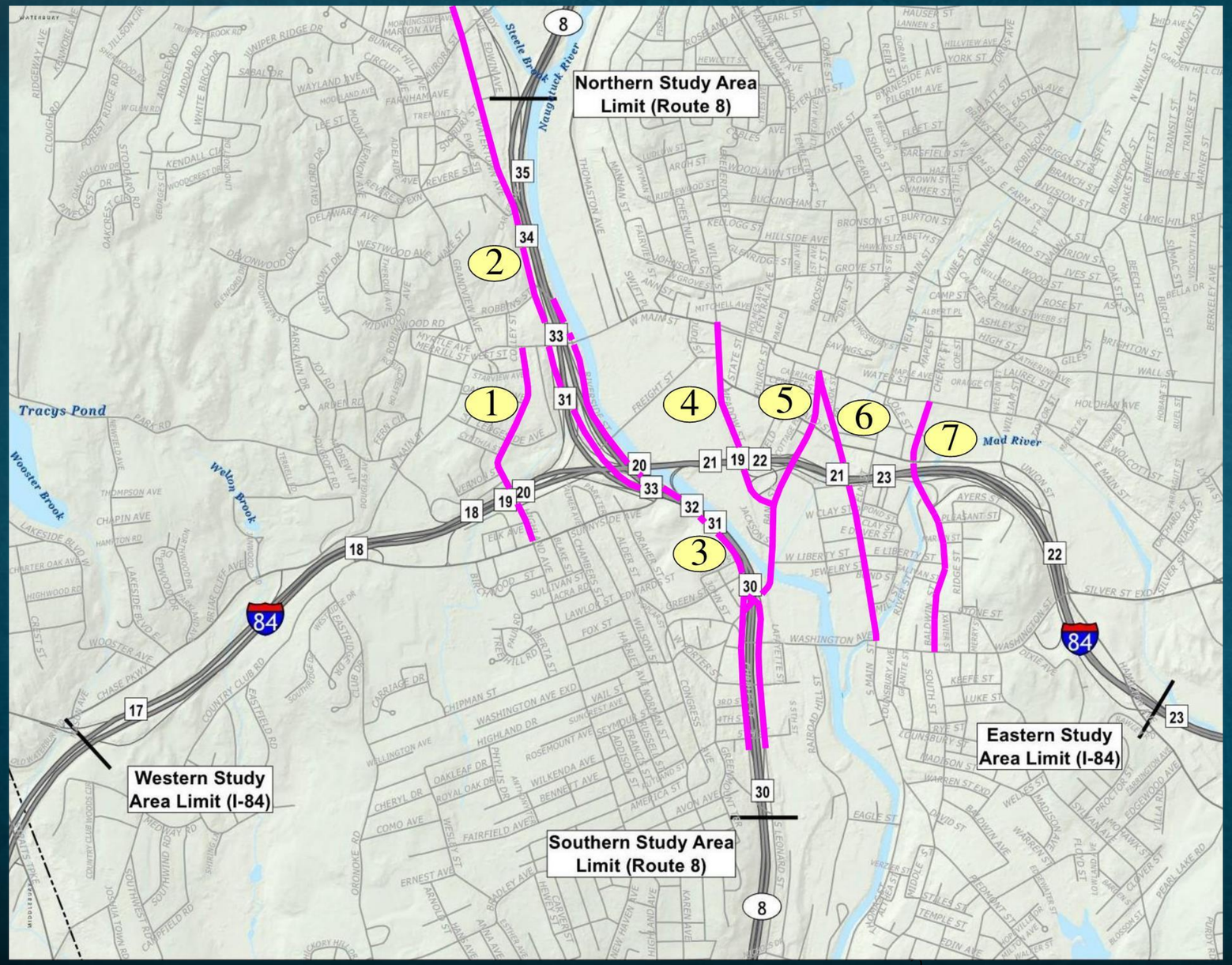
Service Ramps – Green
System Ramps - Yellow

Local Roadway Network - East-West



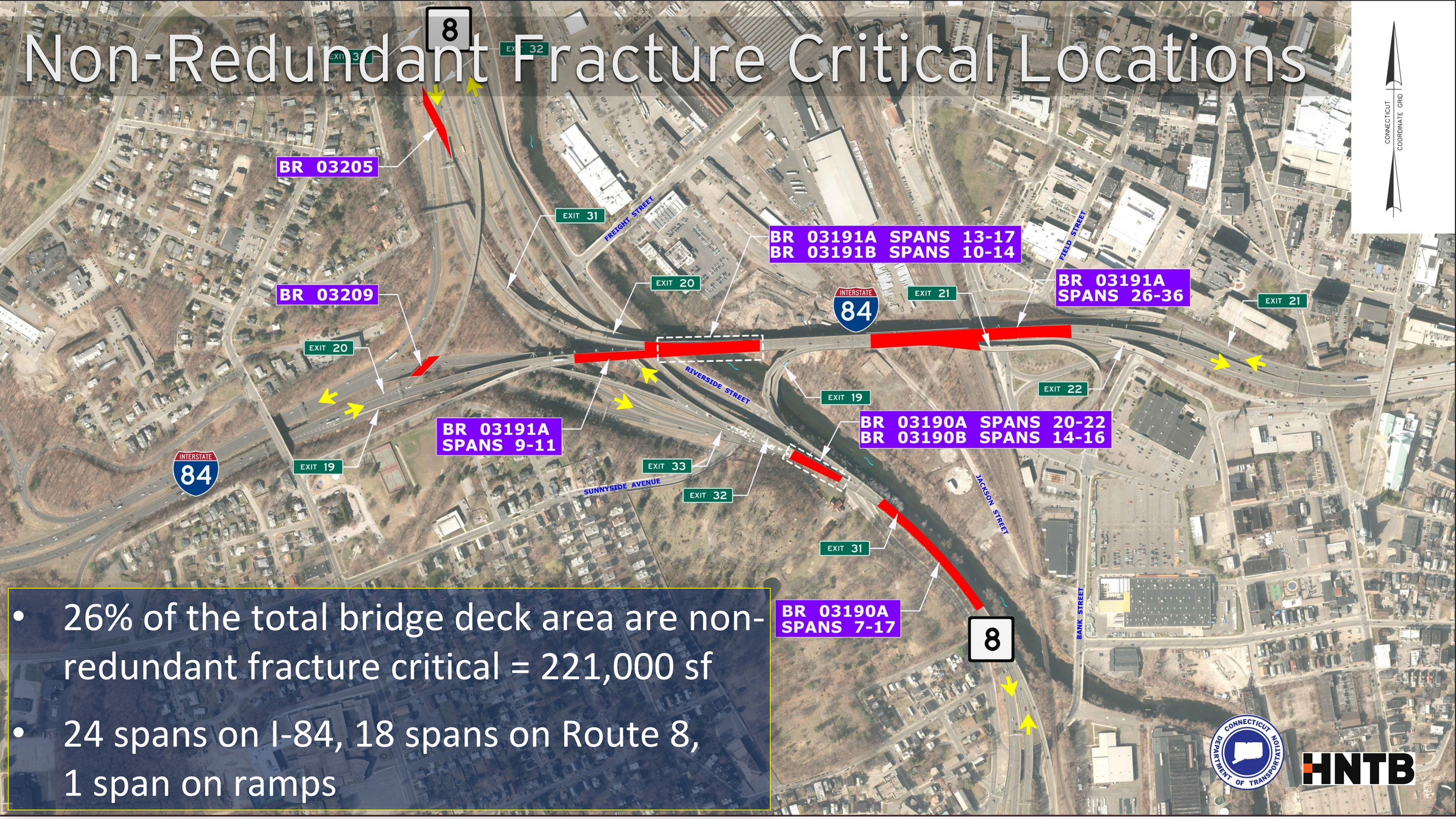
1. Chase Parkway – Sunnyside Avenue
2. Chase Parkway – West Main St
3. East Main Street
4. Grand St. – Union St.
5. Washington Avenue – Route 69
6. Freight Street

Local Roadway Network - North-South



1. Highland Avenue
2. Watertown Avenue
3. Riverside Street
4. Meadow Street
5. Bank Street
6. South Main Street
7. Baldwin Avenue

Non-Redundant Fracture Critical Locations



- 26% of the total bridge deck area are non-redundant fracture critical = 221,000 sf
- 24 spans on I-84, 18 spans on Route 8, 1 span on ramps

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX B
Alternates 6 & 8 from 2010 Study

Legend

- Signage Improvements
- Signal Timing Improvements
- Signal Coordination
- Local Road Improvements
- New Bus Transit Route
- Pedestrian Facility Improvements
- Proposed Multi-use Trail
- To be Removed

CONCEPTUAL ALTERNATIVE 6

I-84 / ROUTE 8 INTERCHANGE STUDY
Waterbury, Connecticut

Wilbur Smith Associates

Figure 2-1

N

0' 300' 600' 900'

CONCEPTUAL ALTERNATIVE 8

I-84 / ROUTE 8 INTERCHANGE STUDY

Waterbury, Connecticut

Figure 2-3

Wilbur Smith Associates

N

0' 300' 600' 900'

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX C
Cost Estimate Verification Report

To: Connecticut Department of Transportation

From: HNTB Team

Date: April 12, 2018

Re: Reconstruction of Interstate 84/Route 8 Interchange "Mixmaster" – Cost Estimate Verification on the I-84/Route 8 Waterbury Interchange Needs Study Project #151-301

Cost Verification White Paper

Overview

Final Deficiencies and Needs Report on the I-84/Route 8 Waterbury Interchange Needs Study, June 2010 was used as the reference document for this cost verification. Cost Estimates were taken from the CTDOT website on the WINS Study for Alternatives 6, 7 and 8. The preferred Alternative from this document, a combination of Alternatives 6 & 8, was the focus of this study.

Alternative 6 was to provide immediate improvements within the interchange including:

- an additional crossing of the Naugatuck River opposite Sunnyside Avenue with the local roadway continuing easterly crossing over the existing railroad tracks connecting with Field Street.
- a local north-south connector between Bank and West Main Streets along the Jackson Street corridor.
- a proposal to combine Interstate 84, Exit Ramps 21 and 22 into a single ramp with improved connectors to Bank and South Main Streets, including a roundabout at the Bank/Meadow Street Intersection. This item was removed from the Alternative 6 estimate due to the existing bridges for these ramps currently undergoing a rehabilitation. These rehabilitation projects are currently scheduled on the CTDOT Capital Plan.

Alternative 8 was to be constructed for the Design Year that would provide:

- a full system interchange while unstacking Interstate 84 and Route 8.
- Interstate 84 would be built to the south of the existing roadway.
- Route 8 was to be constructed on the east side of the Naugatuck River crossing at the southerly end, near Bank Street and the northerly end, to the north of West Main Street.

Reviewed the detailed breakdowns on Alternative 6:

1. Twelve (12) bridges listed and estimated within the original Alternative 6 Rehabilitation List are being addressed by projects which are currently scheduled on the CTDOT Capital Plan. Therefore, to avoid duplicating these costs, these bridges were removed from the cost estimate. These include ten (10) bridges from 151-312, 151-313 and 151-326 which are scheduled to begin in Spring 2018. Two (2) other bridges are currently under design for rehabilitation.

2. Improvements to the local roadway network between the Naugatuck River and Meadow/Bank Streets are in conflict with planned improvements by the City under their TIGER grant – W.A.T.E.R. project. Among these improvements, included in the City's TIGER project, are the reconstruction of existing Jackson Street from Bank Street to the existing Interstate 84 viaduct. Then extending a proposed roadway northerly on the existing abandoned single railroad track bed featuring a new intersection at Freight Street before terminating at West Main Street. This area and new roadway network, to the north of Interstate 84, will form the City's proposed Central Business District.

3. Remaining bridges were listed out and a rehabilitation cost was established per square foot by reviewing the recently released List Bridges project and the CTDOT 2017 Cost Estimating Guide lines.

4. Minor Items was kept at 25%.

5. Lump Sum Items were taken from page 8-5 of the Report with the MP&T percentage increased to 10%.

6. Additional Items were also taken from page 8-5 of the Report with the Contingencies increased to 30%.

7. An assumed Rights of Way cost of $500,000 dollars was used.

Reviewed the detailed breakdowns on Alternative 8:

Civil Items:

1. Lengths of Major Roadways were measured off the Alternative 8 drawing and broken into categories of Reconstruction and Rehabilitation (See Highway Items Table Sheet).

2. Widths of all roadways were reviewed against the CTDOT Highway Design Manual and adjusted as needed (See Highway Items Table Sheet).

3. Reviewed Travel Lane widths, specifically for the concrete base pavement width (See Highway Items Table Sheet).

4. Rehabilitation to include Mill and Overlay for the full widths of the roadways (See Highway Items Table Sheet).

5. Reconstruction to include full depth bituminous concrete shoulders and concrete pavement with bituminous concrete overlay on the travel lanes (See Highway Items Table Sheet).

6. Additional quantities for lane additions, includes the concrete pavement with bituminous concrete overlay (See Highway Items Table Sheet). Full depth bituminous concrete shoulders covered above in #5.

7. No adjustments were made to Ramps and Turning Roadways.

8. Reviewed the costs of the Drainage System. Cost given in Alternative 8 is estimated to be 4 times too high, conservatively. Location is between two rivers so major trunk line expenditures

will not be required. Also, existing system installed (late 1960s) was to handle the City's combined sewerage. The City systems' have been completely disconnected from the CTDOT drainage system.

9. Stage Construction costs seemed too low, increased substantially also increased the "other Structures Miscellaneous" item in conjunction under the Structures tab.

10. Rights of Way costs seemed high but was not adjusted.

11. Excavation quantities between Alternatives 6 and 8 seem duplicative. Carried the costs under Alternative 8 with the delta being carried under Alternative 6.

12. CTDOT Project 151-273 has moved the eastern limit of this project, further west. This reduced the length of Roadway work on the eastern limit.

13. Rock Excavation at 15% seemed high but no adjustment was made.

14. A project to replace the one (1) mile roadway gap between Projects 151-312 and 151-273 will need to occur in the near future. This length of pavement is being treated as Rehabilitation under this Cost Verification.

15. Mitigation costs were increased due to the number of river crossings. Although the 100-year flood lines remain near the high embankments on either side of the rivers, this cost was added.

Structure Items:

1. Costs per square foot for Replacement were low. Adjusted to the CTDOT 2017 Cost Estimating Guidelines based on the overall square footage of the bridge.

2. Bridges that are located within the Roadway Rehabilitation zones were estimated to receive another Rehabilitation, not Reconstruction. These are all simple span bridges that are not long.

3. Project 151-273 reconstructed the Hamilton Avenue bridge. This bridge is considered to be outside of the limits of this project.

4. Demolition costs were reviewed and adjusted to account for Stacked Structures, those over Rail/Water and for increased elevation. Demolition costs for bridges to be Rehabilitated were removed.

5. Reviewed shoulder widths on all bridges and adjusted.

Combined Project Items:

1. Minor Items was kept at 25%.

2. Lump Sum Items were taken from page 8-5 of the Report with the MP&T percentage increased from 4% to 10% (delta of 56.0 million dollars).

3. Additional Items were also taken from page 8-5 of the Report with the Contingencies increased from 10% to 30% (delta of 233.7 million dollars).

Engineering Design Costs:

1. These costs were distributed in the Program Management, Engineering Design and CTDOT Design/Administration categories.

2. These costs were kept separate from the percentage items (Minor, Lump Sum and Additional Items).

3. Inflation Costs applied to these costs through their completion with Program Management through project completion.

4. These costs were added to help complete Program Costs.

Comparison Original Alternative 6 and 8 Costs with the Revised Alternative 6 and 8 Costs:

1. Reasoning provided above for the changes between the Original and Revised Costs.

2. Inflation Rate of 3.5% was used.

3. Assumed construction completion of 2028 for Alternative 6 and 2045 for Alternative 8 was used. Midpoint of Construction assumed to be 2026 for Alternative 6 and 2042 for Alternative 8.

4. Assumed design completion of 2024 for Alternative 6 and 2038 for Alternative 8 was used.

5. Project Management Costs carried through construction completion.

Cost Verification on Previous Studies

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 6-Apr-18

Cost Estimates - Alternate 6 and Alternate 8

			revised Alternate 6			revised Alternate 8
Earth Exc			$ 251,642			$ 13,419,737
Rock Exc			$ 146,850			$ 7,831,313
Unsuitable Exc						
Contaminated			$ 46,600			$ 2,485,137
Hazardous Waste			$ 29,957			$ 1,597,588
Borrow						$ 2,018,104
Drainage System			$ 150,000			**$ 24,750,000**
Ex Drainage System			$ -			**$ 250,000**
Superpave			$ 100,000			**$ 18,280,577**
Concrete Base Widen			$ -			**$ 13,075,563**
Milling			$ -			**$ 3,797,478**
Concrete Pavement Replace						$ 87,000
Subbase			$ 35,000			**$ 4,271,483**
Major Pipe Culverts			$ -			
Concrete Box Culverts			$ -			
Bridge Proposed			$ 14,332,000			**$ 455,818,300**
Bridge Demolition			$ -			**$ 55,459,530**
Bridge Repair			$ 33,525,090			**$ 14,725,800**
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**
Retaining Walls			$ -			**$ 30,000,000**
Standpipes						
Concrete Median Barrier			$ -			**$ 2,000,000**
Major Traffic Signal Mods						$ 2,482,278
New Traffic Signal						$ 300,000
Concrete Sidewalk			$ 50,000			$ 1,330,000
Roadway Lighting			$ 40,000			$ 7,615,034
BCLC						$ 478,395
Concrete Curbing			$ 25,000			$ 687,400
Guide Rail			$ 20,000			$ 2,947,306
Signing & Striping			$ 10,000			**$ 15,000,000**
Stage Construction			$ -			**$ 10,000,000**
Noise Barriers						
Mitigation			$ 300,000			**$ 5,000,000**
IMS						**$ 10,000,000**
SubTotals			**$ 49,822,188**			**$ 775,708,023**

Engineering Design Costs						
Program Management Costs	4%		$ 1,992,888			$ 31,028,321
Engineering Design Costs	9%		$ 4,483,997			$ 69,813,722
CTDOT Design/Administration Costs	13%		$ 6,476,884			$ 100,842,043
Subtotal			**$ 12,953,769**			**$ 201,684,086**

			Alternate 6			Alternate 8	
Civil Highway Items			$ 1,205,049			$ 149,704,393	
Structural Bridge Items			$ 48,617,139			$ 626,003,630	
SubTotal (Major Items)			**$ 49,822,188**			**$ 775,708,023**	
Engineering Design Costs				**$ 12,953,769**			**$ 201,684,086**
Minor Items (25%)			$ 12,455,547			$ 193,927,006	
SubTotal			**$ 62,277,735**			**$ 969,635,029**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,555			$ 19,392,701	
MPT	10%		$ 6,227,774			$ 96,963,503	
Mobilization	8%		$ 4,670,830			$ 72,722,627	
Construction Staking	1%		$ 622,777			$ 9,696,350	
Subtotal			**$ 75,044,671**			**$ 1,168,410,209**	
Additional Items							
Incidentals	21%		$ 15,759,381			$ 245,366,144	
Contingencies	30%		$ 22,513,401			$ 350,523,063	
Utility Cost	3%		$ 2,251,340			$ 35,052,306	
Right of Way			$ 500,000			$ 100,000,000	
Total Cost 2017			**$ 116,068,793**	**$ 12,953,769**		**$ 1,899,351,723**	**$ 201,684,086**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,068,793	$ 12,953,769	$ 1,899,351,723	$ 201,684,086	$ 2,230,058,370
	Inflation Costs	$ 4,062,408	$ 453,382	$ 66,477,310	$ 7,058,943	
2018		$ 120,131,201	$ 13,407,151	$ 1,965,829,033	$ 208,743,029	$ 2,308,110,413
	Inflation Costs	$ 4,204,592	$ 469,250	$ 68,804,016	$ 7,306,006	
2019		$ 124,335,793	$ 13,876,401	$ 2,034,633,049	$ 216,049,035	$ 2,388,894,278
	Inflation Costs	$ 4,351,753	$ 485,674	$ 71,212,157	$ 7,561,716	
2020		$ 128,687,545	$ 14,362,075	$ 2,105,845,206	$ 223,610,751	$ 2,472,505,577
	Inflation Costs	$ 4,504,064	$ 502,673	$ 73,704,582	$ 7,826,376	
2021		$ 133,191,609	$ 14,864,748	$ 2,179,549,788	$ 231,437,127	$ 2,559,043,273
	Inflation Costs	$ 4,661,706	$ 520,266	$ 76,284,243	$ 8,100,299	
2022		$ 137,853,316	$ 15,385,014	$ 2,255,834,031	$ 239,537,427	$ 2,648,609,787
	Inflation Costs	$ 4,824,866	$ 538,475	$ 78,954,191	$ 8,383,810	
2023		$ 142,678,182	$ 15,923,489	$ 2,334,788,222	$ 247,921,237	$ 2,741,311,130
	Inflation Costs	$ 4,993,736	$ 557,322	$ 81,717,588	$ 8,677,243	
2024		$ 147,671,918	$ 16,480,812	$ 2,416,505,809	$ 256,598,480	$ 2,837,257,019
	Inflation Costs	$ 5,168,517	$ 560,323	$ 84,577,703	$ 8,980,947	
2025		$ 152,840,435	$ 17,041,135	$ 2,501,083,513	$ 265,579,427	$ 2,936,544,510
	Inflation Costs	$ 5,349,415	$ 596,440	$ 87,537,923	$ 9,295,280	
2026		$ 158,189,851	$ 17,637,574	$ 2,588,621,436	$ 274,874,707	$ 3,039,323,567
	Inflation Costs			$ 90,601,750	$ 9,620,615	
2027		$ 158,189,851	$ 17,637,574	$ 2,679,223,186	$ 284,495,322	$ 3,139,545,932
	Inflation Costs			$ 93,772,812	$ 9,957,336	
2028		$ 158,189,851	$ 17,637,574	$ 2,772,995,997	$ 294,452,658	$ 3,243,276,080
	Inflation Costs			$ 97,054,860	$ 10,305,843	
2029				$ 2,870,050,857	$ 304,758,501	$ 3,350,636,783
	Inflation Costs			$ 100,451,780	$ 10,666,548	
2030				$ 2,970,502,637	$ 315,425,049	$ 3,461,755,111
	Inflation Costs			$ 103,967,592	$ 11,039,877	
2031				$ 3,074,470,230	$ 326,464,925	$ 3,576,762,580
	Inflation Costs			$ 107,606,458	$ 11,426,272	
2032				$ 3,182,076,688	$ 337,891,198	$ 3,695,795,310
	Inflation Costs			$ 111,372,684	$ 11,826,192	
2033				$ 3,293,449,372	$ 349,717,390	$ 3,818,994,186
	Inflation Costs			$ 115,270,728	$ 12,240,109	
2034				$ 3,408,720,100	$ 361,957,498	$ 3,946,505,023
	Inflation Costs			$ 119,305,203	$ 12,668,512	
2035				$ 3,528,025,303	$ 374,626,011	$ 4,078,478,739
	Inflation Costs			$ 123,480,886	$ 13,111,910	
2036				$ 3,651,506,189	$ 387,737,921	$ 4,215,071,535
	Inflation Costs			$ 127,802,717	$ 13,570,827	
2037				$ 3,779,308,905	$ 401,308,748	$ 4,356,445,079
	Inflation Costs			$ 132,275,812	$ 14,045,806	
2038				$ 3,911,584,717	$ 415,354,554	$ 4,502,766,696
	Inflation Costs			$ 136,905,465	$ 14,121,437	
2039				$ 4,048,490,182	$ 429,475,992	$ 4,653,793,599
	Inflation Costs			$ 141,697,156	$ 15,031,660	
2040				$ 4,190,187,339	$ 444,507,652	$ 4,810,522,415
	Inflation Costs			$ 146,656,557	$ 15,557,768	
2041				$ 4,336,843,896	$ 460,065,419	$ 4,972,736,740
	Inflation Costs			$ 151,789,536	$ 16,102,290	
2042				$ 4,488,633,432	$ 476,167,709	$ 5,140,628,566
	Inflation Costs					
2043				$ 4,488,633,432	$ 476,167,709	$ 5,140,628,566
	Inflation Costs					
2044				$ 4,488,633,432	$ 476,167,709	$ 5,140,628,566
	Inflation Costs					
2045				$ 4,488,633,432	$ 476,167,709	$ 5,140,628,566

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Verification on Previous Studies

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CTDOT Project #151-331
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Cost Estimates - Alternate 6 and Alternate 8

	original Alternate 6	**revised Alternate 6**	original Alternate 8	**revised Alternate 8**
Earth Exc	$ 13,671,379	**$ 251,642**	$ 13,419,737	**$ 13,419,737**
Rock Exc	$ 7,978,163	**$ 146,850**	$ 7,831,313	**$ 7,831,313**
Unsuitable Exc	$ 1,500			
Contaminated	$ 2,531,737	**$ 46,600**	$ 2,485,137	**$ 2,485,137**
Hazardous Waste	$ 1,627,545	**$ 29,957**	$ 1,597,588	**$ 1,597,588**
Borrow			$ 2,018,104	**$ 2,018,104**
Drainage System	$ 222,341	**$ 150,000**	$ 106,557,800	**$ 24,750,000**
Ex Drainage System	$ 17,422	**$ -**	$ 414,400	**$ 250,000**
Superpave	$ 35,344,106	**$ 100,000**	$ 25,114,614	**$ 18,280,577**
Concrete Base Widen	$ 2,890,430	**$ -**	$ 38,735,734	**$ 13,075,563**
Milling	$ 102,400	**$ -**	$ 56,124	**$ 3,797,478**
Concrete Pavement Replace	$ -		$ 87,000	**$ 87,000**
Subbase	$ 2,593	**$ 35,000**	$ 4,602,508	**$ 4,271,483**
Major Pipe Culverts	$ -	**$ -**		
Concrete Box Culverts	$ -	**$ -**		
Bridge Proposed	$ 27,580,800	**$ 14,332,000**	$ 506,543,533	**$ 455,818,300**
Bridge Demolition	$ 1,548,495	**$ -**	$ 66,230,138	**$ 55,459,530**
Bridge Repair	$ 124,938,895	**$ 33,525,090**	$ 178,827	**$ 14,725,800**
other Structures Miscellaneous	$ -	**$ 760,049**	$ 10,000	**$ 70,000,000**
Retaining Walls	$ 4,017,300	**$ -**	$ 14,031,500	**$ 30,000,000**
Standpipes	$ -			
Concrete Median Barrier	$ -	**$ -**	$ 146,297	**$ 2,000,000**
Major Traffic Signal Mods	$ 150		$ 2,482,278	**$ 2,482,278**
New Traffic Signal	$ 630		$ 300,000	**$ 300,000**
Concrete Sidewalk	$ 532,856	**$ 50,000**	$ 1,330,000	**$ 1,330,000**
Roadway Lighting	$ 884,334	**$ 40,000**	$ 7,615,034	**$ 7,615,034**
BCLC	$ -		$ 478,395	**$ 478,395**
Concrete Curbing	$ 820,400	**$ 25,000**	$ 687,400	**$ 687,400**
Guide Rail	$ 159,168	**$ 20,000**	$ 2,947,306	**$ 2,947,306**
Signing & Striping	$ 152,121	**$ 10,000**	$ 8,621,943	**$ 15,000,000**
Stage Construction	$ 1,100,000	**$ -**	$ 3,000,000	**$ 10,000,000**
Noise Barriers				
Mitigation	$ 300,000	**$ 300,000**	$ 1,000,000	**$ 5,000,000**
IMS				**$ 10,000,000**

Totals	**$ 226,424,765**	**$ 49,822,188**	**$ 818,522,710**	**$ 775,708,023**

Cost Verification on Previous Studies

CTDOT Project #151-331
HNTB Project #65665

Date: 6-Apr-18

Highway Items - Roadway (Reconstruction and Rehabilitation)

									Reconstruction					Rehabilitation		Reconstruction
Roadway	**Reconstruction**	**Rehabilitation**	**Lane Add**	Total Length	Lanes	Left Shoulder	Right Shoulder		**Concrete Base**		**Bit. Conc.**		**Bit. Conc.**			
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		Travel Lanes		**shoulder recon**		**Lane Recon**	**Mill/Overlay**		**Subbase**
Interstate 84 EB									only							
West Side	1565	5155			36	12	12		56340		37560		56340	309300		93900
East Side	2545	3395		12660	36	12	12		91620		61080		91620	203700		152700
Interstate 84 WB																
West Side	1435	5155			36	12	12		51660		34440		51660	309300		86100
East Side	2545	3395			36	12	12		91620		61080		91620	203700		152700
				12530												
Route 8 NB																
South Side	350	3710			36	4	10		12600		4900		12600	185500		17500
Center Portion	2260				24	4	10		54240		31640		54240	0		85880
North Side	350	2330		9000	36	4	10		12600		4900		12600	116500		17500
Route 8 SB																
South Side	350	3710	815		36	4	10		22380		4900		12600	185500		17500
Center Portion	2260				24	4	10		54240		31640		54240	0		85880
North Side	350	1370		8040	36	4	10		12600		4900		12600	68500		17500
Ramps	49945	49945			14	4	8		699230		599340		699230	1298570		1298570
Turning Roadways	20660	20660			14	4	8		289240		247920		289240	537160		537160

Subtotals (sf)	1448370 sf	1124300 sf	1438590 sf	3417730 sf	2562890 sf
Subtotals (sy)		124922 sy	159843 sy	379748 sy	
depths	0.75 ft	10 in	4 in	3 in	1 ft
T/sy*in		0.0575	0.0575	0.0575	
	1086278 cf				2562890 cf
	40233 CY	**71830 Ton**	**36764 Ton**	**65506 Ton**	**94922 CY**
				174101 Ton	

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CTDOT Project #151-331
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Structure Items - Alternate 6 (Rehabilitation)

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

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HNTB Project #65665 Date: 6-Apr-18

Structure Items - Alternate 8 (Demolition)

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
	Route 8	SR 846 SB	1715		11,759		$ -
	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
	Route 8 NB	PORTER STREET	3184A		4,132		$ -
	Route 8 SB	PORTER STREET	3184B		4,132		$ -
	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 50	$ 360,500
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 50	$ 145,750
	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 70	$ 9,111,550
	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 50	$ 3,765,600
	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ 75	$ 1,808,850
	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ 75	$ 1,604,625
	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 50	$ 680,650
	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 60	$ 1,075,800
	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ 70	$ 15,518,930
	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050	$ 70	$ 11,063,500
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 60	$ 1,663,560
	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 60	$ 1,341,900
	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 50	$ 315,800
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 50	$ 94,500
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 50	$ 525,400
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 50	$ 136,450
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 50	$ 317,200
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 50	$ 270,050
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 50	$ 424,000
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 50	$ 427,150
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 50	$ 301,500
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 50	$ 966,600
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 35	$ 143,535
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 50	$ 452,900
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 50	$ 429,450
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 50	$ 211,700
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 50	$ 453,150
	Highland Avenue	I-84	3207		15,120		$ -
	I-84 TR 806	I-84 WB	3209		5,781	$ 50	$ 289,050
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 55,459,530

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Structure Items - Alternate 8 (New and Rehabilitation)

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**			
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$	365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$	420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required								
4	West Main Street to Bank Street Connector	Metro North									
									Subtotal		$ 14,332,000
ALTERNATE 8			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**			
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required								
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street									
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$	420	$ 1,159,200
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,680	36	12	12	60	160,800	$	365	$ 58,692,000
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$	365	$ 2,452,800
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$	135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$	135	$ 777,600
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$	365	$ 63,072,000
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$	365	$ 2,452,800
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$	135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$	365	$ 5,139,200
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$	135	$ 2,937,600
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$	135	$ 4,320,000
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$	-	$ -
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$	365	$ 21,462,000
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$	365	$ 13,140,000
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$	365	$ 12,264,000
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$	420	$ 3,024,000
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$	420	$ 1,209,600
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$	365	$ 4,336,200
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$	365	$ 19,710,000
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$	365	$ 25,360,200
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$	365	$ 9,636,000
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$	420	$ 1,512,000
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$	365	$ 715,400
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$	135	$ 820,800
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$	135	$ 564,300
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$	135	$ 405,000
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$	365	$ 7,300,000
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$	365	$ 12,899,100
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$	365	$ 1,095,000
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$	365	$ 4,022,300
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$	365	$ 20,987,500
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$	135	$ 820,800
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$	135	$ 564,300
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$	135	$ 405,000
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$	365	$ 9,125,000
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$	365	$ 14,147,400
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$	365	$ 1,095,000
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$	365	$ 4,022,300
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$	365	$ 20,987,500
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$	365	$ 11,388,000
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$	365	$ 18,396,000
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$	365	$ 7,489,800
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$	365	$ 9,110,400
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$	365	$ 12,351,600
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$	365	$ 963,600
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$	365	$ 8,760,000
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$	365	$ 18,396,000
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$	365	$ 7,533,600
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$	365	$ 17,082,000
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$	365	$ 3,328,800
										Rehabilitate	**$ 14,725,800**
			37,500					1,425,340		**Reconstruct**	**$ 455,818,300**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX D
Temporary Movements
Crossovers on Interstate 84
U-Turn Movements



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=50'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER"

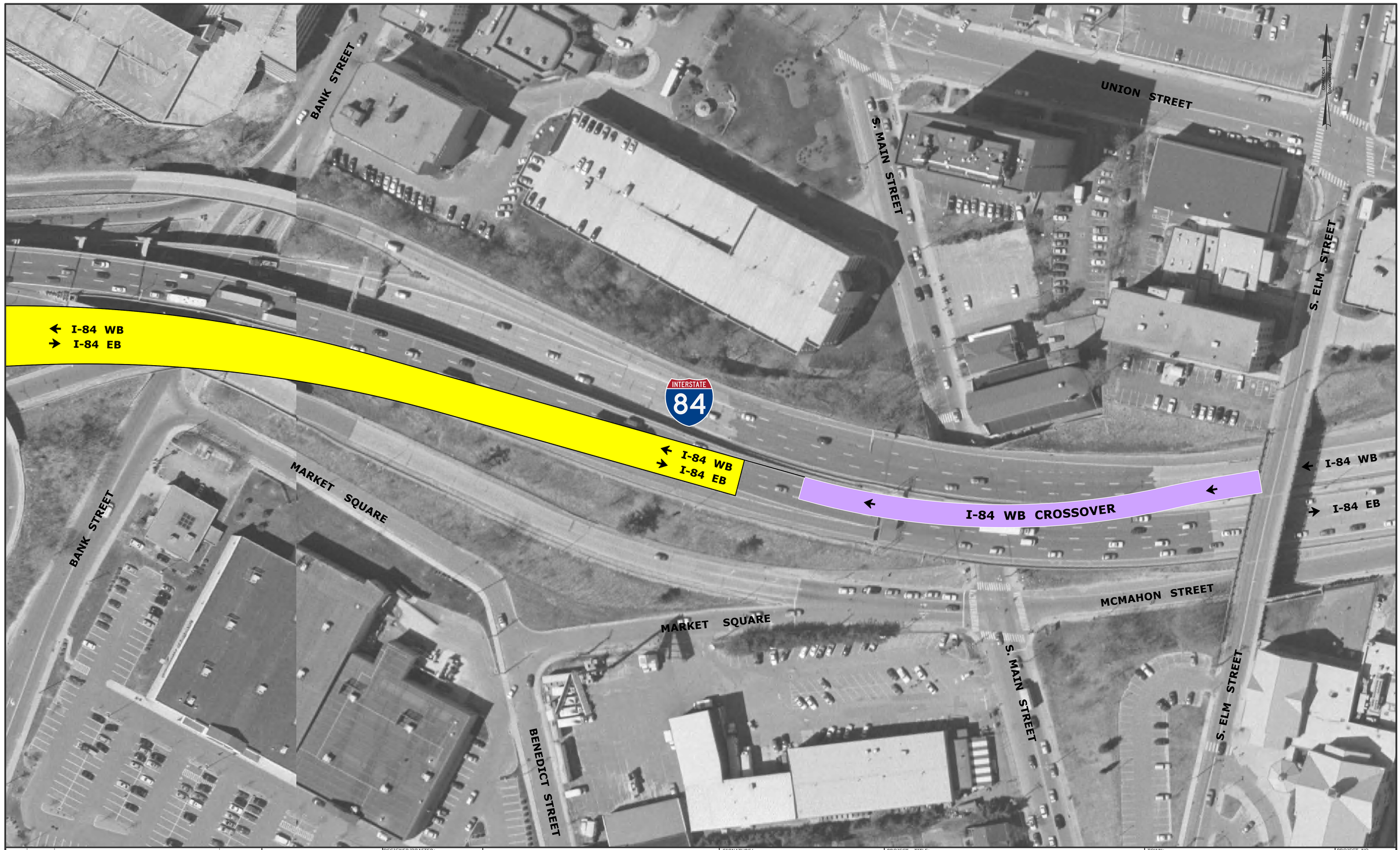
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
I-84 WEST CROSSOVER WEST

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER"

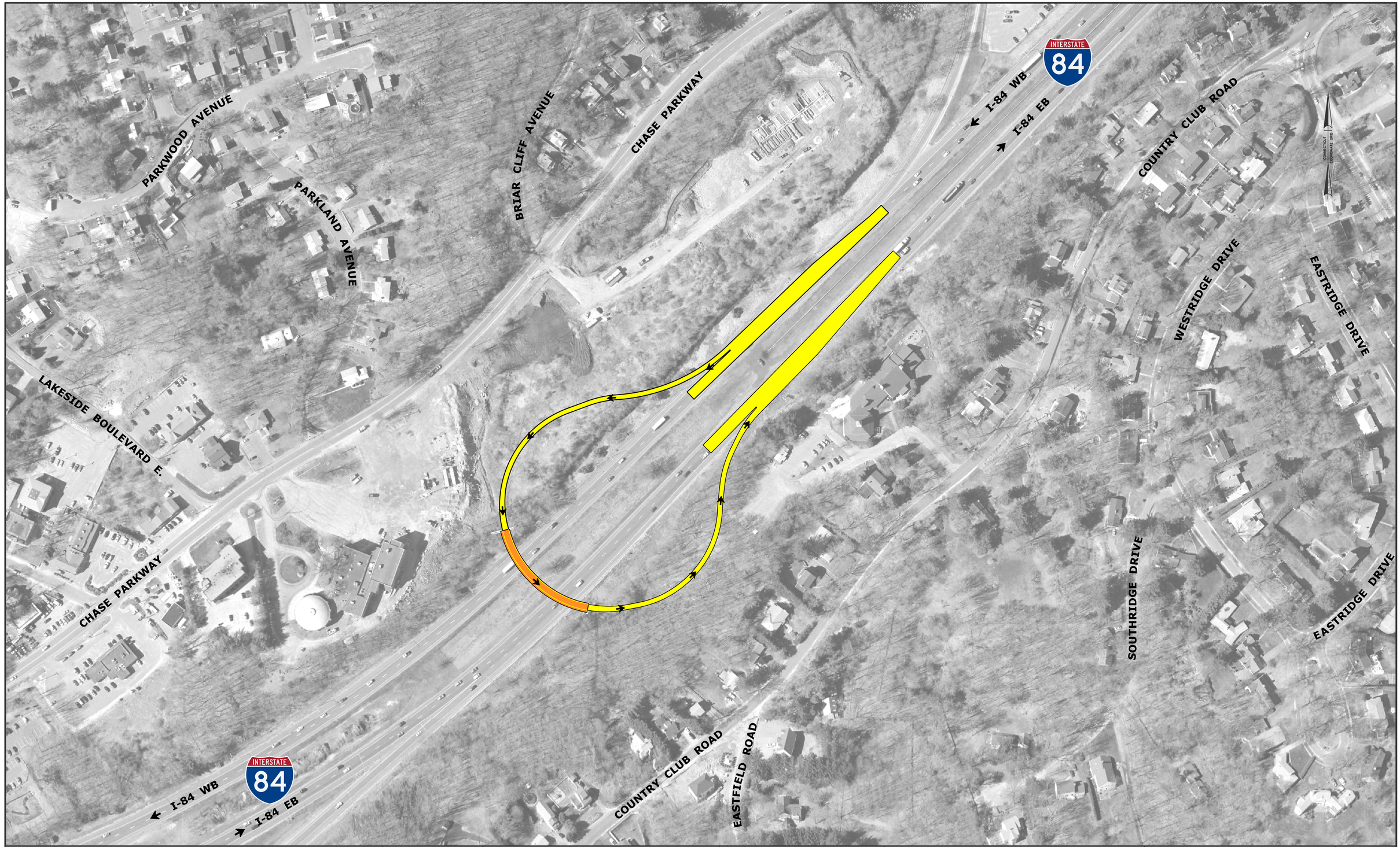
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
I-84 WEST CROSSOVER EAST

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
-
I-84 WEST U-TURN

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
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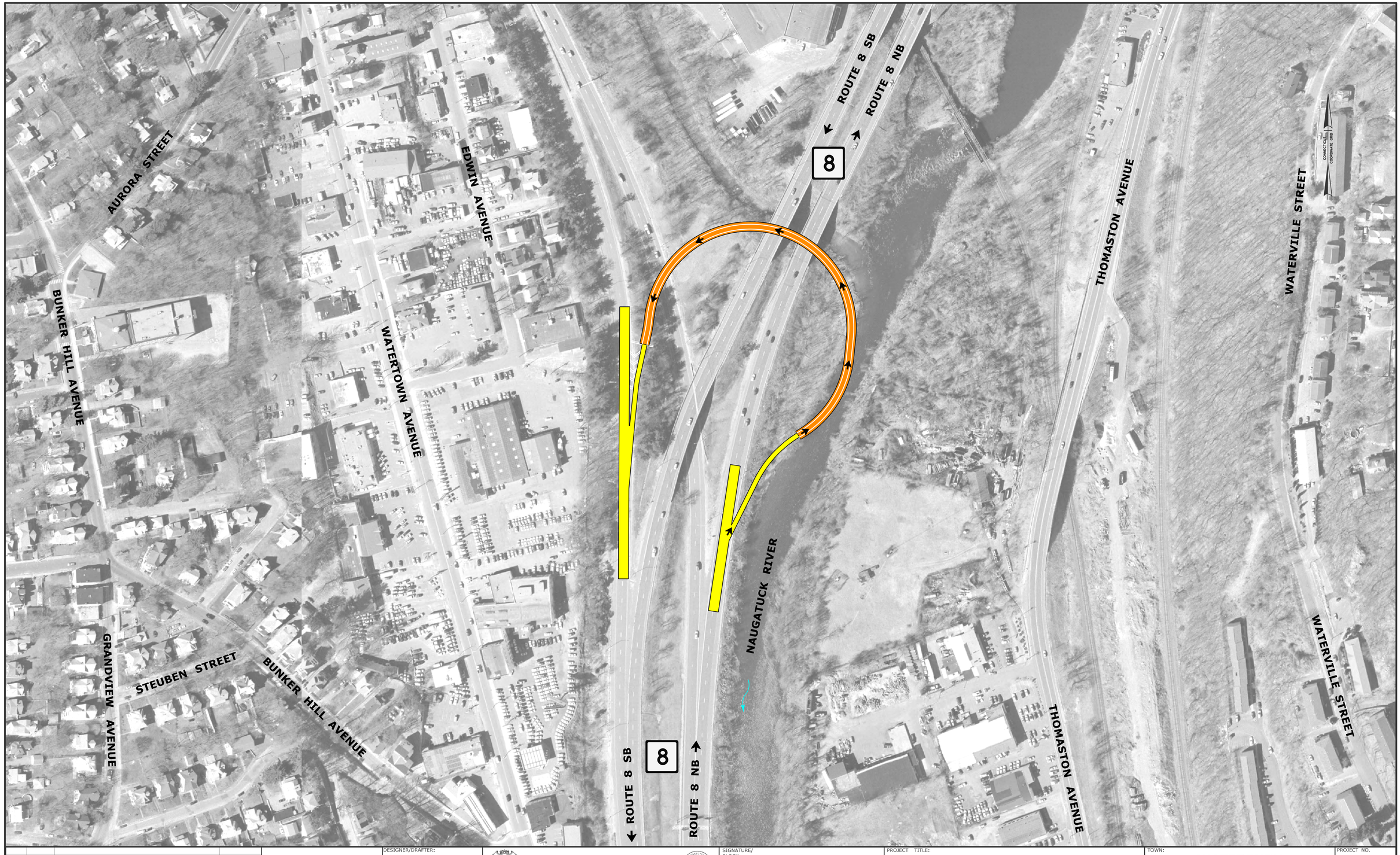

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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

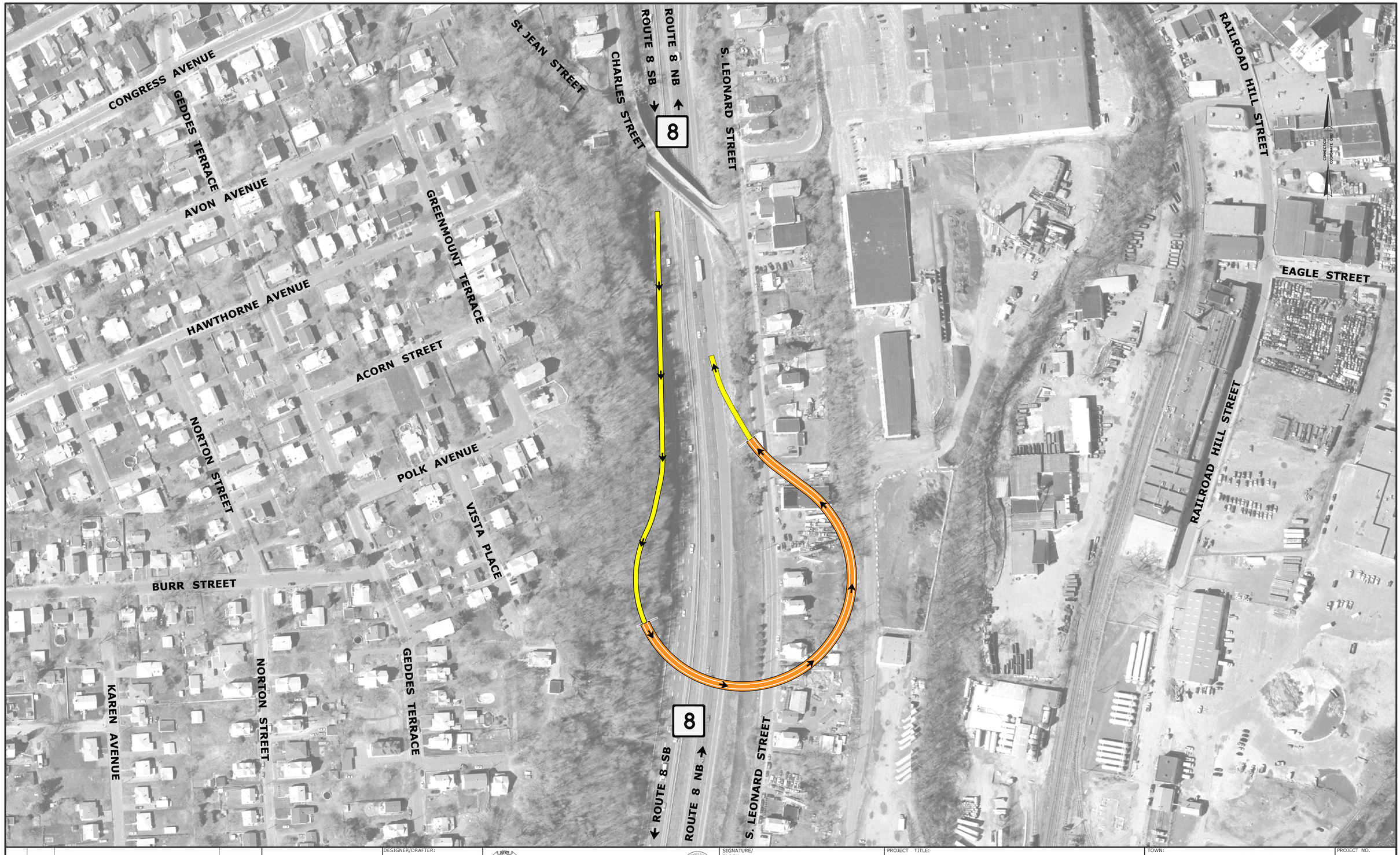
TOWN: **WATERBURY CONNECTICUT**

DRAWING TITLE: **- ROUTE 8 NORTH U-TURN**

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. S



REV.		DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
- ROUTE 8 SOUTH U-TURN

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

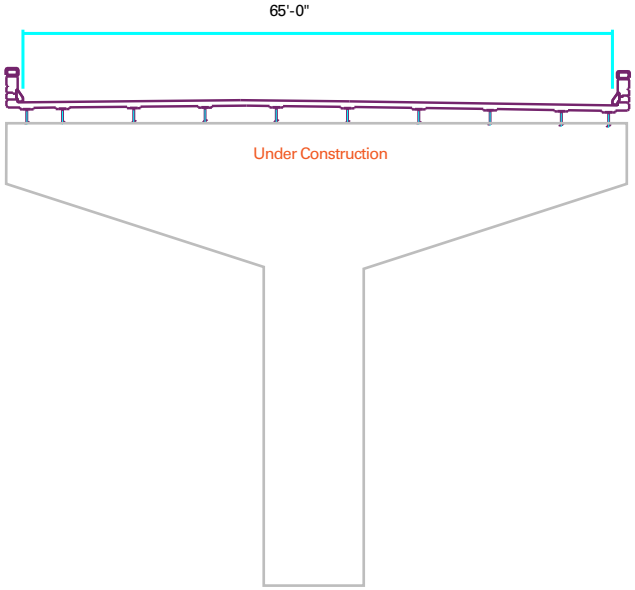
APPENDIX E
Option A

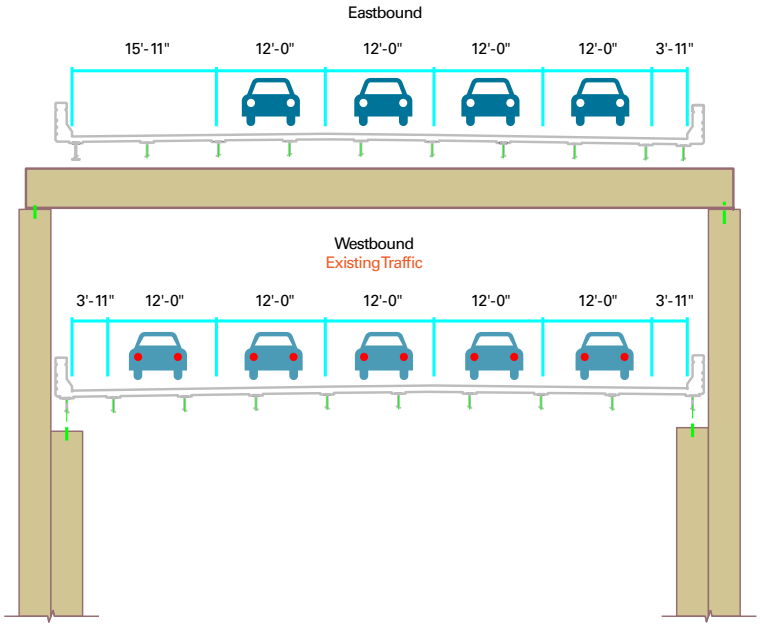
OPTION

A-3

STAGE 1

Looking West

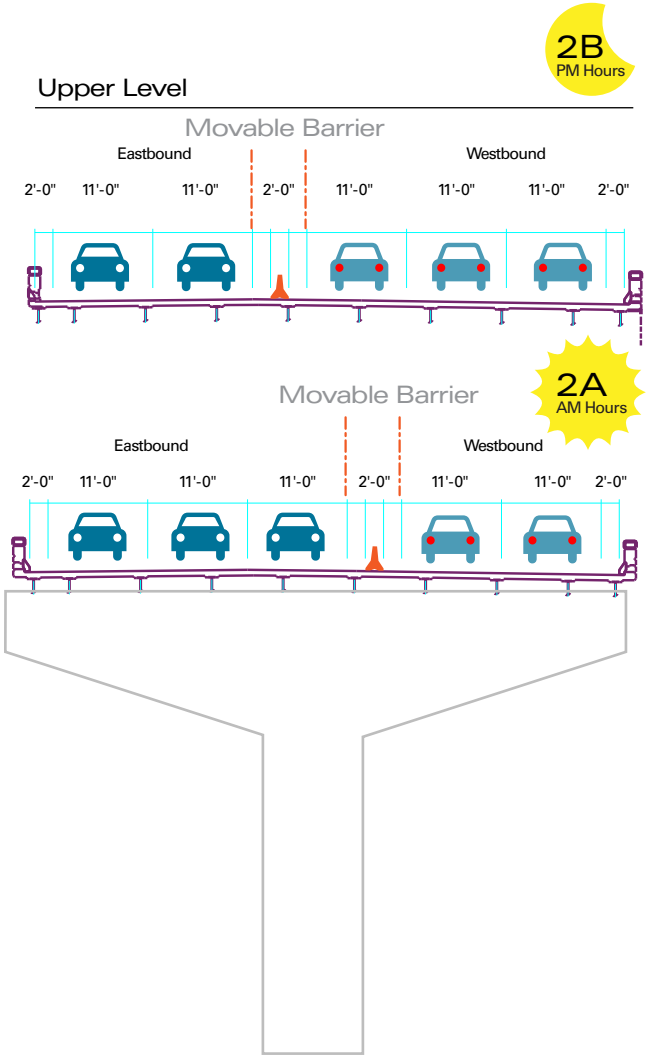


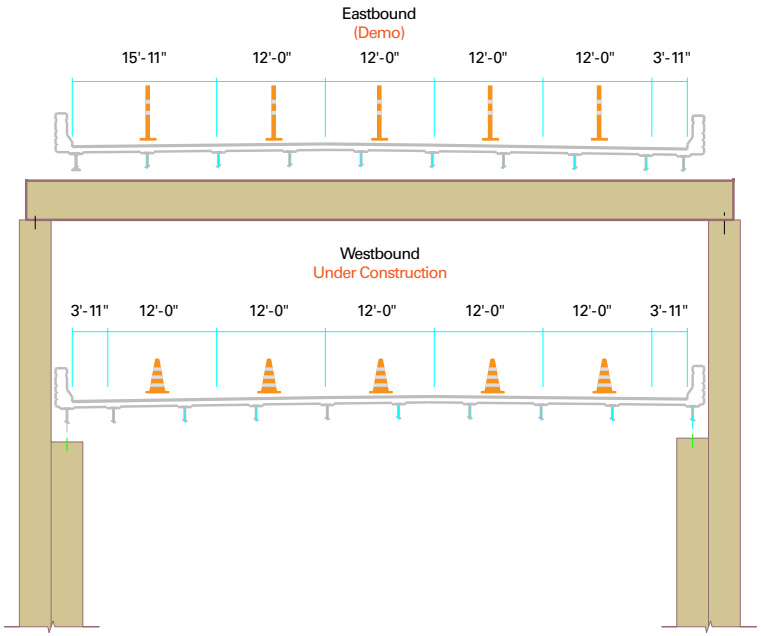


OPTION

A-3

STAGE 2A & 2B

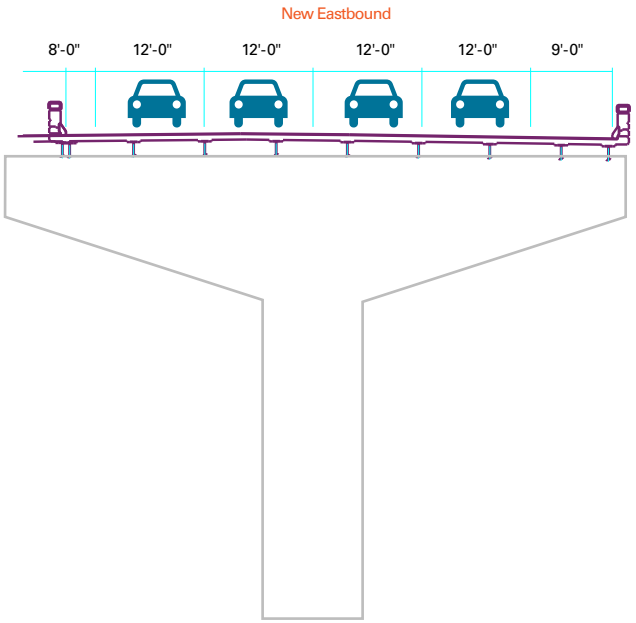


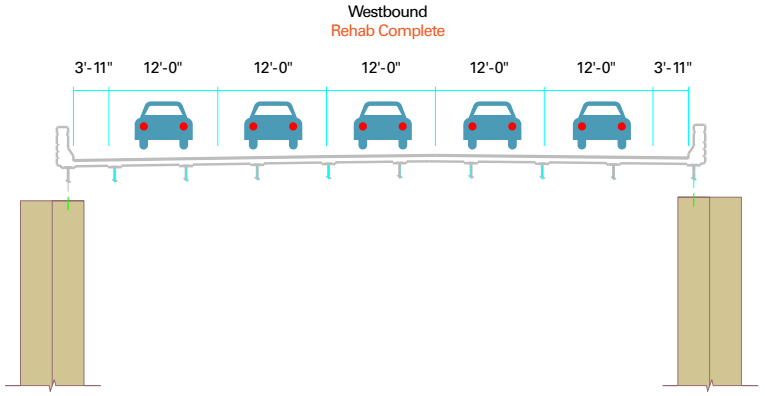


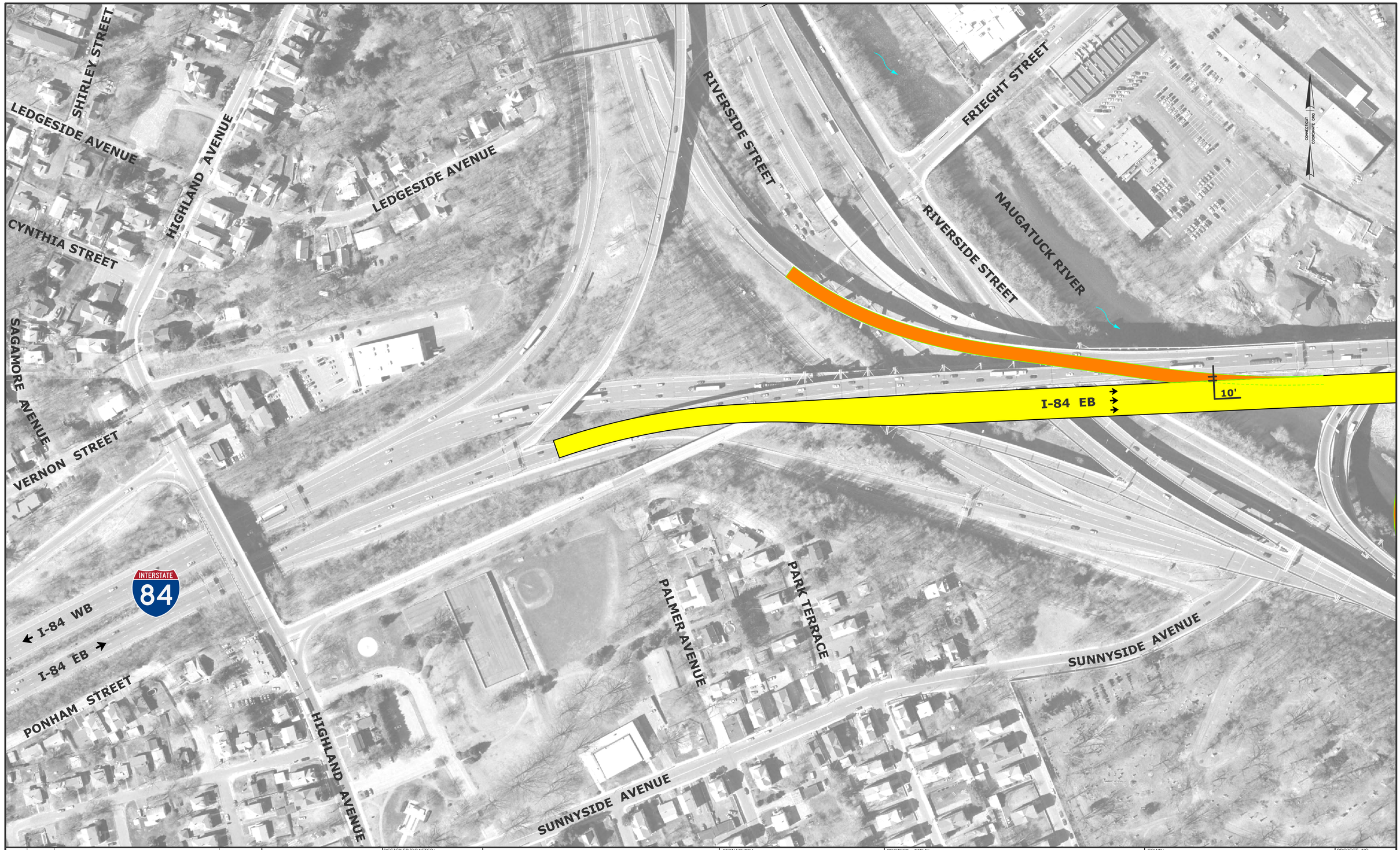
OPTION

A-3

STAGE 3







REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION A

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
- A-3 WEST

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
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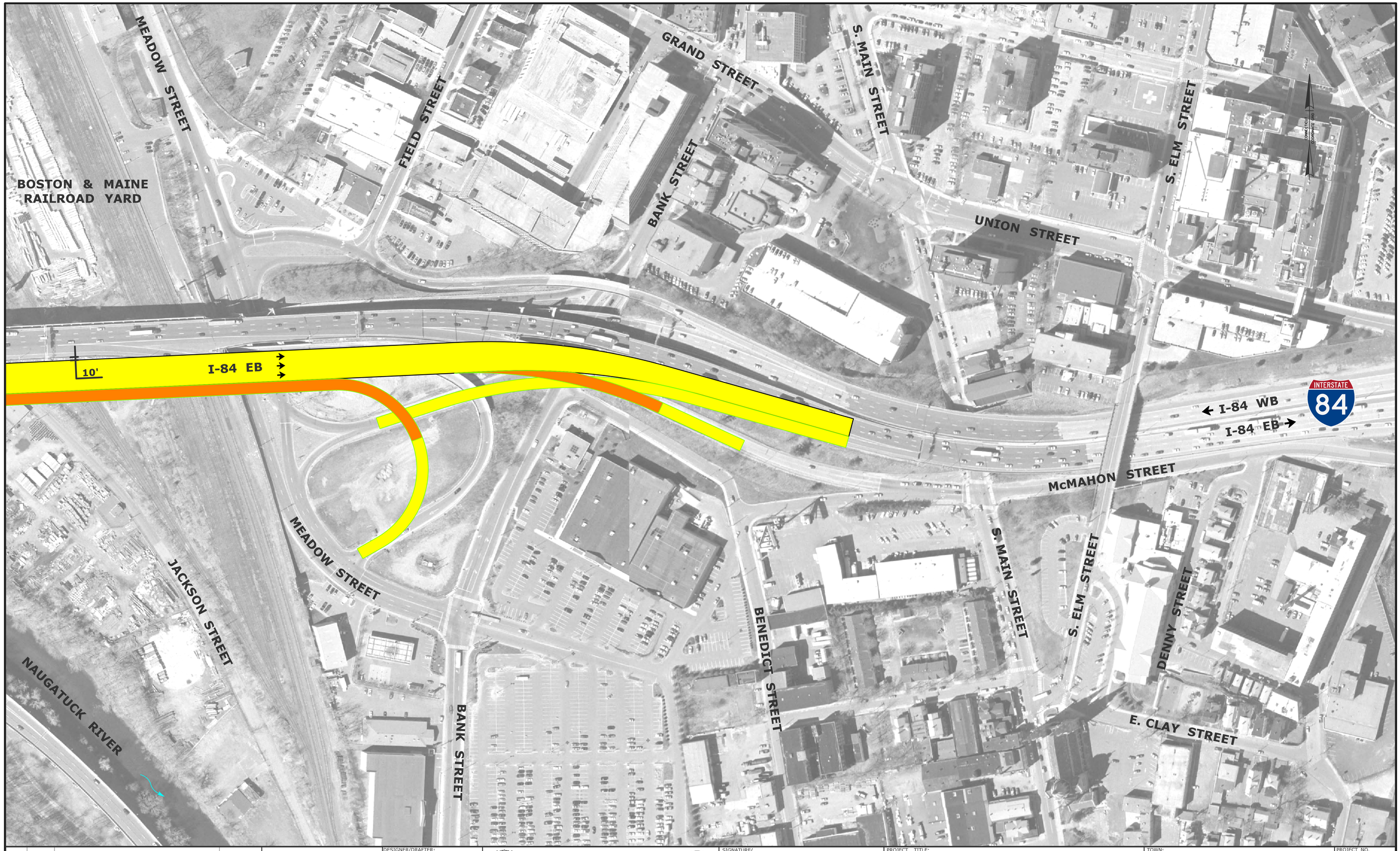

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER"- OPTION A

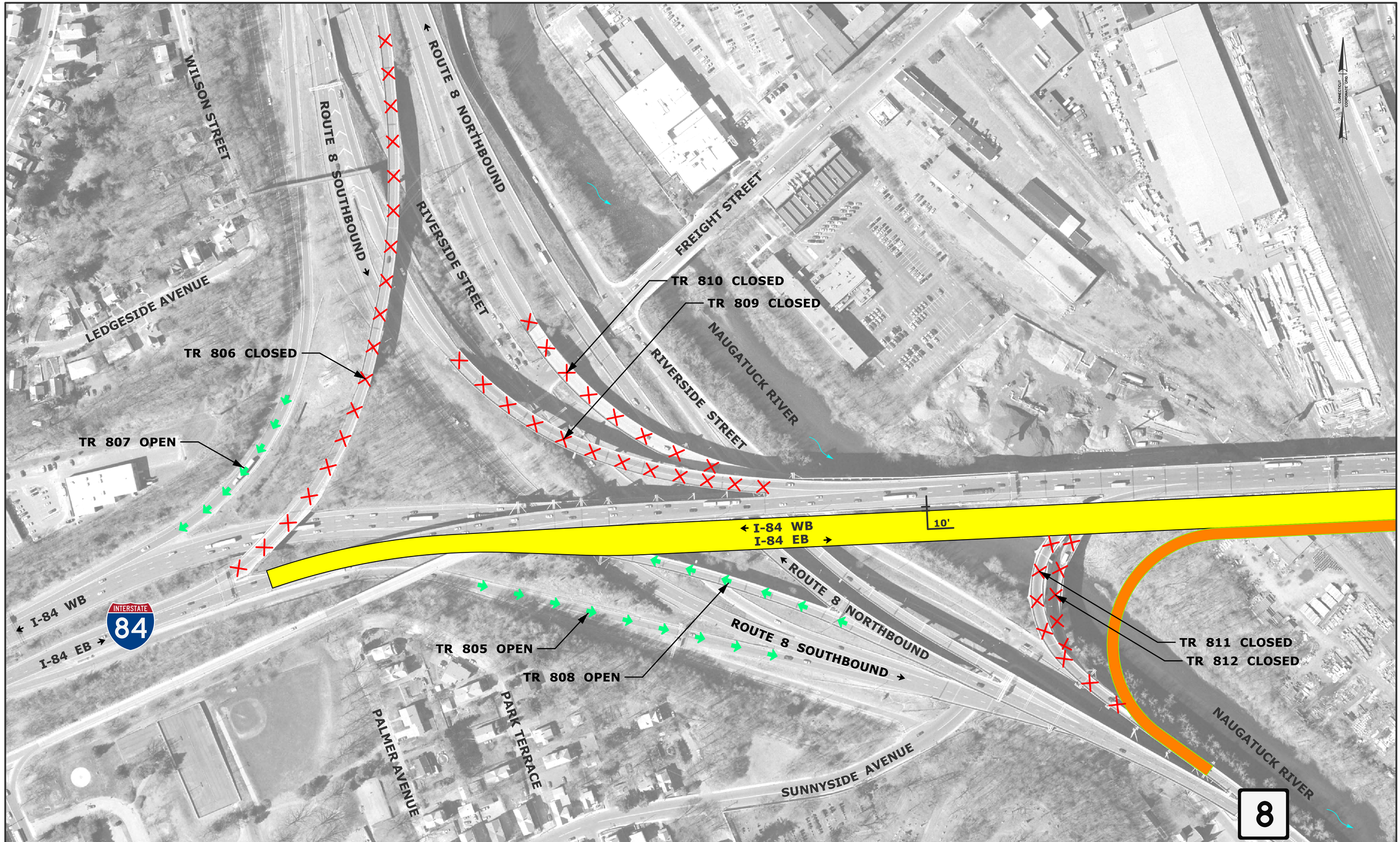
TOWN: **WATERBURY CONNECTICUT**

DRAWING TITLE: **- A-3 EAST**

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION A

TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
SYSTEM RAMPS DURING OPTION A

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
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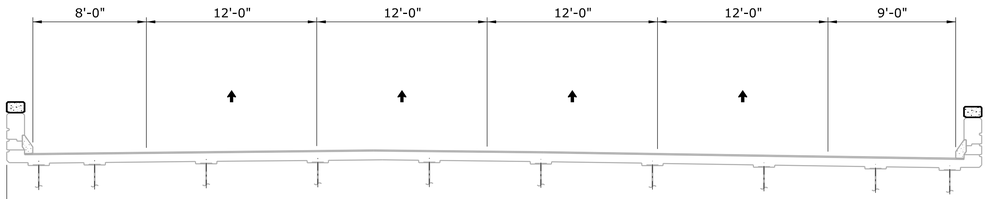
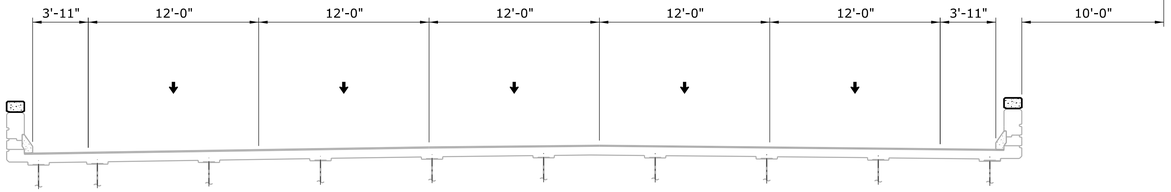


NEW I-84 EB



EXISTING I-84 WB

OPTION A-3
FINAL
LOOKING EAST

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: 8/22/2018

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\Br_03191A Cross Section Staging A-3_3.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER - OPTION A-3

TOWN: **WATERBURY CONNECTICUT**

DRAWING TITLE: - -

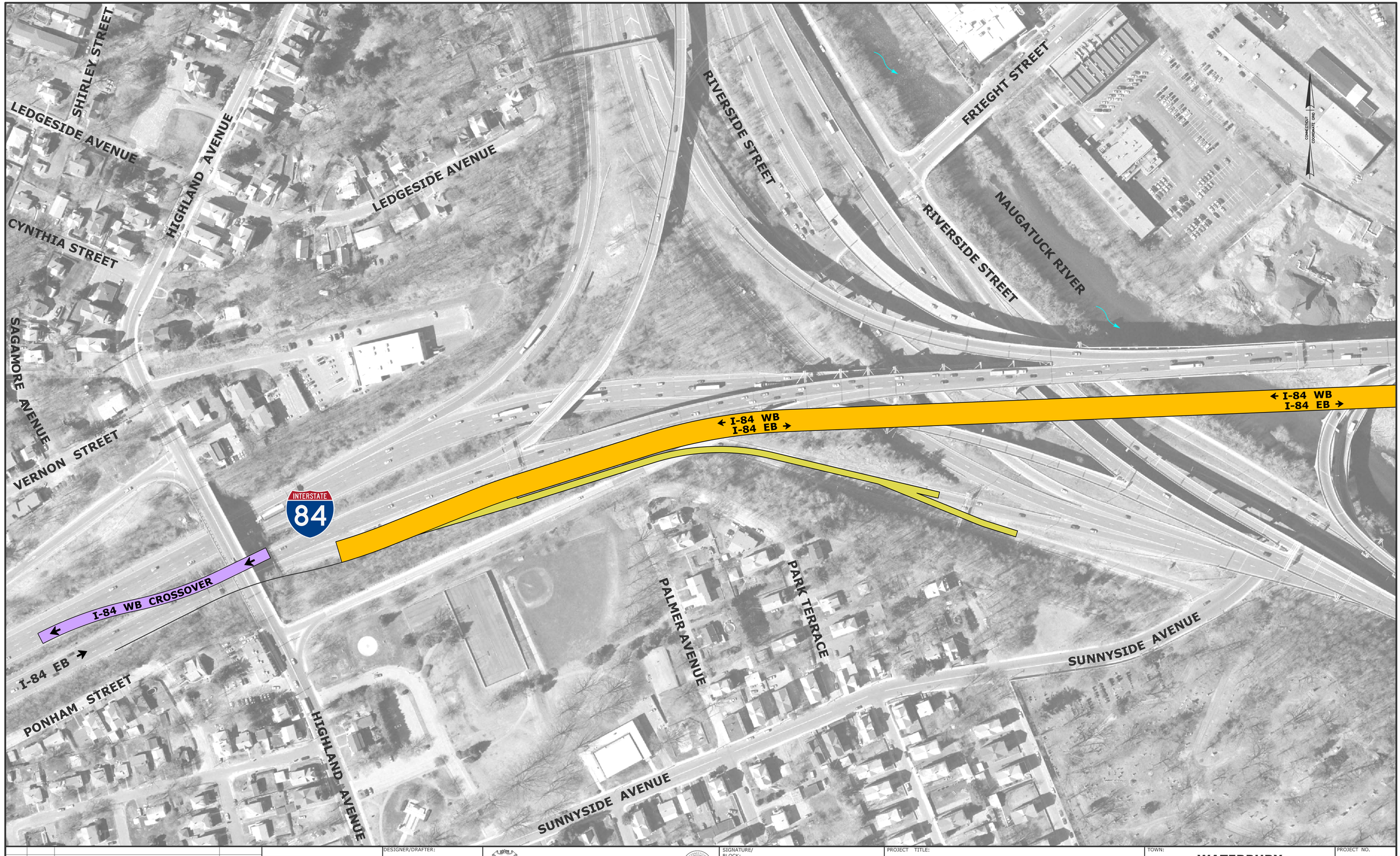
PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX F
Options B, C & E
C/D Roadway & Frontage Road



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
200 100 0 200
SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

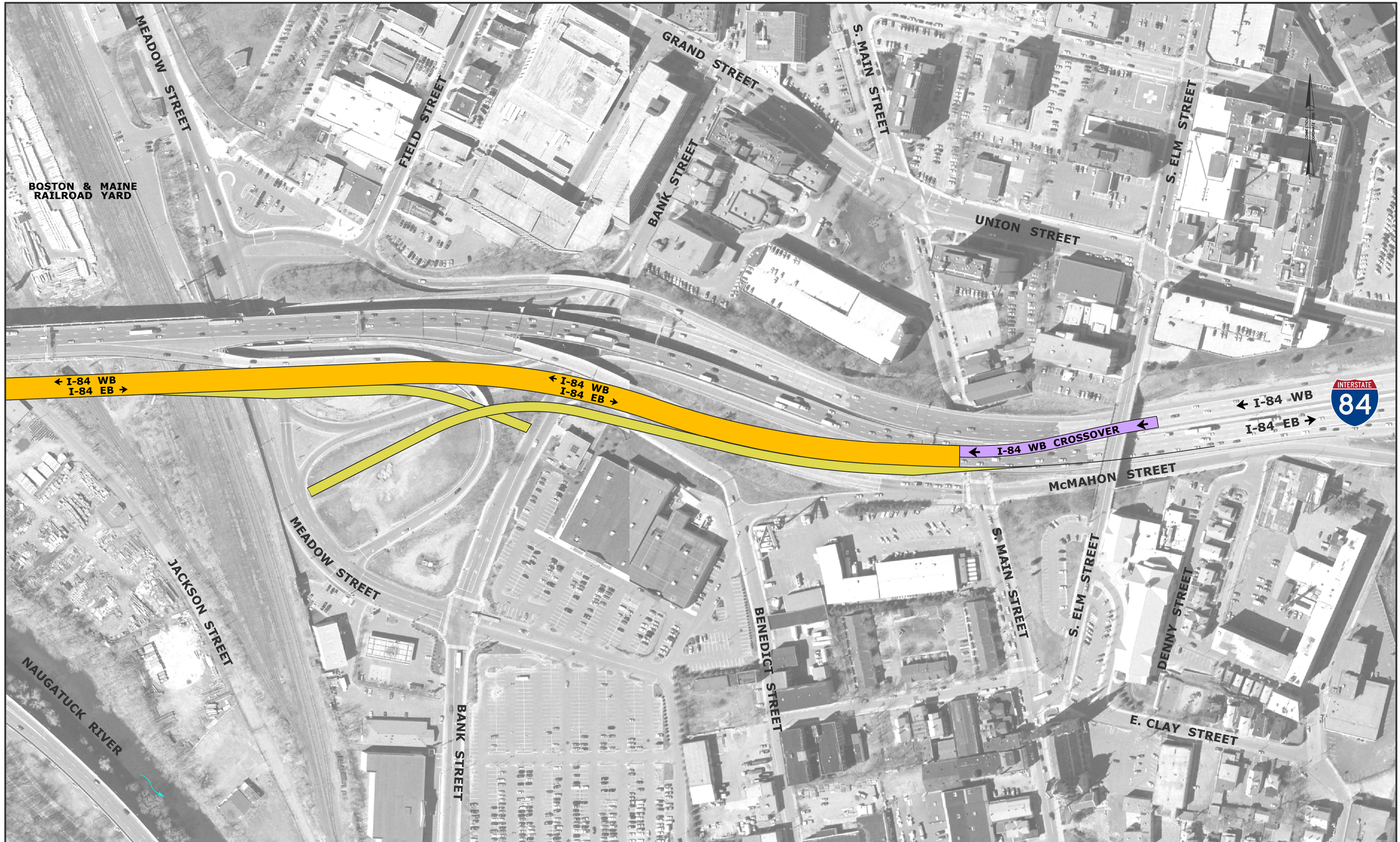
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
- C-D NIGHT TIME WEST

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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-	-	-	-

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
200 100 0 200
SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

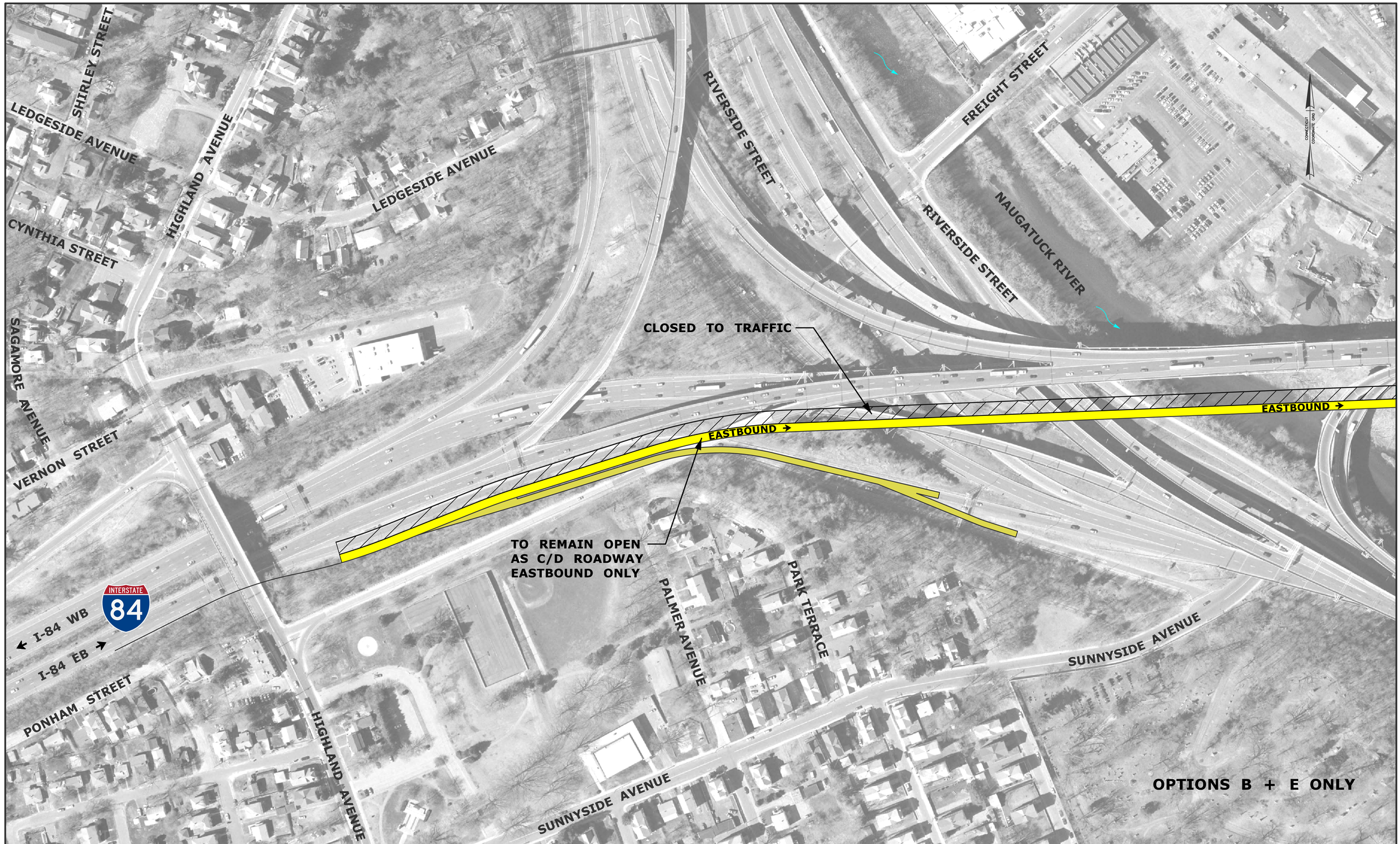
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
- C-D NIGHT TIME EAST

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
200 100 0 200
SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
-
C-D DAYTIME WEST

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
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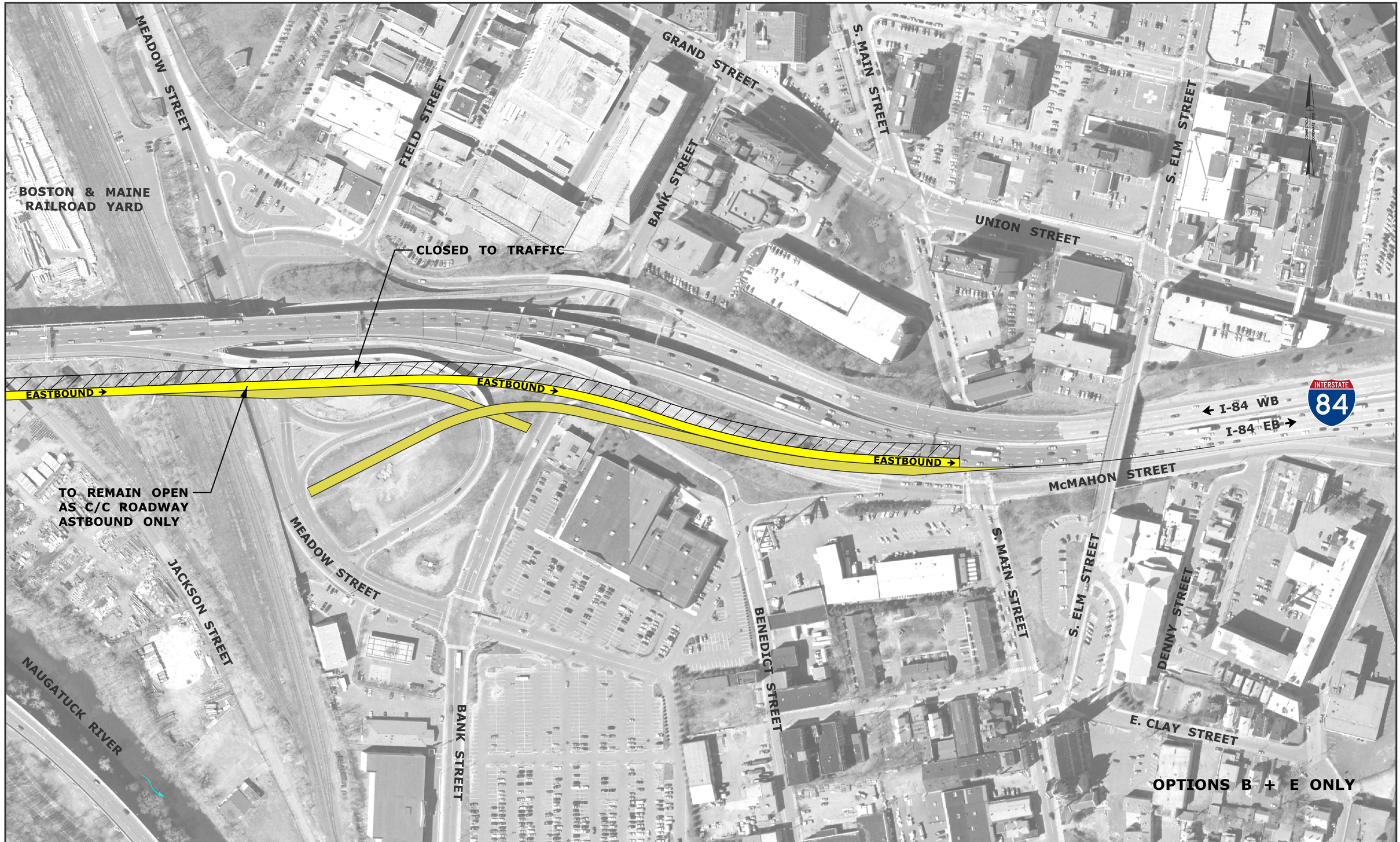

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

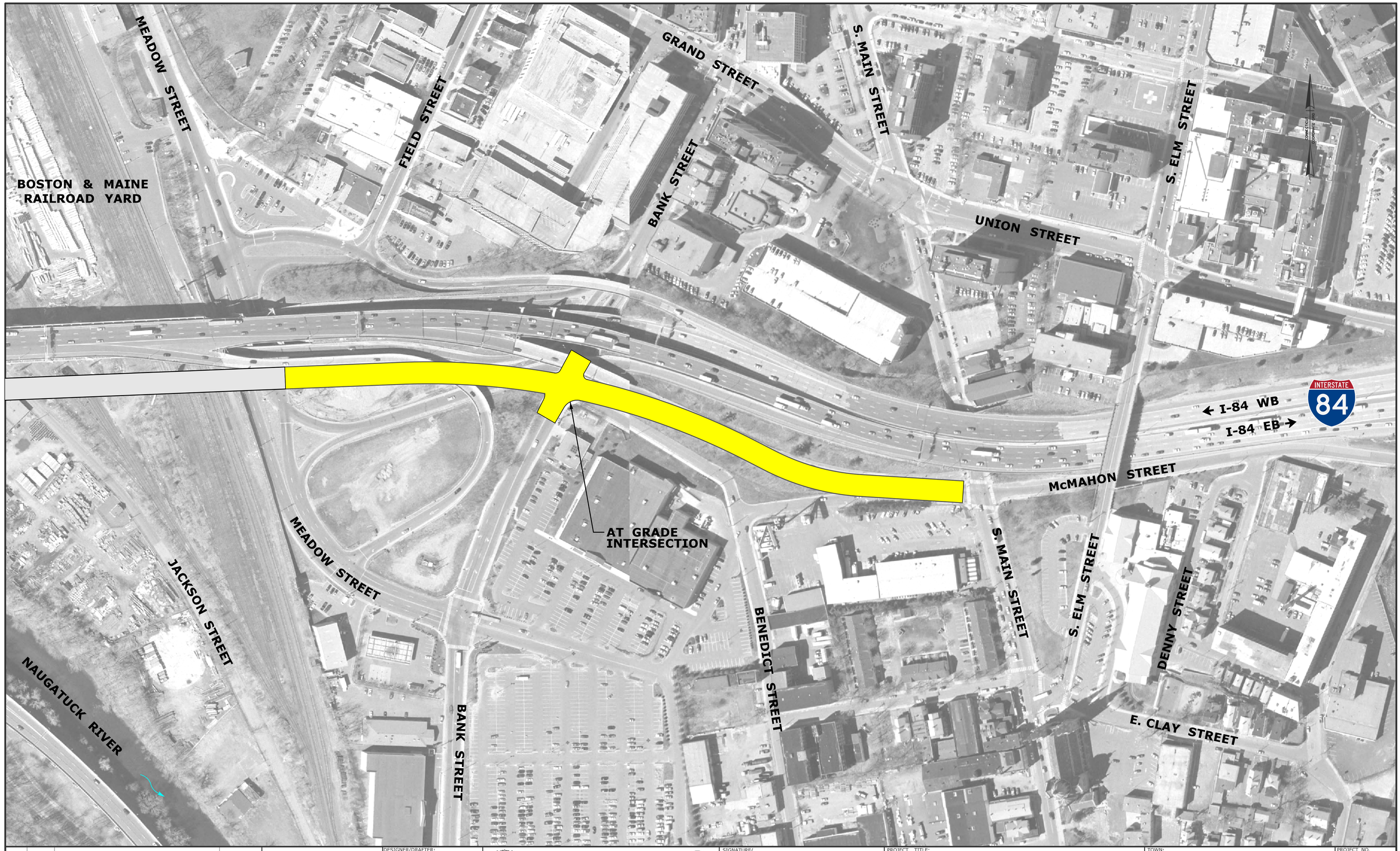
TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
-
C-D DAYTIME EAST

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
200 100 0 200
SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTIONS

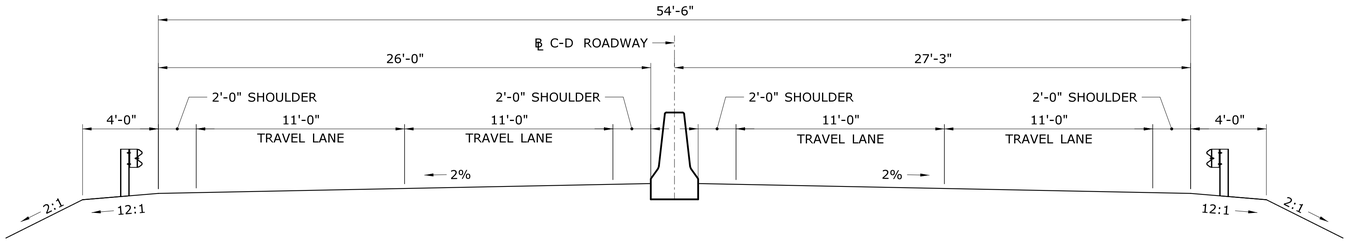
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
- FRONTAGE ROADWAY

PROJECT NO. 0151-0331

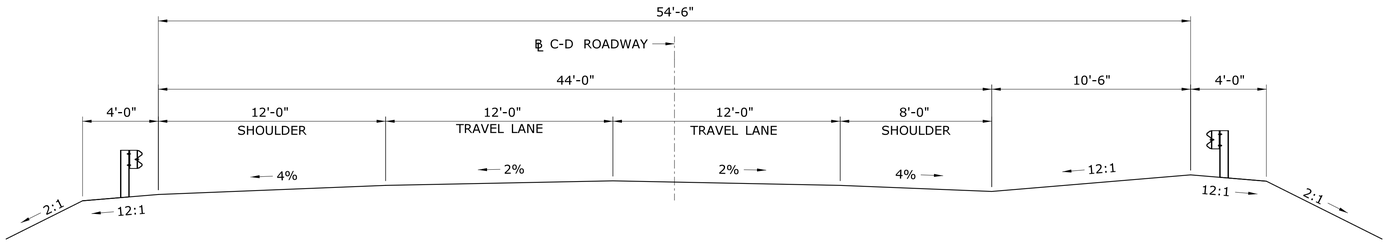
DRAWING NO. -

SHEET NO. -



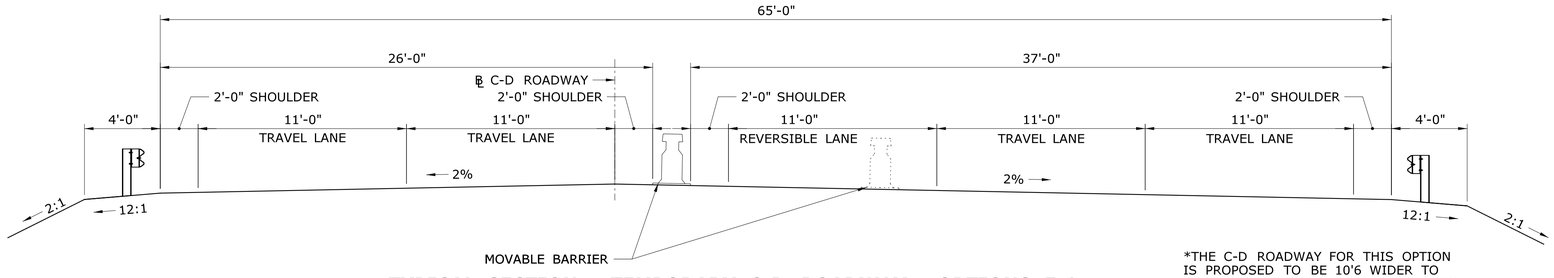
TYPICAL SECTION - TEMPORARY C-D ROADWAY

SCALE: 1/4" = 1'-0"



TYPICAL SECTION - FINAL C-D ROADWAY

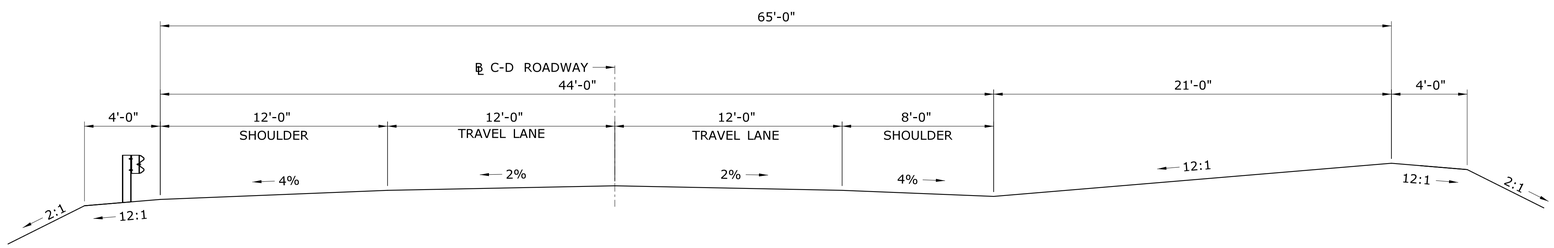
SCALE: 1/4" = 1'-0"



TYPICAL SECTION - TEMPORARY C-D ROADWAY - OPTIONS E-1

SCALE: 1/4" = 1'-0"

*THE C-D ROADWAY FOR THIS OPTION IS PROPOSED TO BE 10'6 WIDER TO ACCOMOMODATE FIVE (5) TRAVEL LANES TO ALLOW FOR LONGER CLOSURE PERIODS OF INTERSTATE 84.



TYPICAL SECTION - FINAL C-D ROADWAY - OPTIONS E-1

SCALE: 1/4" = 1'-0"

REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: 10/16/2018

DESIGNER/DRAFTER: D. LOGAN

CHECKED BY: D. SCHWEITZER

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MkMaster_FCA_(C-D) Section Sheet.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
INTERSTATE-84 & ROUTE 8 INTERCHANGE RECONFIGURATION CONCEPTS

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
C-D ROADWAY CONCEPT TYPICAL SECTION

PROJECT NO.
151-331

DRAWING NO.
-

SHEET NO.
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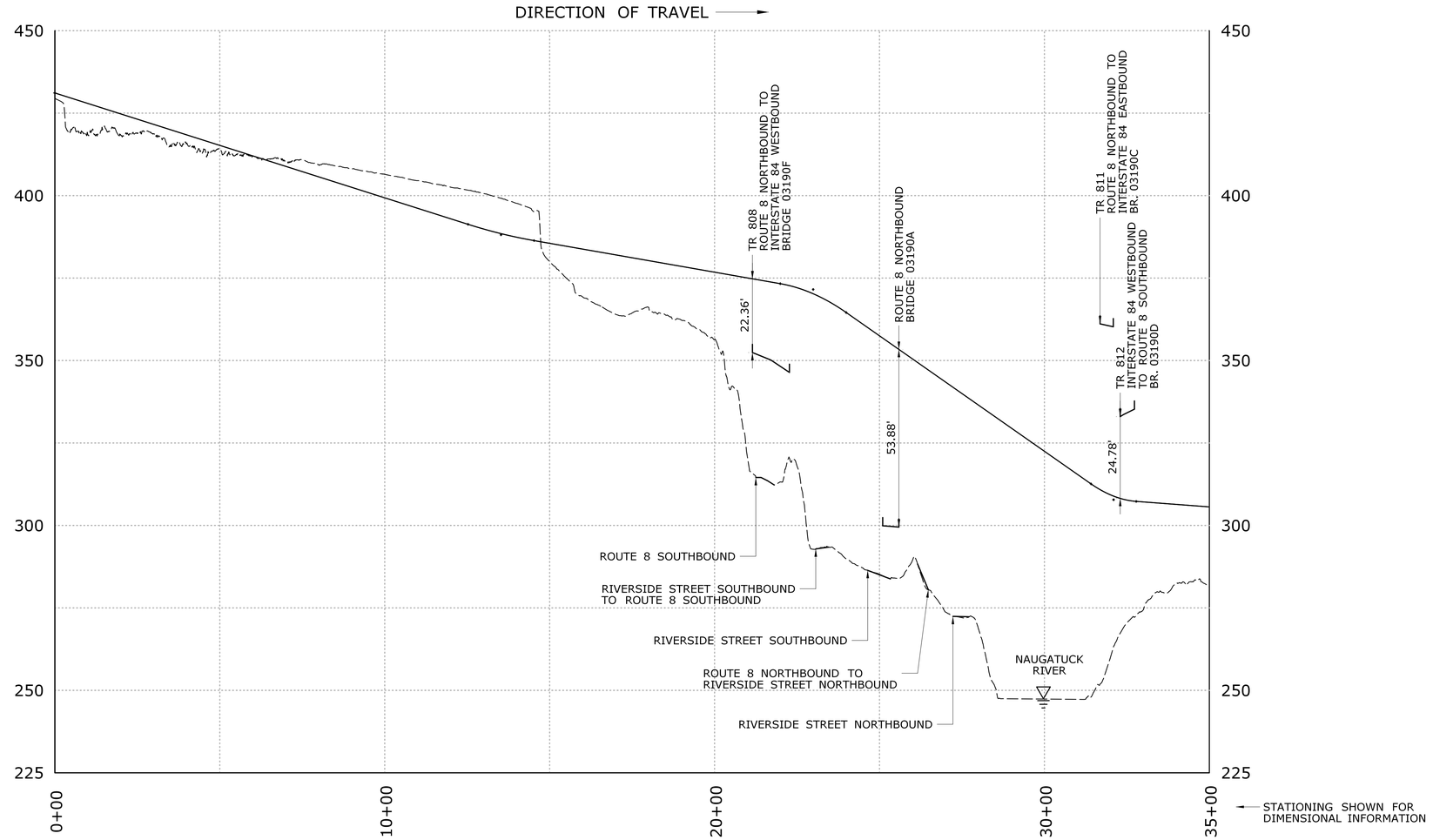

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 10/1/2018

DESIGNER/DRAFTER: Z.HELLYAR

CHECKED BY: D.SCHWEITZER

HORIZ. SCALE IN FEET
0 200 400

VERT. SCALE IN FEET
0 20 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\C-D Roadway-West Concept Sht.dgn

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE - 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - "C/D ROADWAY"

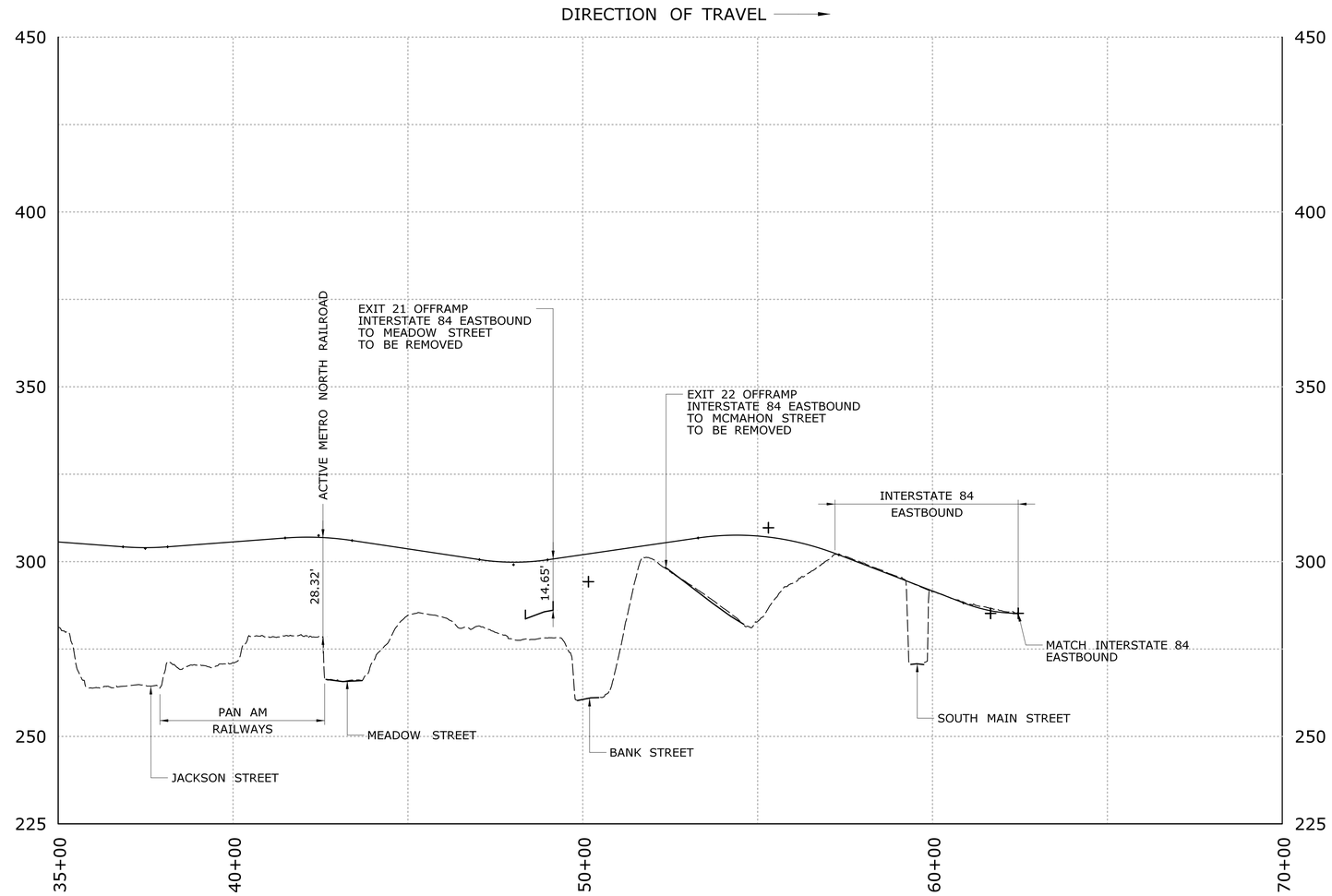
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
C-D ROADWAY CONCEPT WEST SIDE

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.



REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: 10/1/2018

DESIGNER/DRAFTER: Z.HELLYAR

CHECKED BY: D.SCHWEITZER

HORIZ. SCALE IN FEET
0 200 400

VERT. SCALE IN FEET
0 20 40

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\C-D Roadway-East Concept Sht.dgn

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE - 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - "C/D ROADWAY"

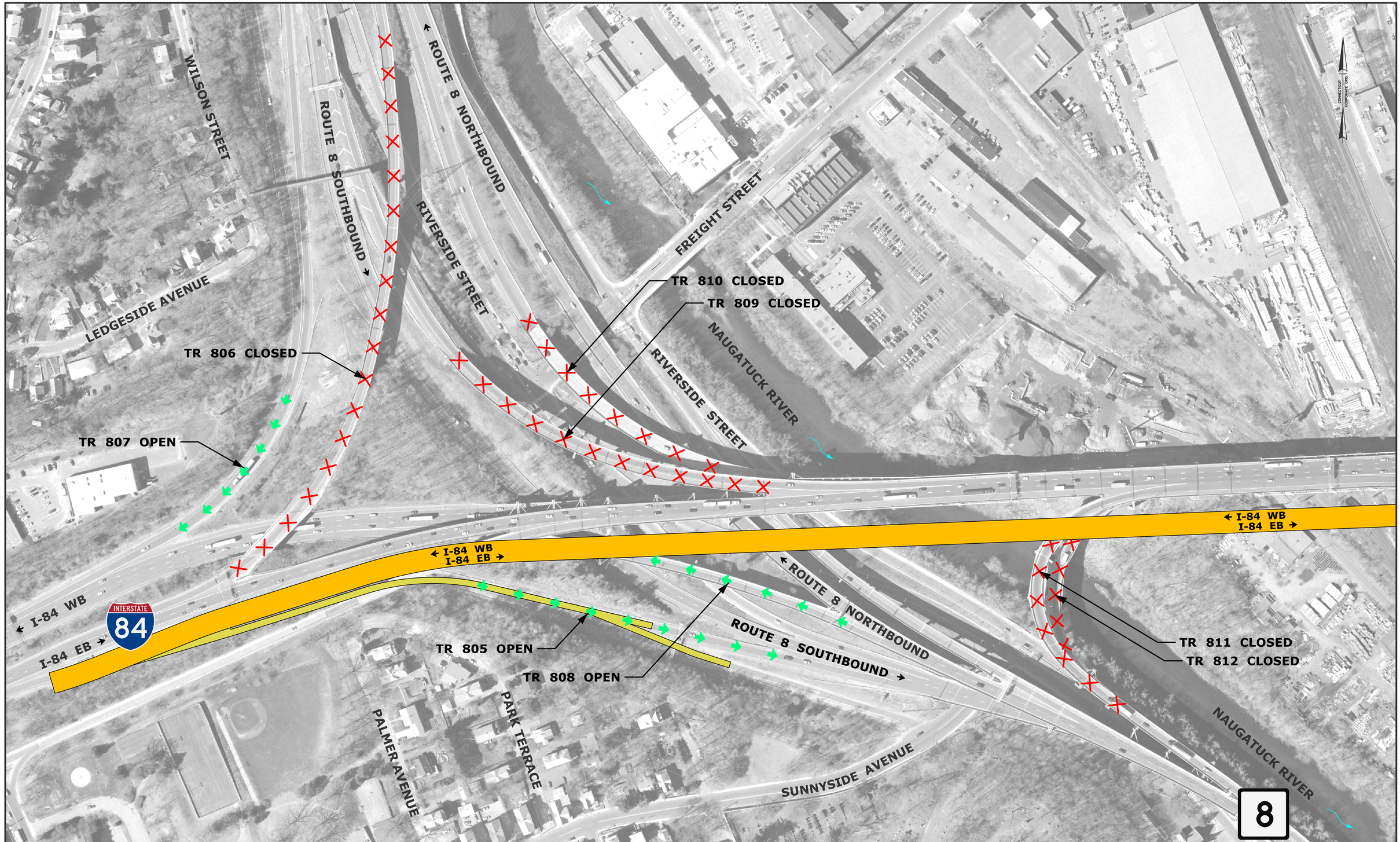
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
C-D ROADWAY CONCEPT EAST SIDE

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION B

TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
SYSTEM RAMPS DURING OPTION B

PROJECT NO.
0151-0331

DRAWING NO.
-

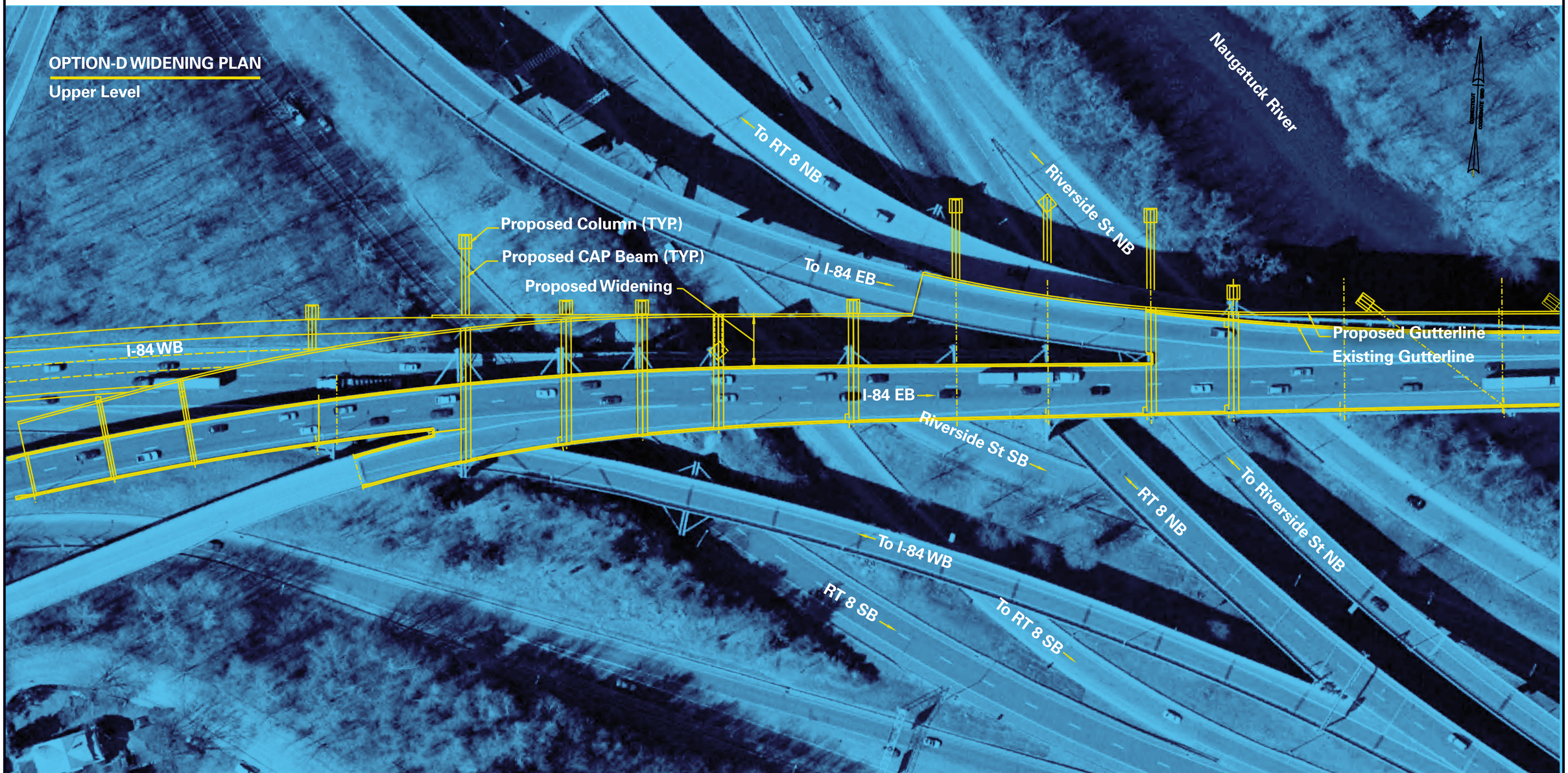
SHEET NO.
-

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX G
Option D

OPTION-D WIDENING PLAN

Upper Level



BRIDGE 03191A WIDENING PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/10/2018

DESIGNER/DRAFTER: -

CHECKED BY: -

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
BRIDGE 03191A WIDENING PLAN 1

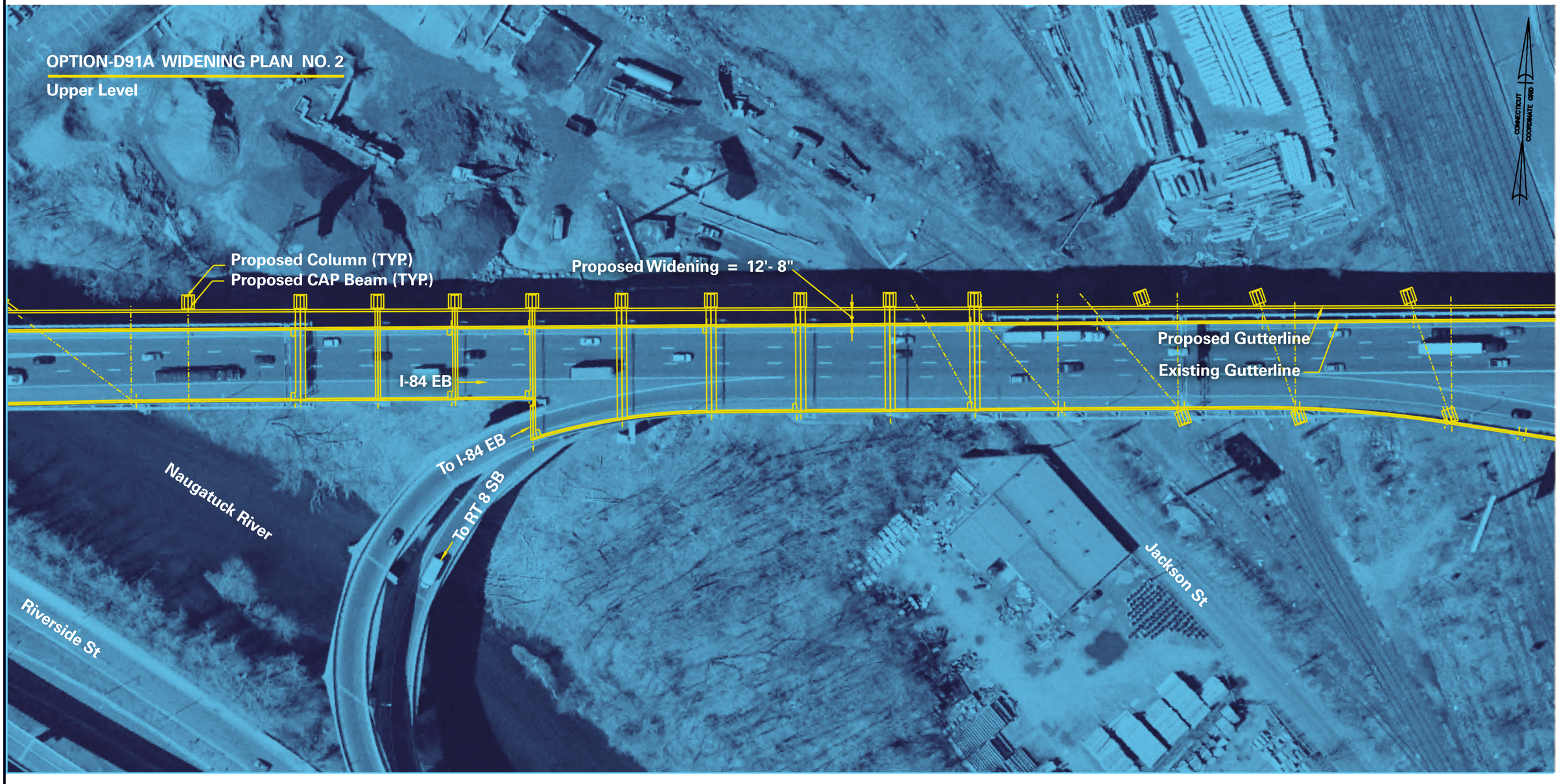
PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.

OPTION-D91A WIDENING PLAN NO. 2

Upper Level



BRIDGE 03191A WIDENING PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/18/2018

DESIGNER/DRAFTER: -

CHECKED BY: -

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

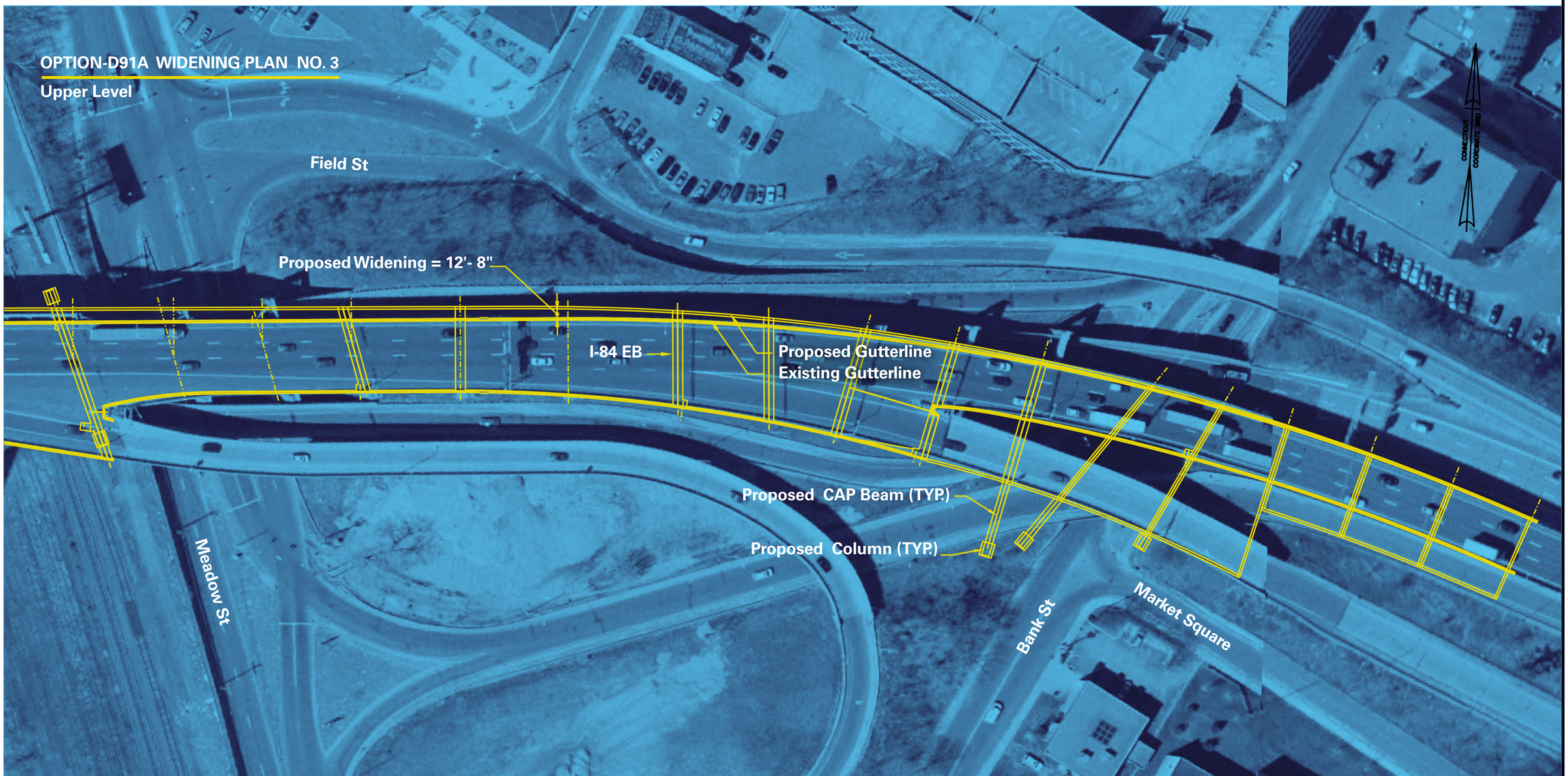
TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
BRIDGE 03191A WIDENING PLAN 2

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.



BRIDGE 03191A WIDENING PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/16/2018

DESIGNER/DRAFTER: -

CHECKED BY: -

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

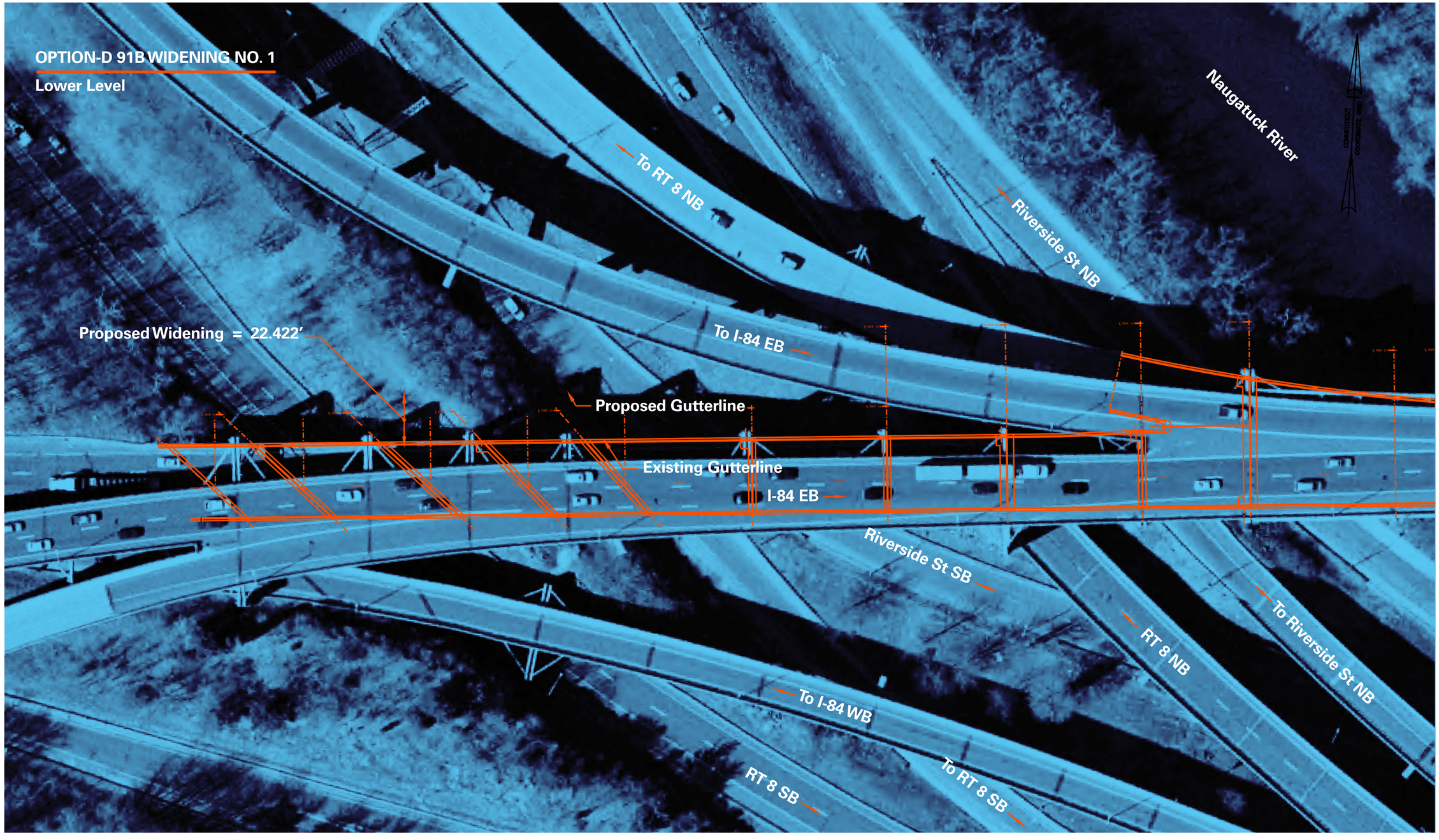
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191A WIDENING PLAN 3

PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO.



BRIDGE 03191B WIDENING PLAN

SCALE: 1" = 30'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91B 7-12-18 layout .dgn

SIGNATURE/ BLOCK:

PROJECT TITLE: RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191B WIDENING PLAN 1

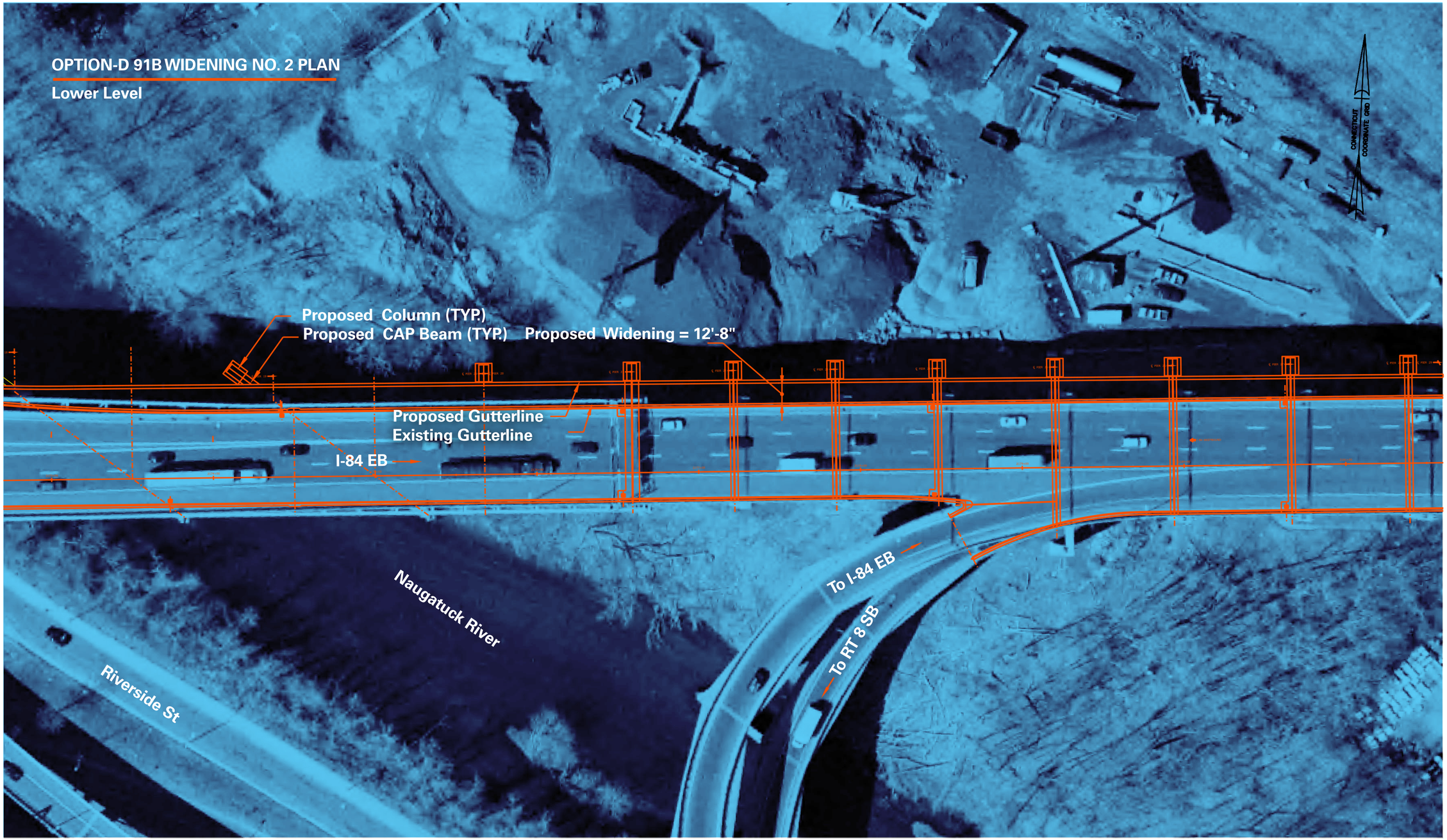
PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.

OPTION-D 91B WIDENING NO. 2 PLAN

Lower Level



BRIDGE 03191B WIDENING PLAN

SCALE: 1" = 30'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/18/2018

DESIGNER/DRAFTER: T. ADINOLFI

CHECKED BY: M. KUCHAS

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91B Pebble$ layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191B WIDENING PLAN 2

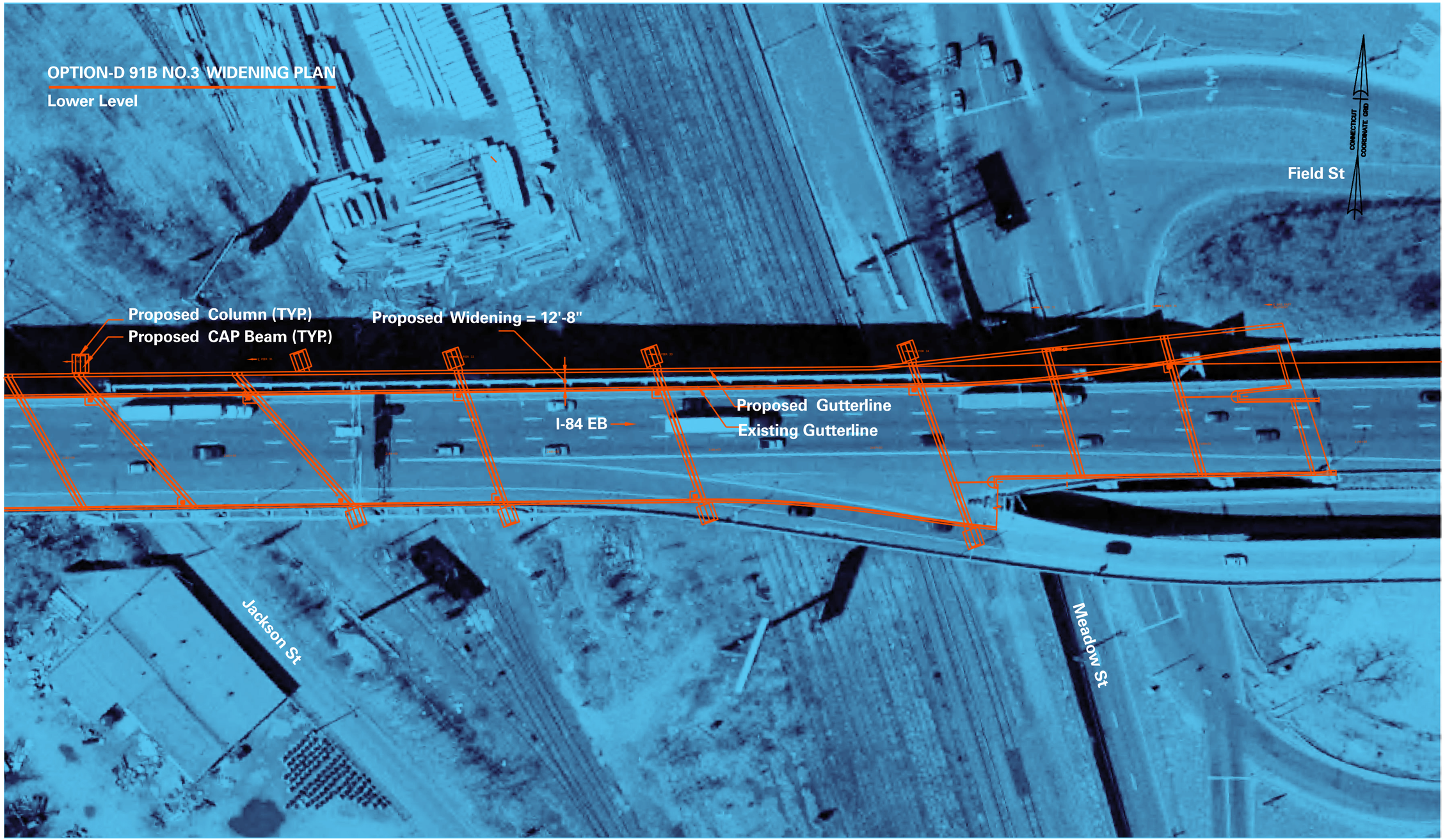
PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.

OPTION-D 91B NO.3 WIDENING PLAN

Lower Level



BRIDGE 03191B WIDENING PLAN

SCALE: 1" = 30'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/16/2018

DESIGNER/DRAFTER: T. ADINOLFI

CHECKED BY: M. KUCHAS

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option D 91B Feb2018 Layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

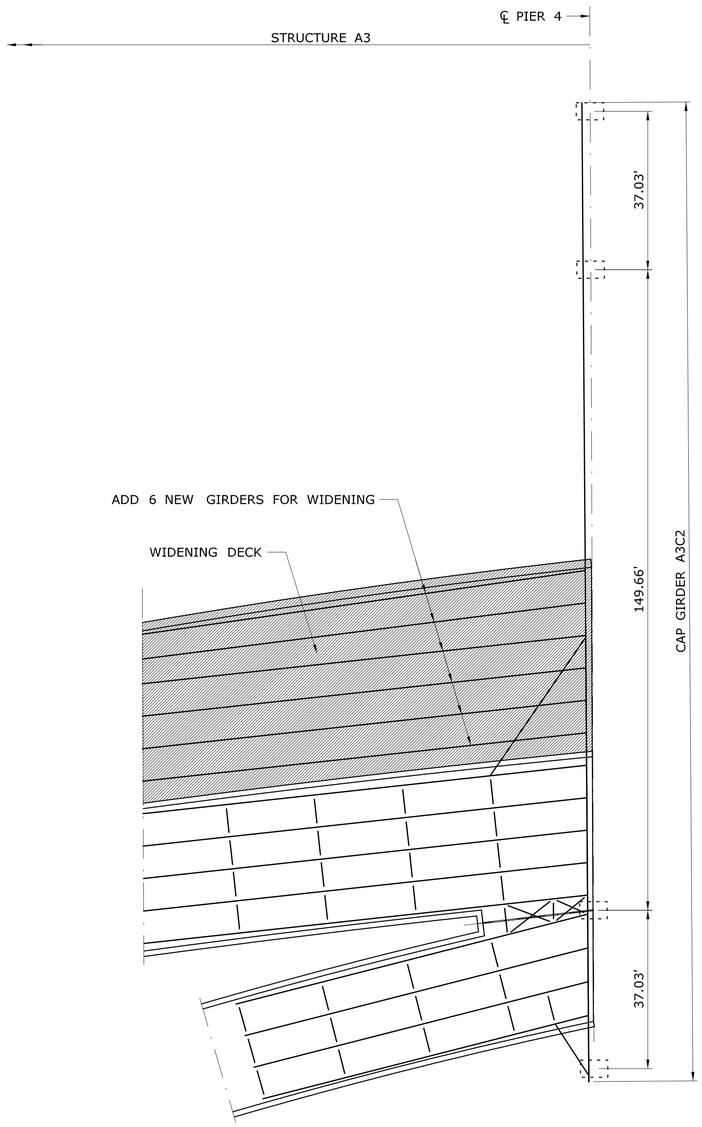
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191B WIDENING PLAN 3

PROJECT NO. 0151-0331

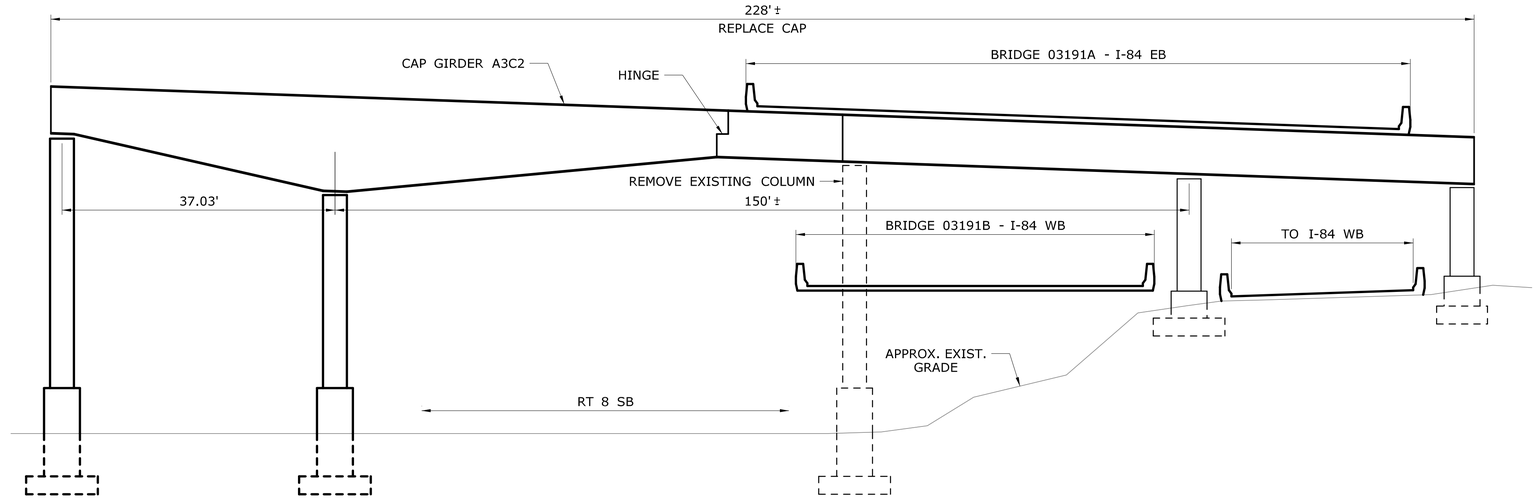
DRAWING NO.

SHEET NO.



FRAMING PLAN - 03191A STRUCTURE A3
N.T.S.

CONNECTICUT COORDINATE GRID



PIER 4 CAP GIRDER A3C2 WEST ELEVATION
N.T.S.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

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Plotted Date: $DATE$

DESIGNER/DRAFTER: -
CHECKED BY: -
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

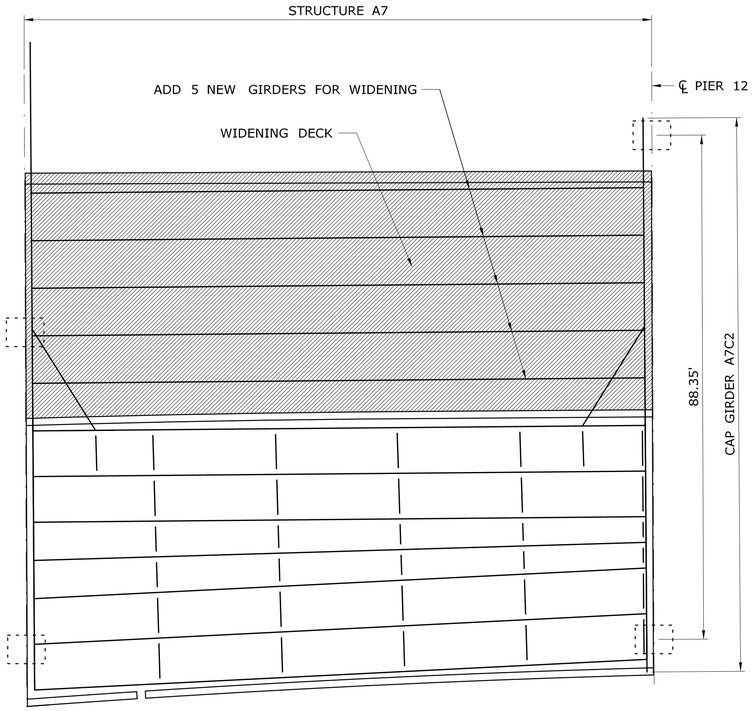
PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

TOWN: **WATERBURY CONNECTICUT**

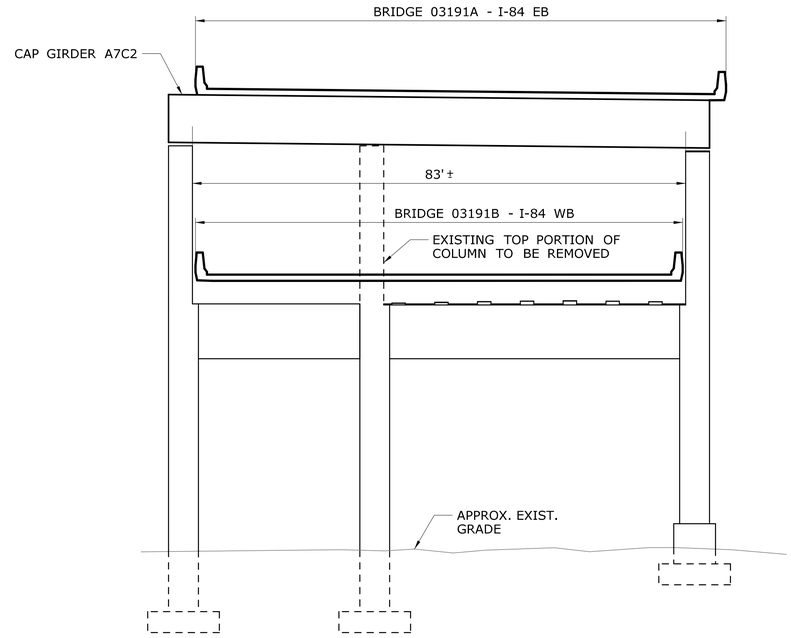
DRAWING TITLE: **BRIDGE 03191A PIER 4**

PROJECT NO. -
DRAWING NO. -
SHEET NO.





FRAMING PLAN - 03191A STRUCTURE A7
N.T.S.



PIER 12 CAP GIRDER A7C2 WEST ELEVATION
N.T.S.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: -

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

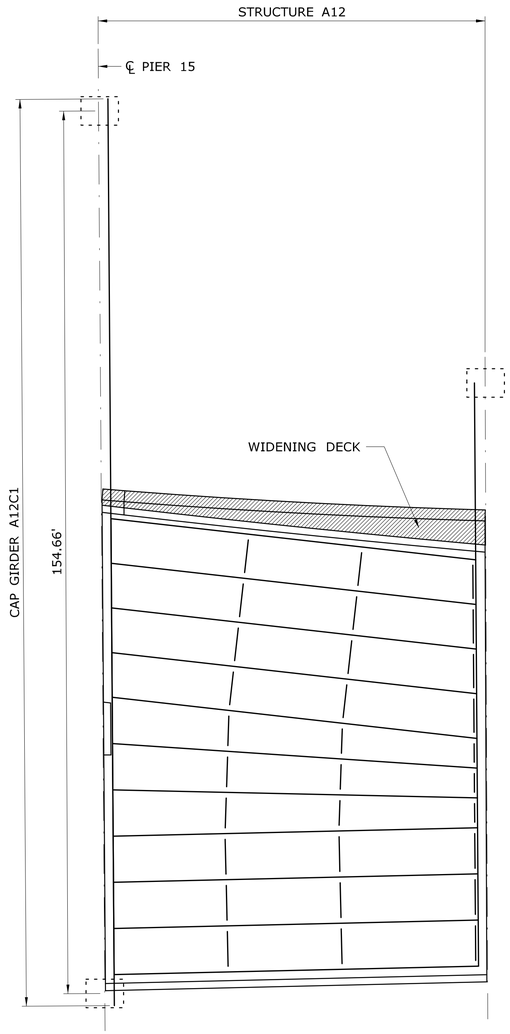
TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
BRIDGE 03191A PIER 12

PROJECT NO. -

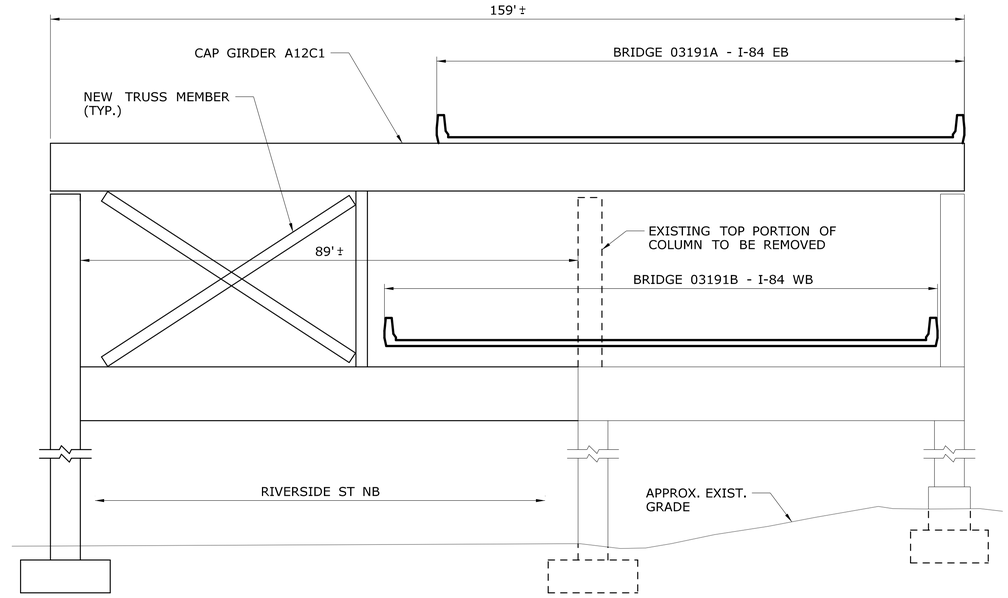
DRAWING NO. -

SHEET NO.



FRAMING PLAN - 03191A STRUCTURE A12
N.T.S.

CONNECTICUT COORDINATE GRID



PIER 15 CAP GIRDER A12C1 WEST ELEVATION
N.T.S.

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -
CHECKED BY: -
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION D

TOWN: **WATERBURY CONNECTICUT**

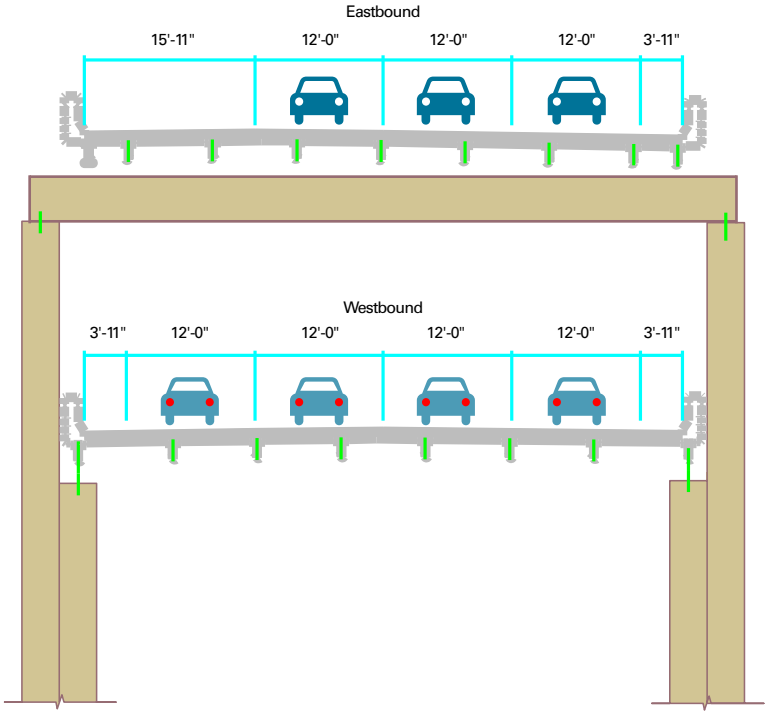
DRAWING TITLE: **BRIDGE 03191A PIER 15**

PROJECT NO. -
DRAWING NO. -
SHEET NO.

OPTION

D

EXISTING
CONDITION

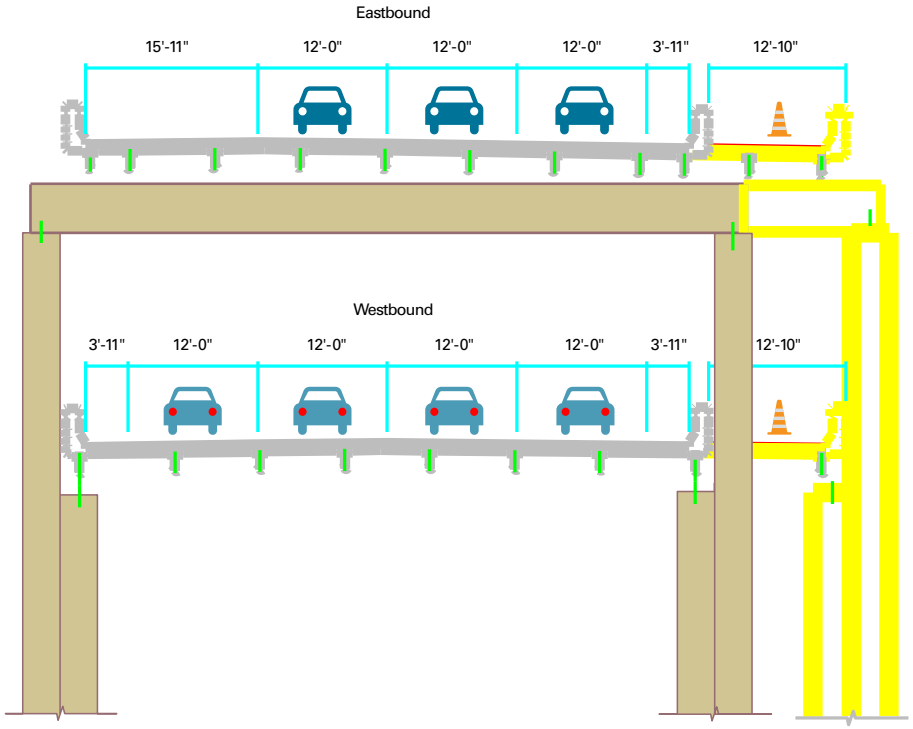


OPTION

D

STAGE

1A

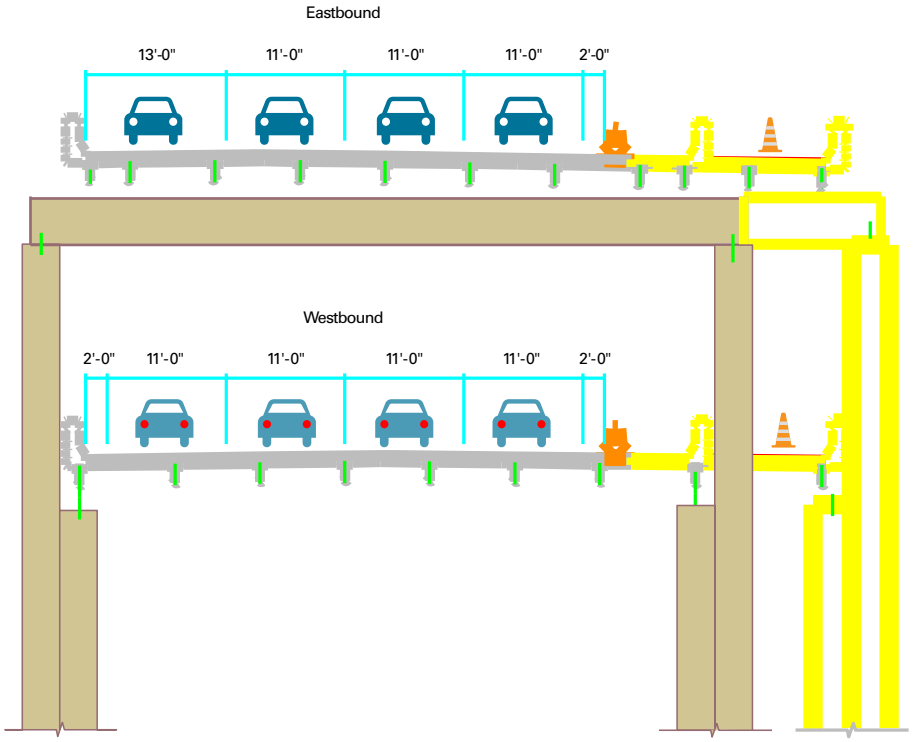


OPTION

D

STAGE

1B

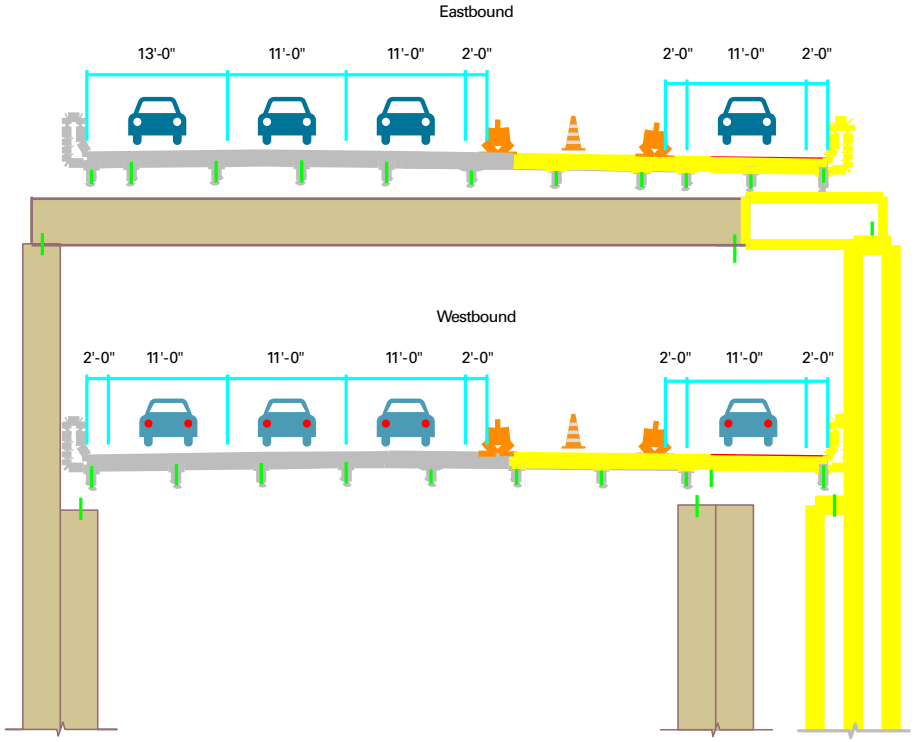


OPTION

D

STAGE

1C

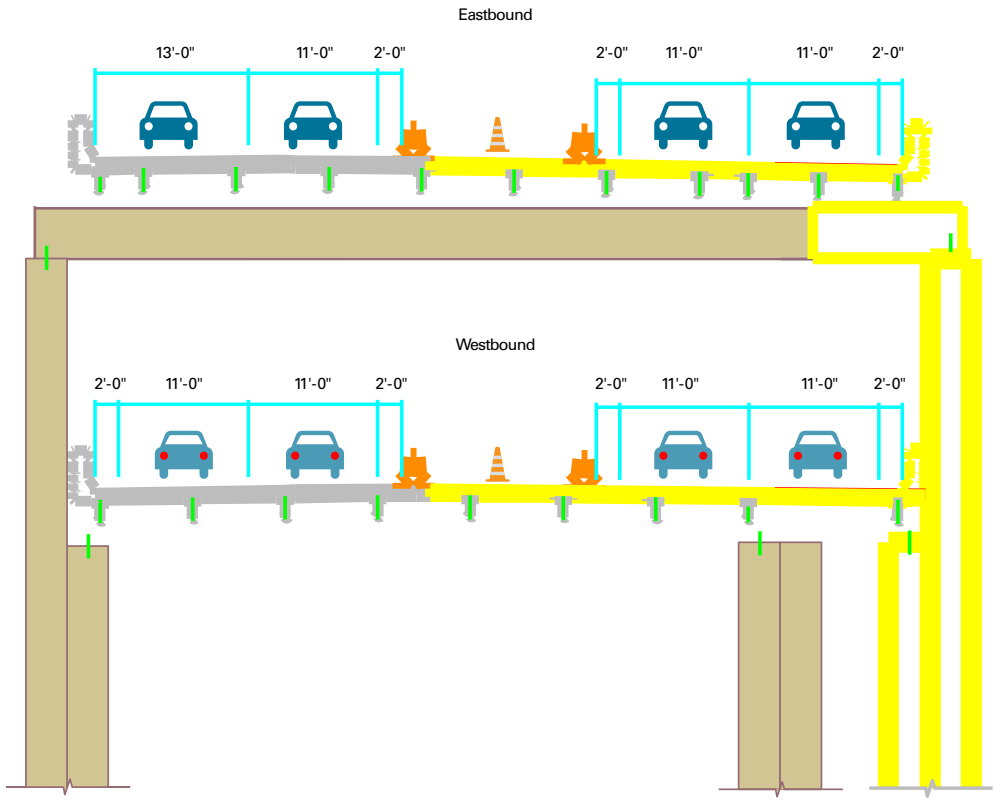


OPTION

D

STAGE

2



OPTION

D

STAGE

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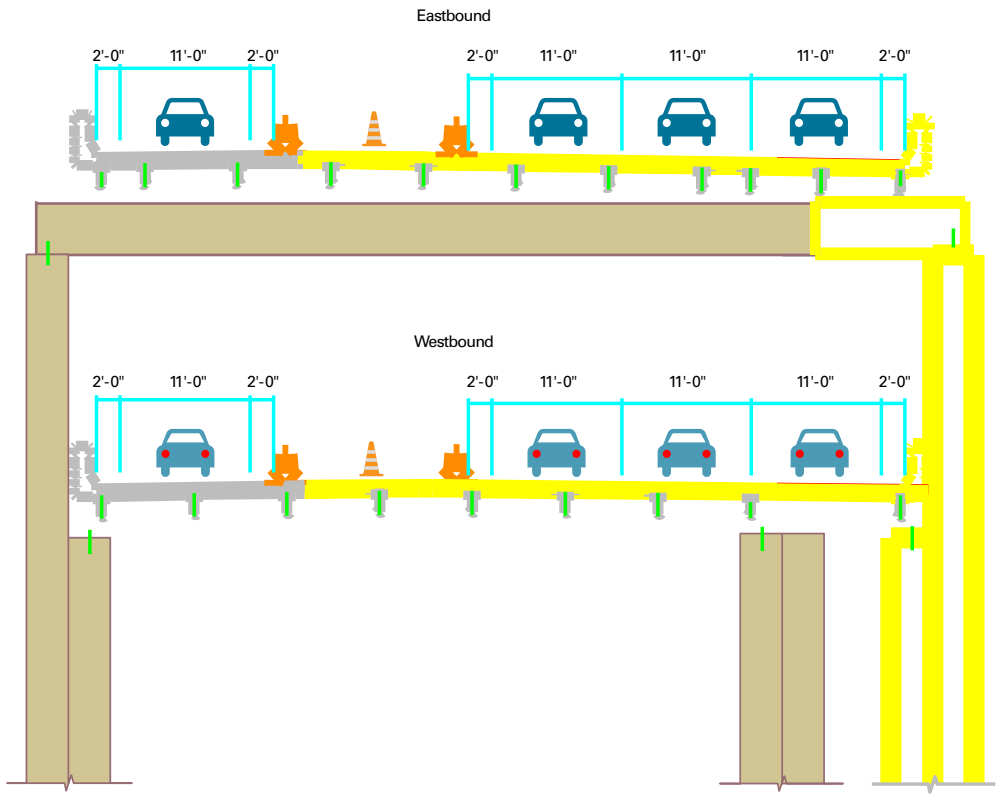
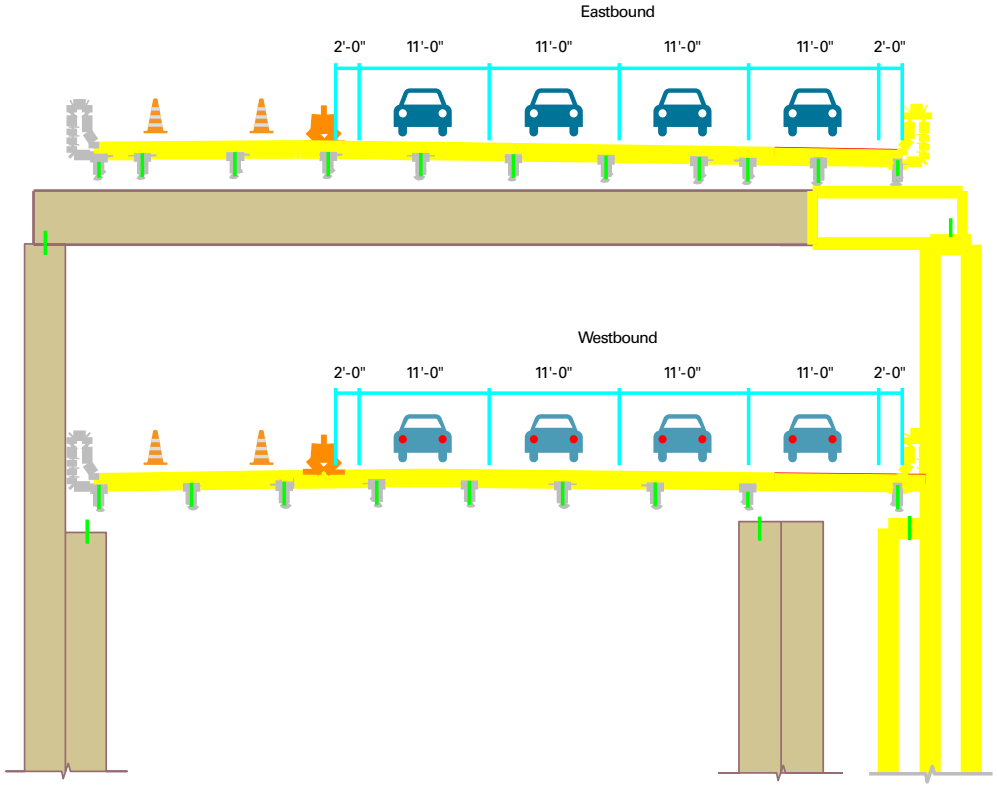


OPTION

D

STAGE

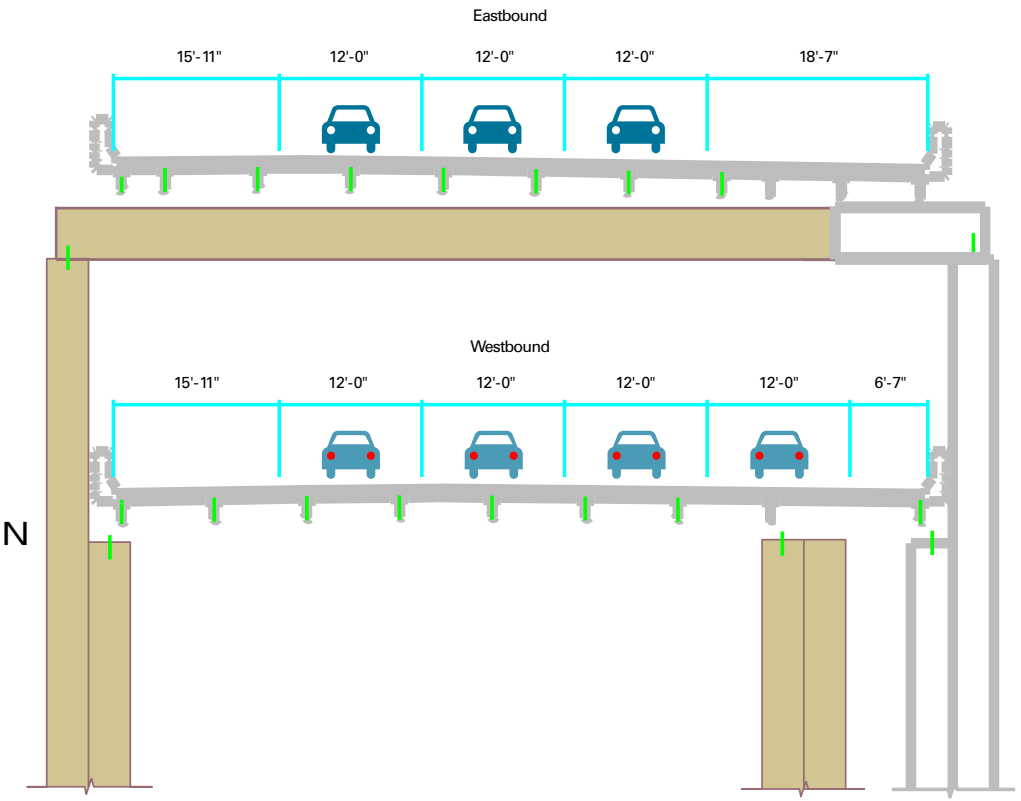
4

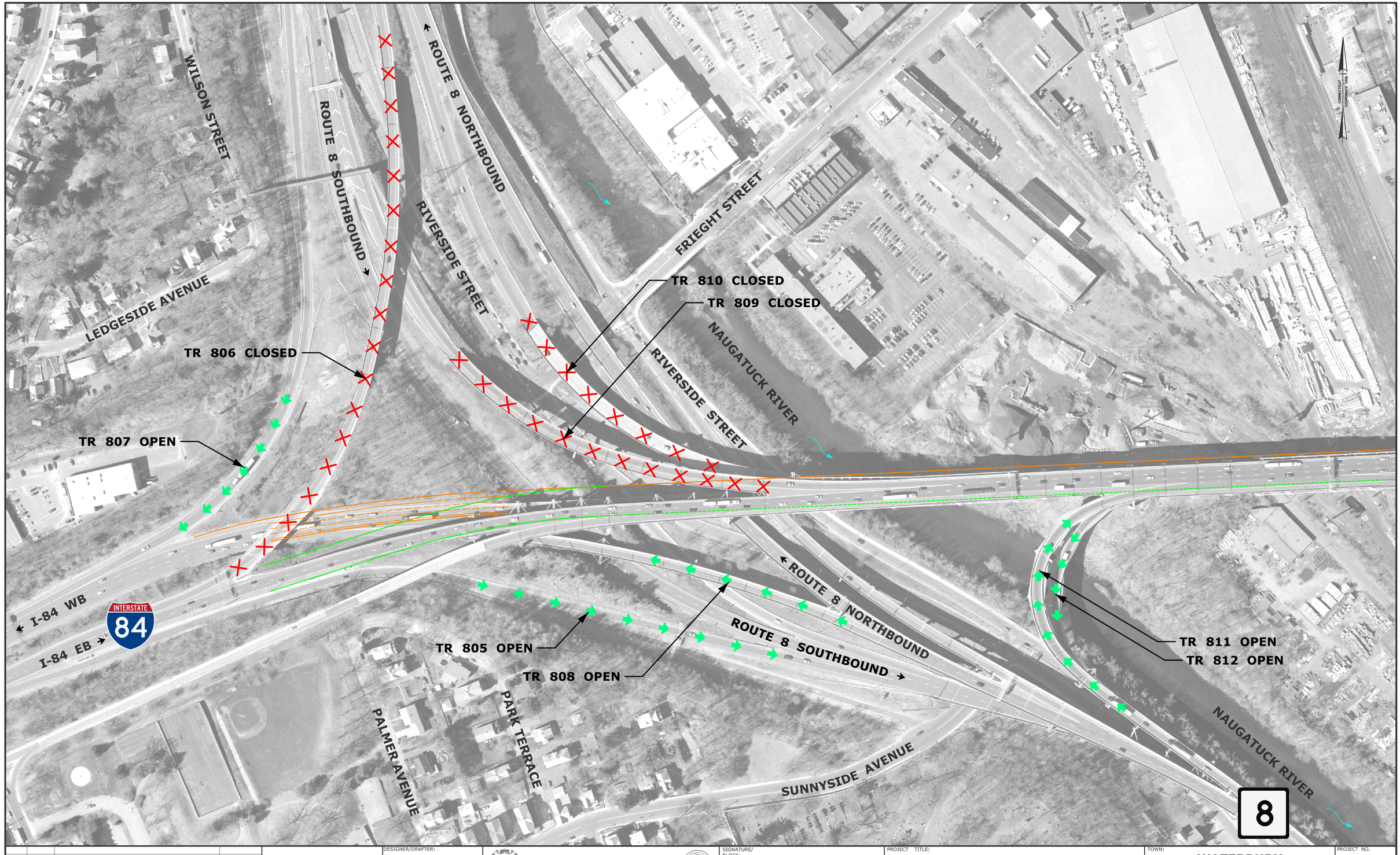


OPTION

D

FINAL CONDITION





REV.		DATE	REVISION DESCRIPTION	SHEET NO.
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-	-	-		-

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION A

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
SYSTEM RAMPS DURING OPTION D

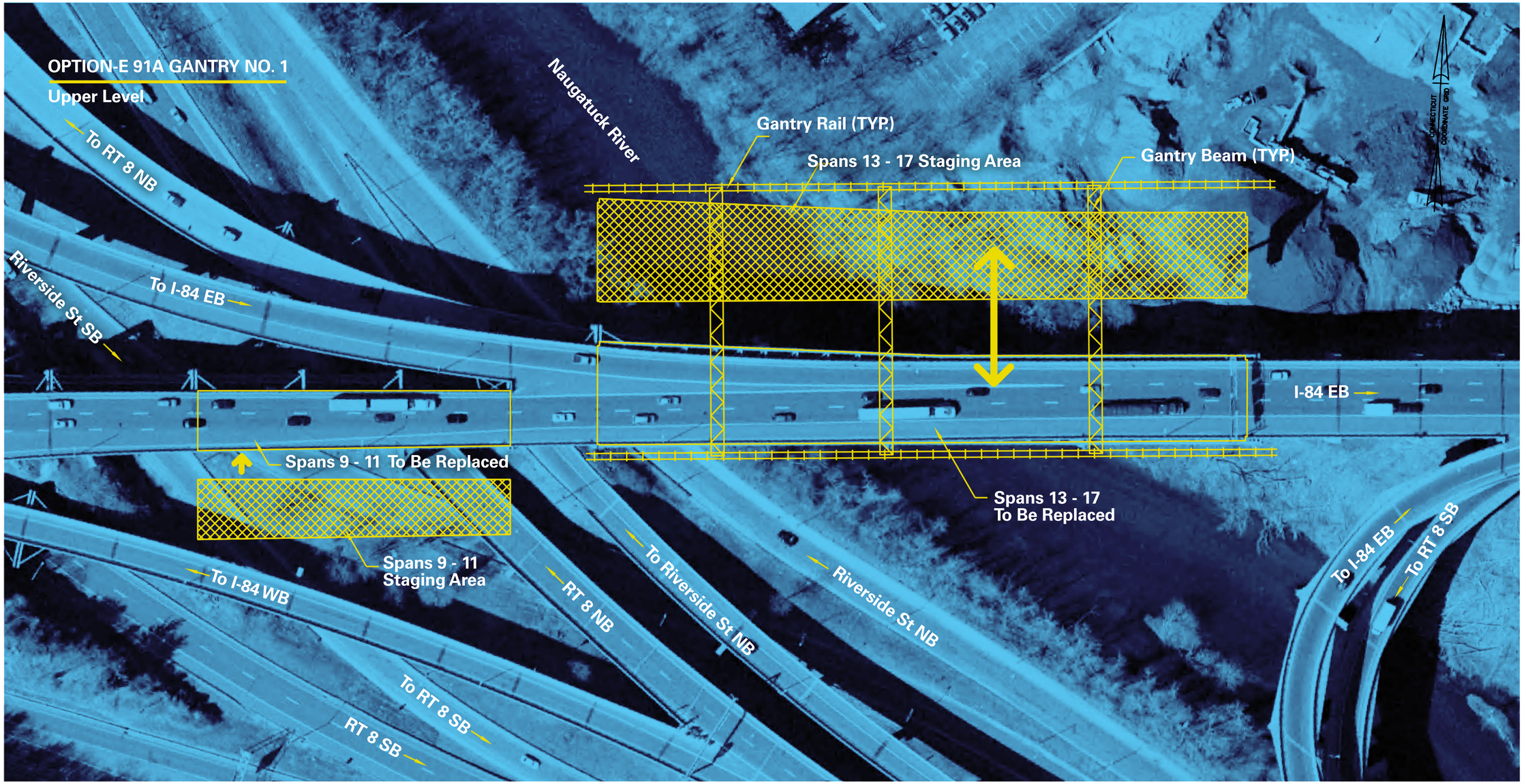
PROJECT NO. 0151-0331

DRAWING NO. -

SHEET NO. -

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX H
Option E



BRIDGE 03191A SPANS 9 - 11 & 13 - 17 GANTRY REPLACEMENT PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/10/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option E 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

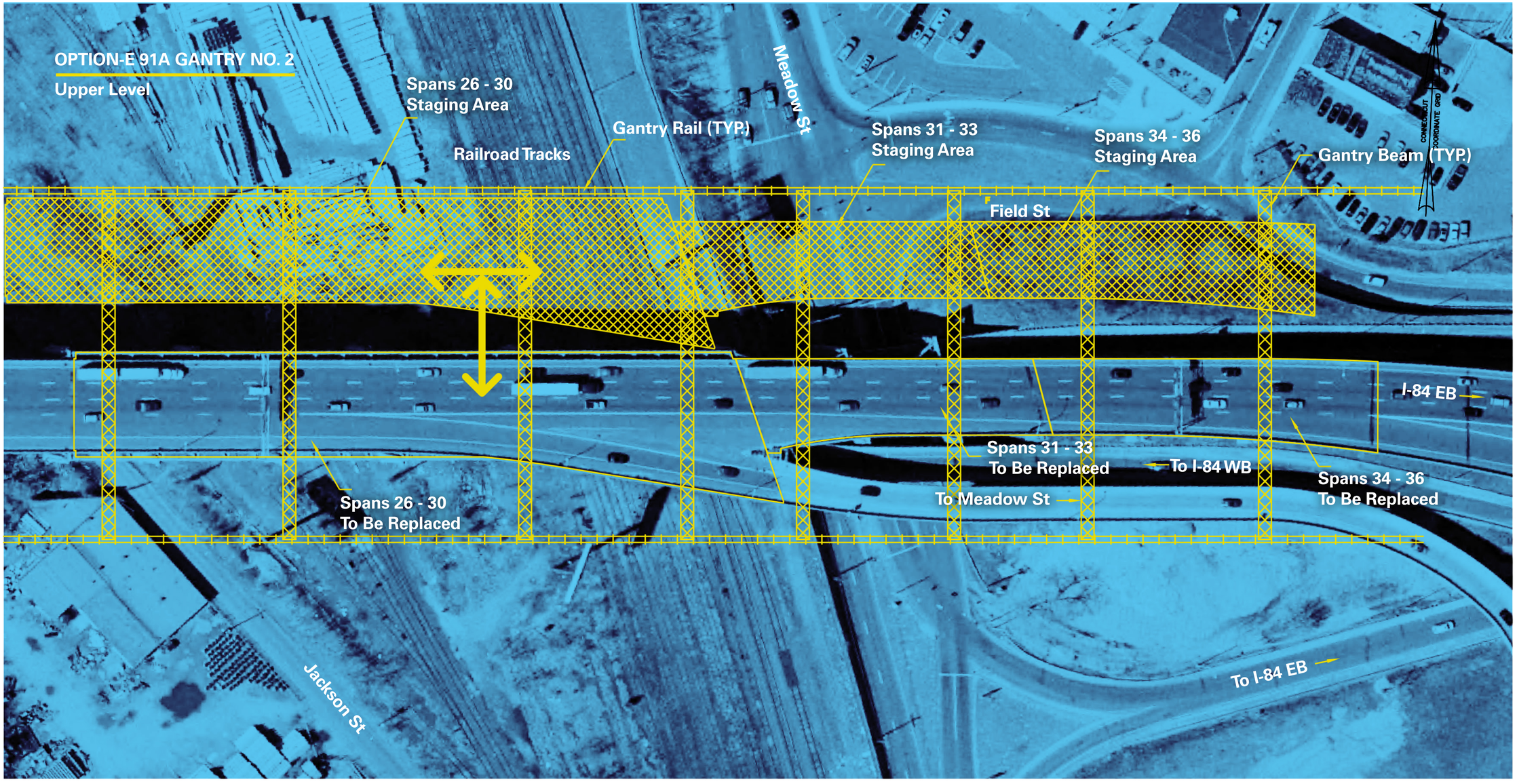
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191A SPAN 9-11 & 13-17 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03191A SPANS 26 - 36 GANTRY REPLACEMENT PLAN
SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option_E_91A_7-12-18_layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

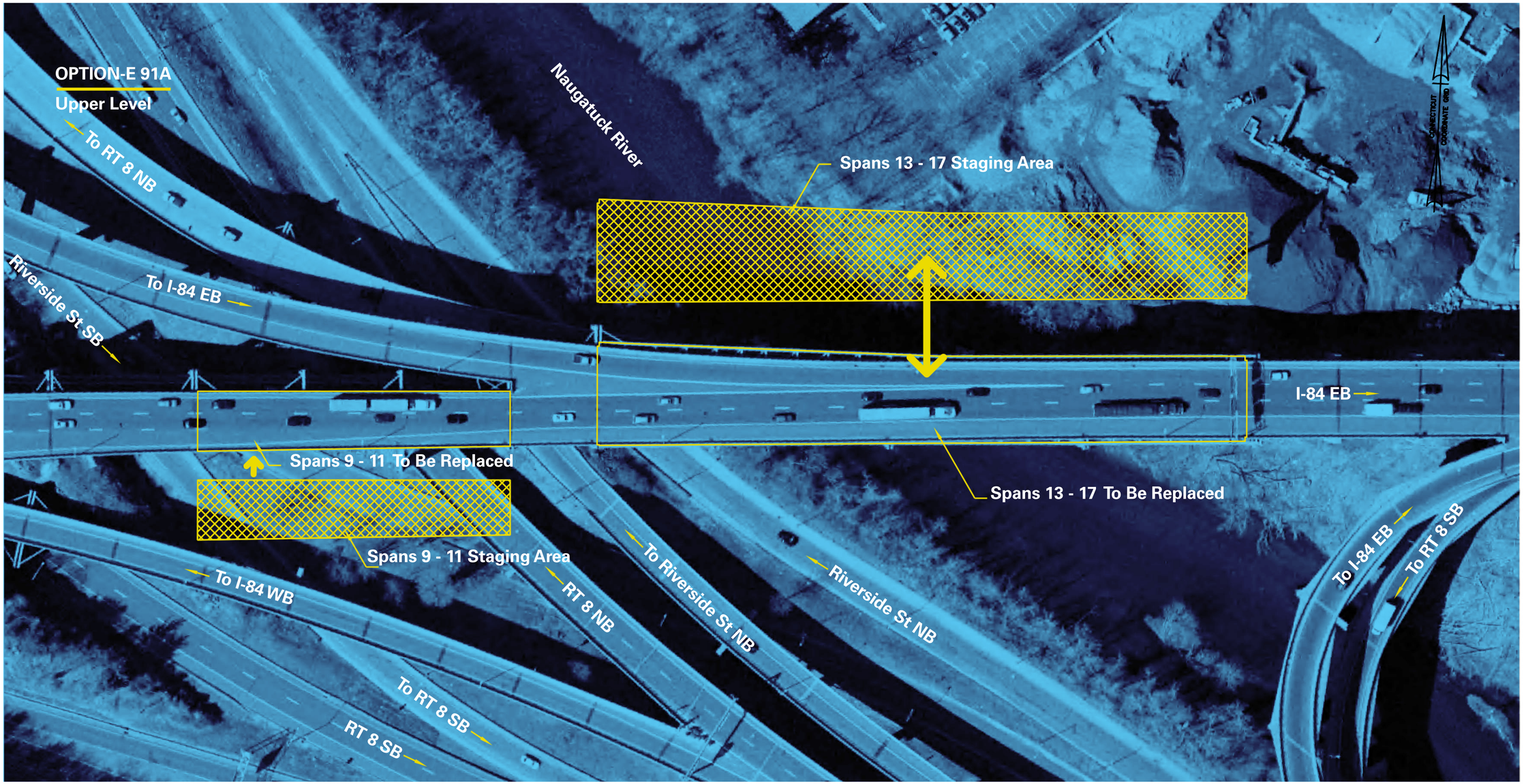
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191A SPAN 26-36 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03191A SPANS 9 - 11 & 13 - 17 REPLACEMENT PLAN
SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/10/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option E 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE: RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

TOWN: WATERBURY CONNECTICUT

PROJECT NO. 0151-0331

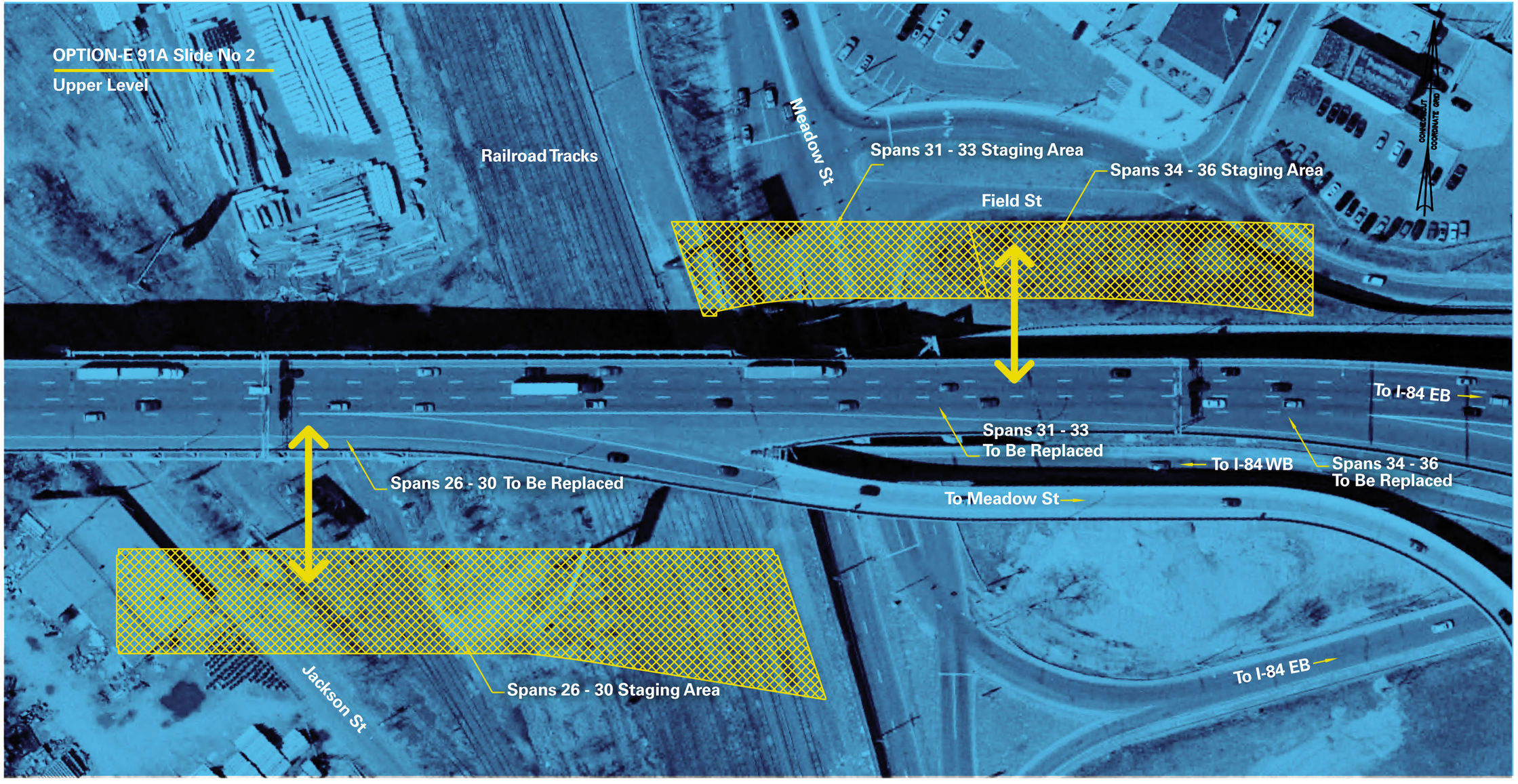
DRAWING NO.

DRAWING TITLE: BRIDGE 03191A SPAN 9-11 & 13-17 REPLACEMENT

SHEET NO.

OPTION-E 91A Slide No 2

Upper Level



BRIDGE 03191A SPANS 26 - 36 REPLACEMENT PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI

CHECKED BY: M. KUCHAS

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option E 91A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE: RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

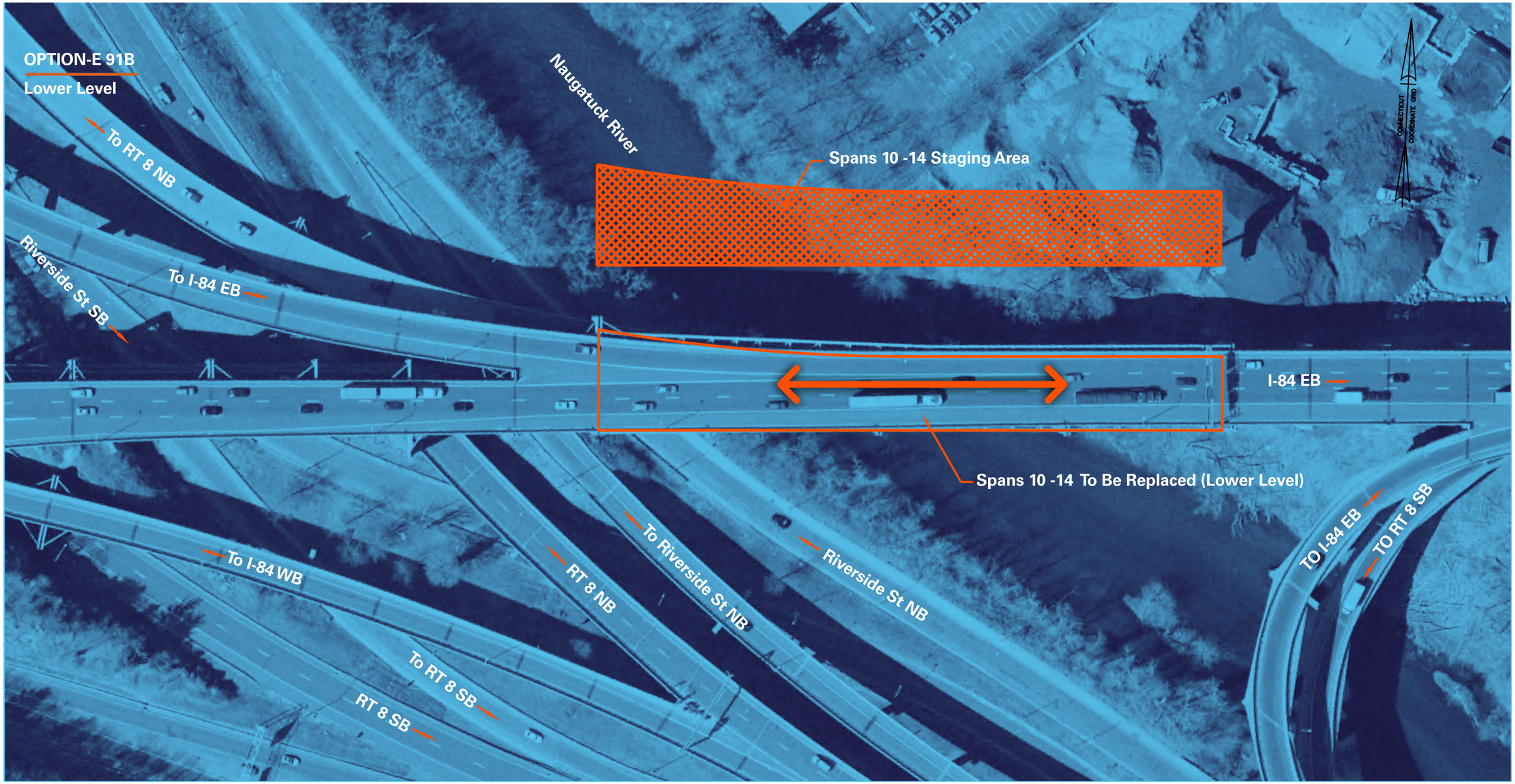
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191A SPAN 26-36 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03191B SPANS 10 - 14 REPLACEMENT PLAN

SCALE: 1" = 40'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/15/2018

DESIGNER/DRAFTER: T. ADINOLFI

CHECKED BY: M. KUCHAS

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option E 91B 7-12-18 layout .dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

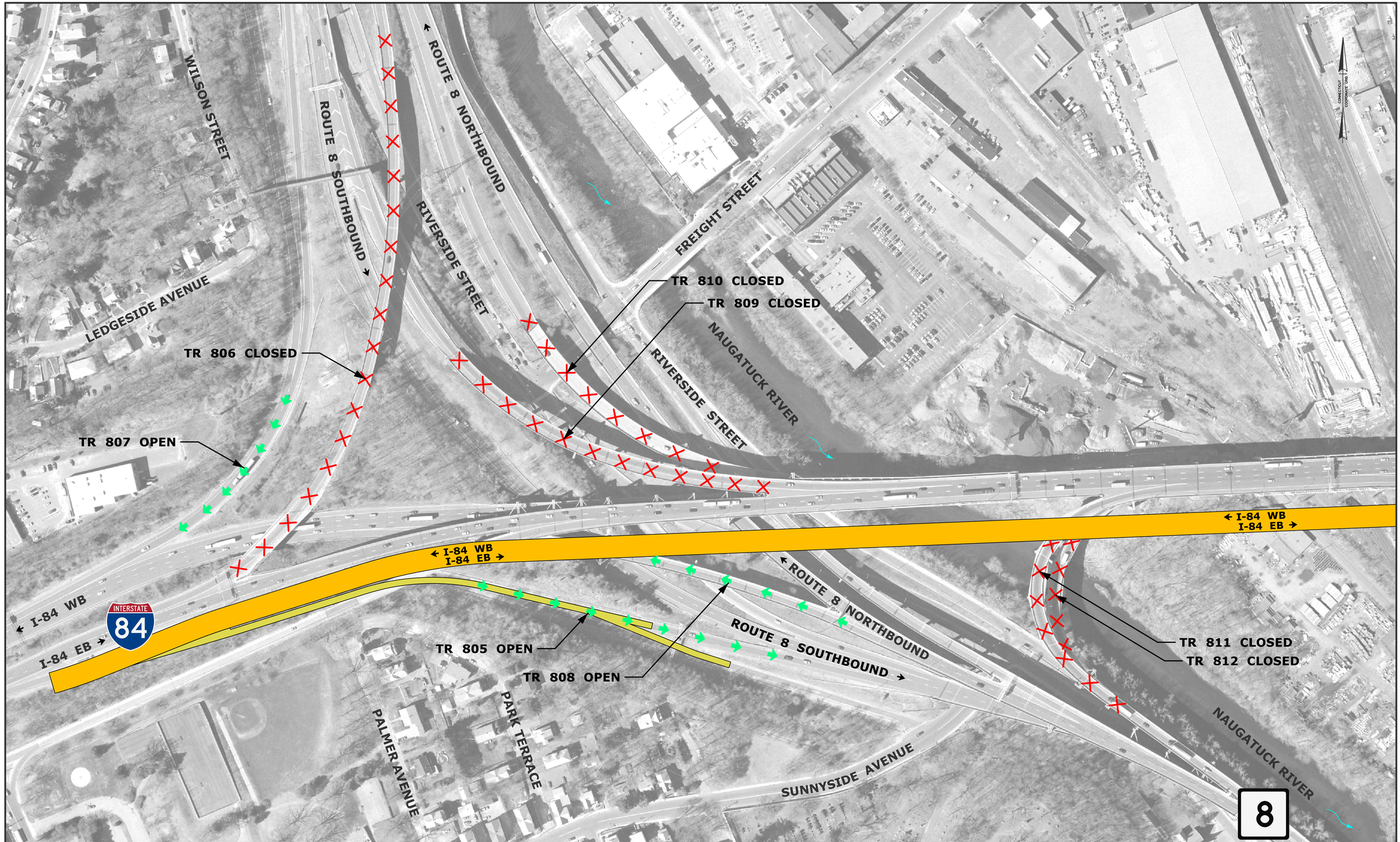
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03191B SPAN 10 - 14 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE: 1"=100'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION E

TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
SYSTEM RAMPS DURING OPTION E

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
-

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX I
Option F



REV.	DATE	REVISION DESCRIPTION	SHEET NO.
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THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER:
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CHECKED BY: D. SCHWEITZER
SCALE 1"=200'
SCALE IN FEET
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SCALE 1"=200'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER"

TOWN:
WATERBURY CONNECTICUT

DRAWING TITLE:
ROUTE 8 TEMPORARY BYPASS

PROJECT NO.
0151-0331

DRAWING NO.
-

SHEET NO.
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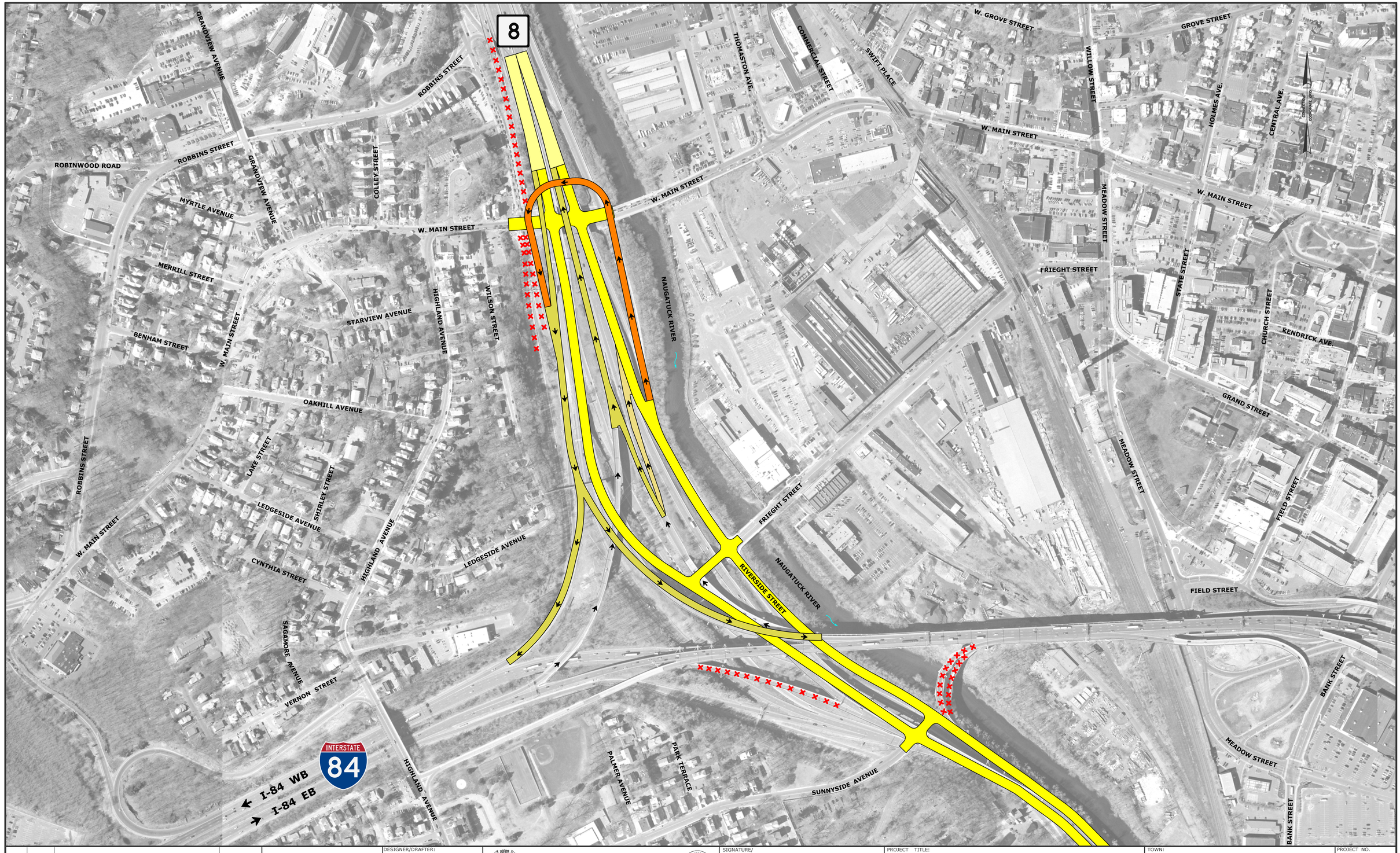
FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX J
Option G



REV.		DATE	REVISION DESCRIPTION	SHEET NO.
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THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: $DATE$

DESIGNER/DRAFTER: -

CHECKED BY: D. SCHWEITZER

SCALE IN FEET
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SCALE 1"=200'

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: $FILEA$

SIGNATURE/
BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE -84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION G

TOWN:
WATERBURY
CONNECTICUT

DRAWING TITLE:
- BOULEVARD CONCEPT

PROJECT NO. 0151-0331

DRAWING NO. -

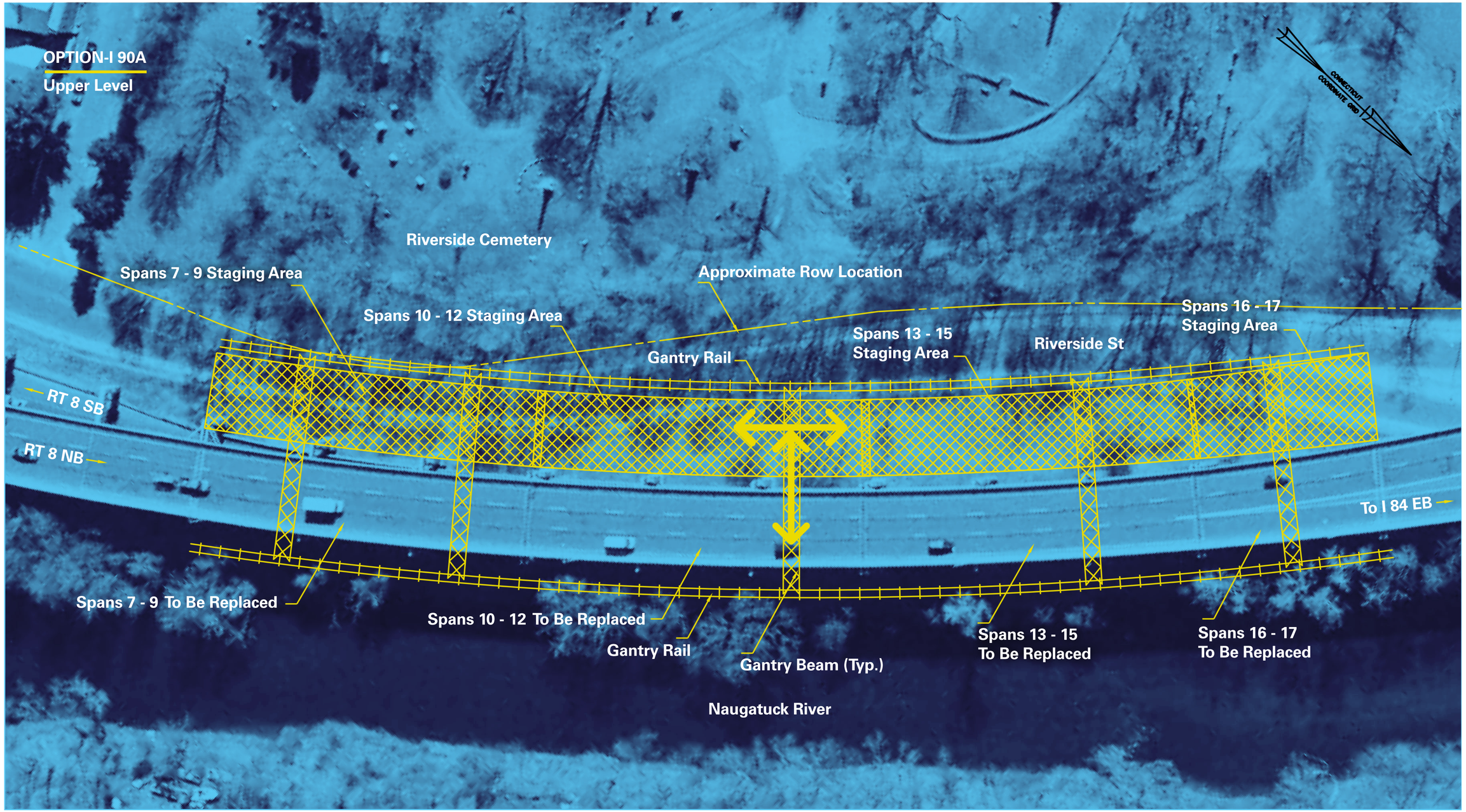
SHEET NO. -

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX K
Option I

OPTION-I 90A

Upper Level



BRIDGE 03190A SPANS 7 - 17 GANTRY REPLACEMENT PLAN

SCALE: 1" = 30'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI

CHECKED BY: M. KUCHAS

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option I 90A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE: RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION I

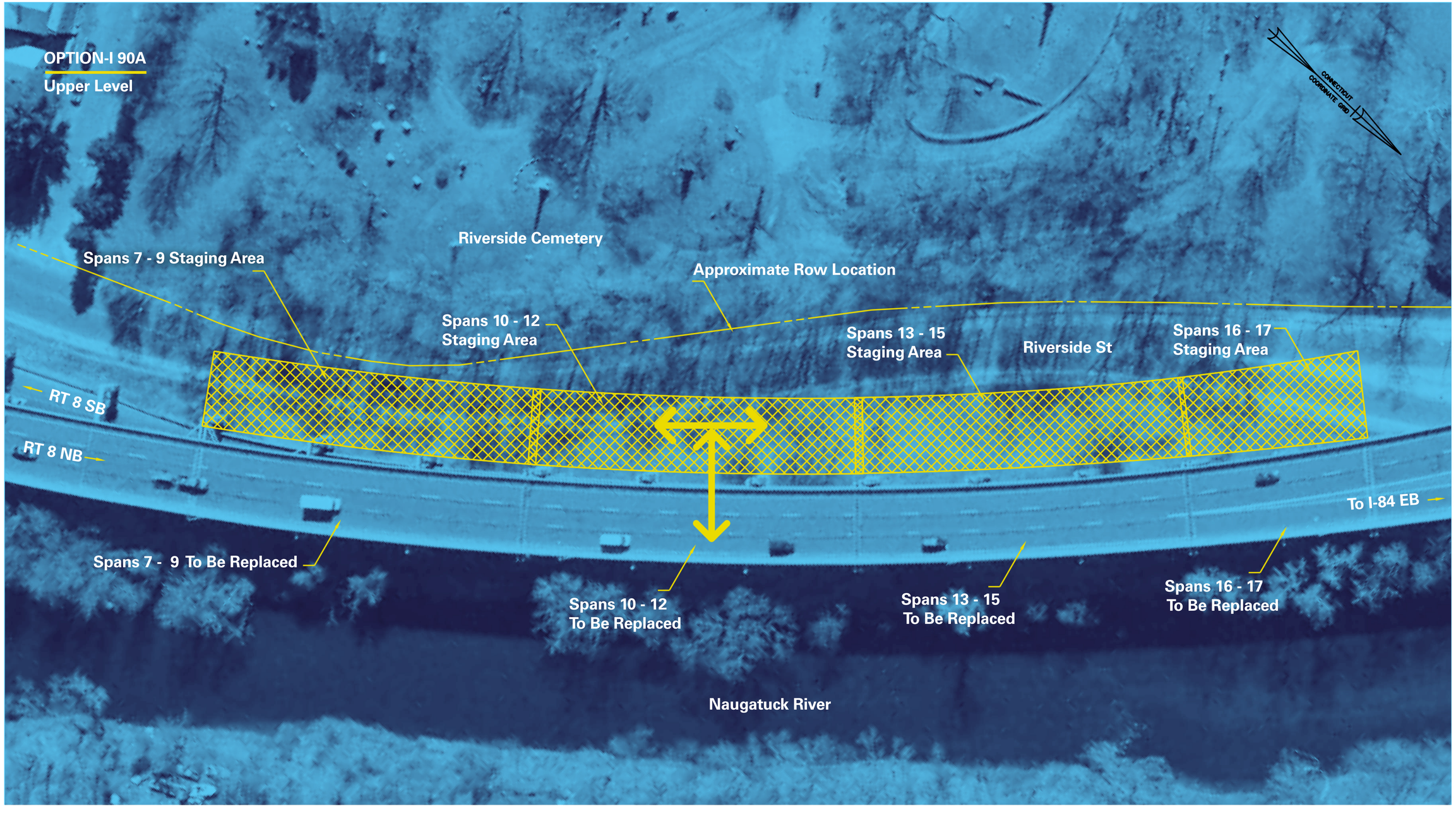
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03190A SPAN 7 - 17 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03190A SPANS 7 - 17 REPLACEMENT PLAN
SCALE: 1" = 30'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option I 90A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION I

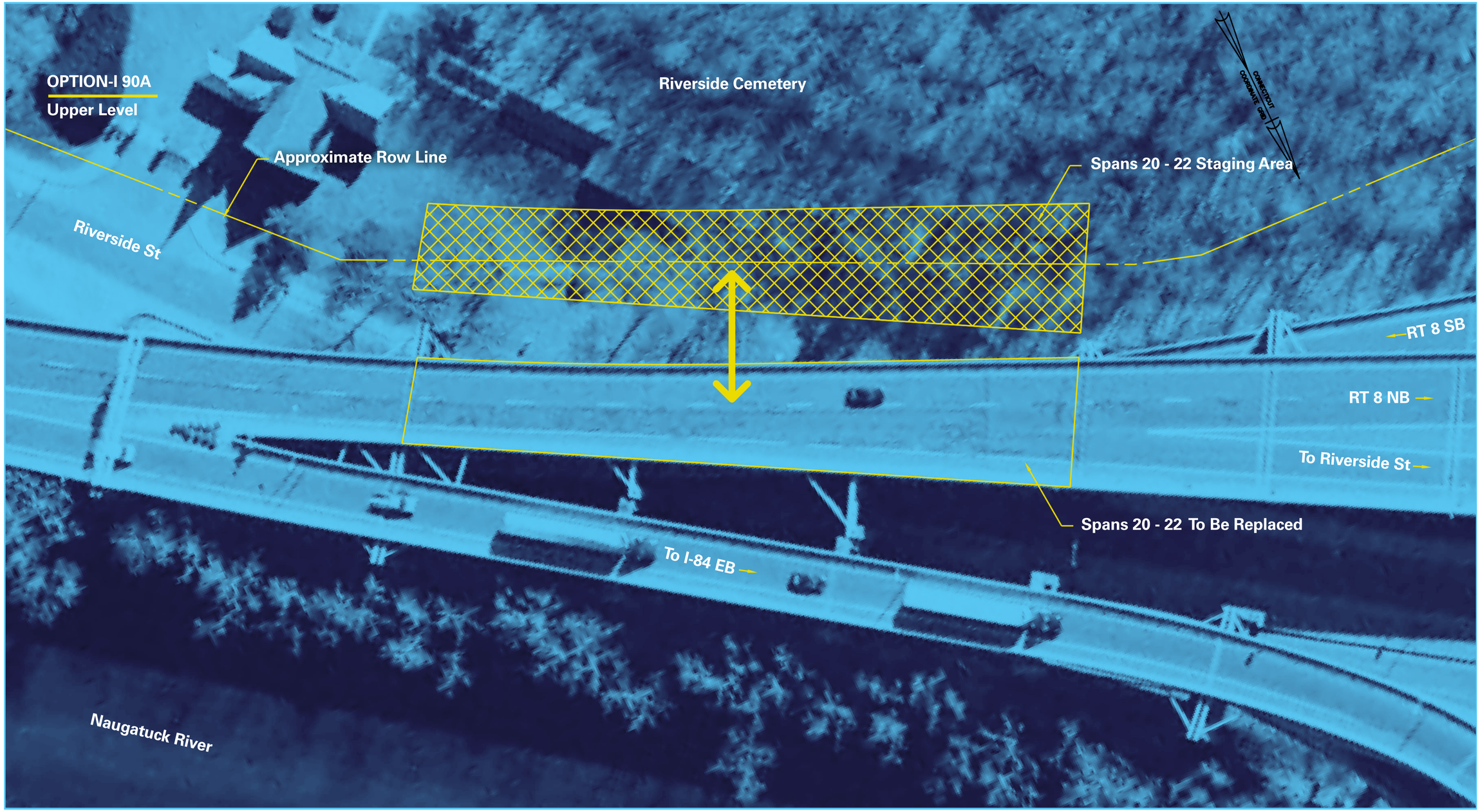
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03190A SPAN 7 - 17 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03190A SPAN 20 - 22 REPLACEMENT PLAN

SCALE: 1" = 20'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/13/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option I 90A 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION I

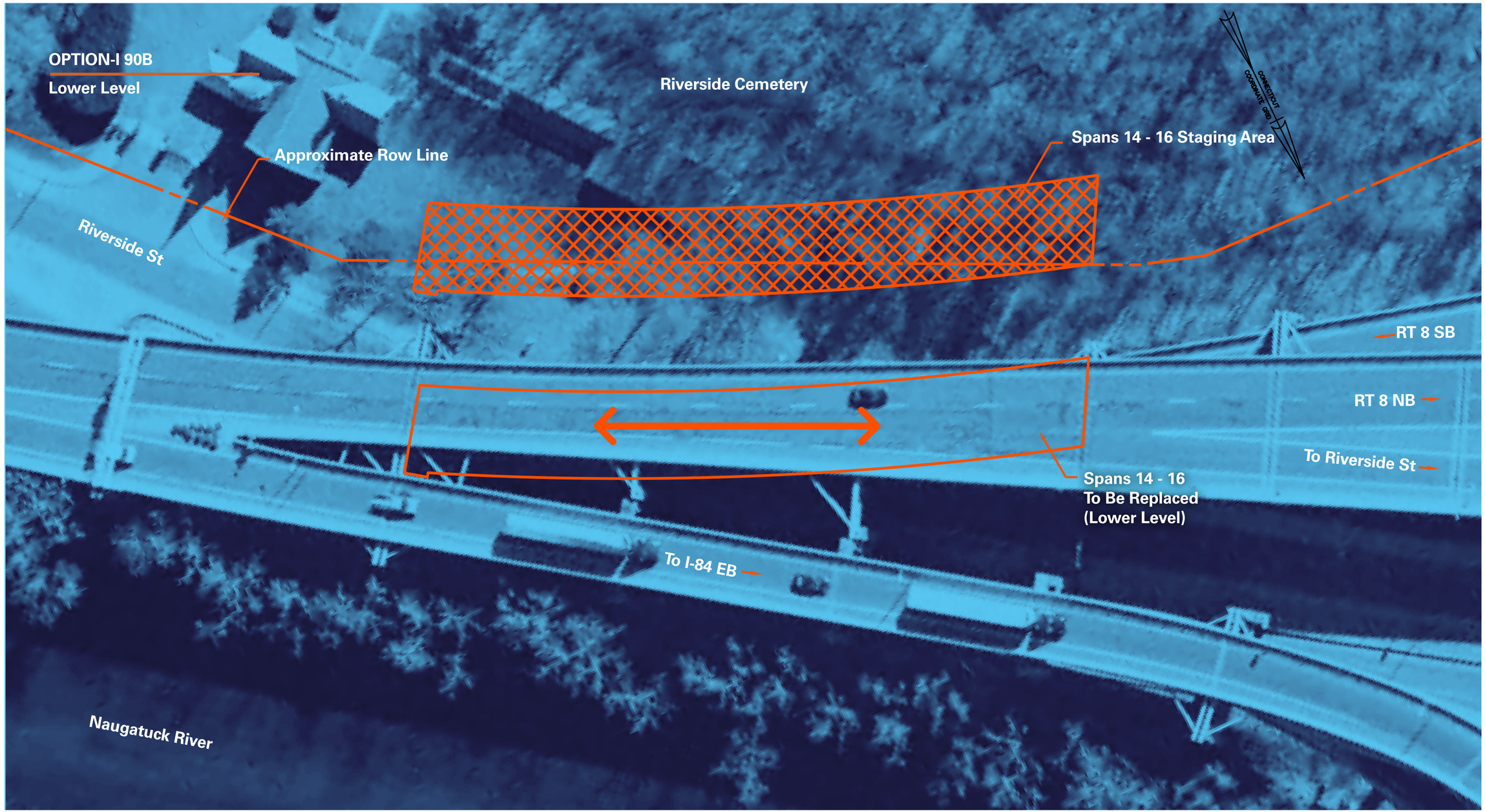
TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03190A SPAN 20 - 22 REPLACEMENT

PROJECT NO. 0151-0331

DRAWING NO.

SHEET NO.



BRIDGE 03190B SPAN 14 - 16 REPLACEMENT PLAN
SCALE: 1" = 20'-0"

PRELIMINARY DESIGN REVIEW

REV.	DATE	REVISION DESCRIPTION	SHEET NO.

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 8/15/2018

DESIGNER/DRAFTER: T. ADINOLFI
CHECKED BY: M. KUCHAS
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\MixMaster Option I 90B 7-12-18 layout.dgn

SIGNATURE/ BLOCK:

PROJECT TITLE:
RECONSTRUCTION OF INTERSTATE 84 / ROUTE 8 INTERCHANGE "MIXMASTER" - OPTION I

TOWN: WATERBURY CONNECTICUT

DRAWING TITLE: BRIDGE 03190B SPAN 14 - 16 REPLACEMENT

PROJECT NO. 0151-0331
DRAWING NO.
SHEET NO.

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option A
Option B
Option C
Option D
Option E

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option A

Cost Verification on FCA Option A

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option A

			revised Alternate 6			FCA Option A
Earth Exc			$ 251,642			$ 2,000,000
Rock Exc			$ 146,850			$ 500,000
Unsuitable Exc						
Contaminated			$ 46,600			$ 1,000,000
Hazardous Waste			$ 29,957			$ 750,000
Borrow						$ 1,000,000
Drainage System			$ 150,000			**$ 250,000**
Ex Drainage System			$ -			**$ 10,000,000**
Bituminous Concrete			$ 100,000			**$ 10,000,000**
Concrete Base Widen			$ -			**$ 1,000,000**
Milling			$ -			**$ 6,000,000**
Concrete Pavement Replace						$ 87,000
Subbase			$ 35,000			**$ 2,000,000**
Major Pipe Culverts			$ -			
Concrete Box Culverts			$ -			
Bridge Proposed by 2025			**$ 14,332,000**			
Bridge Proposed by 2045						**$ 172,072,090**
Bridge Demolition			$ -			**$ 2,354,100**
Bridge Rehabilitation by 2025			**$ 33,525,090**			
Bridge Rehabilitation by 2045						**$ 146,138,850**
other Structures Miscellaneous			$ 760,049			**$ 12,000,000**
Retaining Walls			$ -			**$ 30,000,000**
Standpipes						
Concrete Median Barrier			$ -			**$ 4,000,000**
Major Traffic Signal Mods						$ 2,482,278
New Traffic Signal						$ 300,000
Concrete Sidewalk			$ 50,000			$ 1,330,000
Roadway Lighting			$ 40,000			$ 7,615,034
BCLC						$ 478,395
Concrete Curbing			$ 25,000			$ 687,400
Guide Rail			$ 20,000			$ 2,947,306
Signing & Striping			$ 10,000			**$ 15,000,000**
Stage Construction			$ -			**$ 25,000,000**
Noise Barriers						
Mitigation			$ 300,000			**$ 5,000,000**
IMS						**$ 10,000,000**
SubTotals			**$ 49,822,188**			**$ 471,992,453**

Engineering Design Costs						
Program Management Costs	4%		$ 1,992,888			$ 18,879,698
Engineering Design Costs	9%		$ 4,483,997			$ 42,479,321
CTDOT Design/Administration Costs	13%		$ 6,476,884			$ 61,359,019
Subtotal			**$ 12,953,769**			**$ 122,718,038**

			Alternate 6			FCA Option A	
Civil Highway Items			$ 1,205,049			$ 109,427,413	
Structural Bridge Items			$ 48,617,139			$ 362,565,040	
SubTotal (Major Items)			**$ 49,822,188**			**$ 471,992,453**	
Engineering Design Costs				**$ 12,953,769**			**$ 122,718,038**
Minor Items (25%)			$ 12,455,547			$ 117,998,113	
SubTotal			**$ 62,277,735**			**$ 589,990,566**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,555			$ 11,799,811	
MPT	10%		$ 6,227,774			$ 58,999,057	
Mobilization	8%		$ 4,670,830			$ 44,249,292	
Construction Staking	1%		$ 622,777			$ 5,899,906	
Subtotal			**$ 75,044,671**			**$ 710,938,632**	
Additional Items							
Incidentals	21%		$ 15,759,381			$ 149,297,113	
Contingencies	30%		$ 22,513,401			$ 213,281,589	
Utility Cost	3%		$ 2,251,340			$ 21,328,159	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 116,068,793**	**$ 12,953,769**		**$ 1,134,845,493**	**$ 122,718,038**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,068,793	$ 12,953,769	$ 1,134,845,493	$ 122,718,038	$ 1,386,586,092
	Inflation Costs	$ 4,062,408	$ 453,382	$ 39,719,592	$ 4,295,131	
2018		$ 120,131,201	$ 13,407,151	$ 1,174,565,085	$ 127,013,169	$ 1,435,116,605
	Inflation Costs	$ 4,204,592	$ 469,250	$ 41,109,778	$ 4,445,461	
2019		$ 124,335,793	$ 13,876,401	$ 1,215,674,863	$ 131,458,630	$ 1,485,345,686
	Inflation Costs	$ 4,351,753	$ 485,674	$ 42,548,620	$ 4,601,052	
2020		$ 128,687,545	$ 14,362,075	$ 1,258,223,483	$ 136,059,682	$ 1,537,332,785
	Inflation Costs	$ 4,504,064	$ 502,673	$ 44,037,822	$ 4,762,089	
2021		$ 133,191,609	$ 14,864,748	$ 1,302,261,305	$ 140,821,771	$ 1,591,139,433
	Inflation Costs	$ 4,661,706	$ 520,266	$ 45,579,146	$ 4,928,762	
2022		$ 137,853,316	$ 15,385,014	$ 1,347,840,451	$ 145,750,533	$ 1,646,829,313
	Inflation Costs	$ 4,824,866	$ 538,475	$ 47,174,416	$ 5,101,269	
2023		$ 142,678,182	$ 15,923,489	$ 1,395,014,866	$ 150,851,801	$ 1,704,468,339
	Inflation Costs	$ 4,993,736	$ 557,322	$ 48,825,520	$ 5,279,813	
2024		$ 147,671,918	$ 16,480,812	$ 1,443,840,387	$ 156,131,614	$ 1,764,124,731
	Inflation Costs	$ 5,168,517	$ 560,323	$ 50,534,414	$ 5,464,607	
2025		$ 152,840,435	$ 17,041,135	$ 1,494,374,800	$ 161,596,221	$ 1,825,852,591
	Inflation Costs	$ 5,349,415		$ 52,303,118	$ 5,655,868	
2026		$ 158,189,851	$ 17,041,135	$ 1,546,677,918	$ 167,252,089	$ 1,889,160,992
	Inflation Costs			$ 54,133,727	$ 5,853,823	
2027		$ 158,189,851	$ 17,041,135	$ 1,600,811,645	$ 173,105,912	$ 1,949,148,542
	Inflation Costs			$ 56,028,408	$ 6,058,707	
2028		$ 158,189,851	$ 17,041,135	$ 1,656,840,053	$ 179,164,619	$ 2,011,235,657
	Inflation Costs			$ 57,989,402	$ 6,270,762	
2029				$ 1,714,829,455	$ 185,435,380	$ 2,075,495,820
	Inflation Costs			$ 60,019,031	$ 6,490,238	
2030				$ 1,774,848,486	$ 191,925,619	$ 2,142,005,090
	Inflation Costs			$ 62,119,697	$ 6,717,397	
2031				$ 1,836,968,183	$ 198,643,015	$ 2,210,842,183
	Inflation Costs			$ 64,293,886	$ 6,952,506	
2032				$ 1,901,262,069	$ 205,595,521	$ 2,282,088,575
	Inflation Costs			$ 66,544,172	$ 7,195,843	
2033				$ 1,967,806,242	$ 212,791,364	$ 2,355,828,591
	Inflation Costs			$ 68,873,218	$ 7,447,698	
2034				$ 2,036,679,460	$ 220,239,062	$ 2,432,149,507
	Inflation Costs			$ 71,283,781	$ 7,708,367	
2035				$ 2,107,963,241	$ 227,947,429	$ 2,511,141,655
	Inflation Costs			$ 73,778,713	$ 7,978,160	
2036				$ 2,181,741,955	$ 235,925,589	$ 2,592,898,529
	Inflation Costs			$ 76,360,968	$ 8,257,396	
2037				$ 2,258,102,923	$ 244,182,985	$ 2,677,516,893
	Inflation Costs			$ 79,033,602	$ 8,546,404	
2038				$ 2,337,136,525	$ 252,729,389	$ 2,765,096,900
	Inflation Costs			$ 81,799,778	$ 8,592,424	
2039				$ 2,418,936,304	$ 261,321,813	$ 2,855,489,102
	Inflation Costs			$ 84,662,771		
2040				$ 2,503,599,074	$ 261,321,813	$ 2,940,151,872
	Inflation Costs			$ 87,625,968		
2041				$ 2,591,225,042	$ 261,321,813	$ 3,027,777,840
	Inflation Costs			$ 90,692,876		
2042				$ 2,681,917,918	$ 261,321,813	$ 3,118,470,716
	Inflation Costs					
2043				$ 2,681,917,918	$ 261,321,813	$ 3,118,470,716
	Inflation Costs					
2044				$ 2,681,917,918	$ 261,321,813	$ 3,118,470,716
	Inflation Costs					
2045				$ 2,681,917,918	$ 261,321,813	$ 3,118,470,716

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option A

Bridge New 2025	$	14,332,000		
Total Rehab Cost			$	14,332,000
Bridge Rehab 2025	$	33,525,090		
Total Rehab Cost			$	33,525,090
Bridge Rehab 2045	$	140,653,570		
Rehab Cost			$	100,729,730
			$	9,320,400
Bearing Replacement Cost			$	1,668,000
Painting Cost			$	28,935,440
Bridge Combined 2045	$	177,557,370		
Rehab Cost			$	5,485,280
Rebuild Cost			$	172,072,090
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
2	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ 160	$ 3,423,200
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 160	$ 2,178,080
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050	$ 160	$ 25,288,000
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 135	$ 3,019,275
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ -	$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
40	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
							$ 100,729,730

Cost Estimate on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	1	94	2914	31.0	4	8	2	$6,000.00
01715	1	96	12,048	125.5	17	34	9	$27,000.00
01716	3	261	11,432	43.8	6	36	9	$27,000.00
03183A	1	94	4,089	43.5	6	12	3	$9,000.00
03183B	1	94	4,089	43.5	6	12	3	$9,000.00
03184A	1	95	4,132	43.5	6	12	3	$9,000.00
03184B	1	95	4,133	43.5	6	12	3	$9,000.00
03185	1	73	3,176	43.5	6	12	3	$9,000.00
03186	1	77	3,350	43.5	6	12	3	$9,000.00
03187	3	199	11,681	58.7	8	48	12	$36,000.00
03188	2	165	7,210	43.7	6	24	6	$18,000.00
03189	1	106	2,915	27.5	3	6	2	$6,000.00
03190A	36	2,634	131,987	50.1	7	504	126	$378,000.00
03190B	21	1,589	75,312	47.4	6	252	63	$189,000.00
03190C	9	877	24,188	27.6	3	54	0	$0.00
03190D	9	778	21,395	27.5	3	54	14	$42,000.00
03190E	7	495	13,613	27.5	3	42	11	$33,000.00
03190F	10	652	17,930	27.5	3	60	15	$45,000.00
03191A	46	3,766	231,227	61.4	8	736	0	$0.00
03191B	30	2,461	154,873	62.9	8	480	120	$360,000.00
03191C	4	408	11,220	27.5	3	24	0	$0.00
03191D	10	781	27,726	35.5	5	100	25	$75,000.00
03191E	8	630	22,365	35.5	5	80	20	$60,000.00
03191F	11	672	18,480	27.5	3	66	0	$0.00
03191G	3	228	6,316	27.7	3	18	5	$15,000.00
03191H	1	70	1,890	27.0	3	6	2	$6,000.00
03191I	3	296	10,508	35.5	5	30	0	$0.00
03192	1	81	2,729	33.7	4	8	0	
03193	2	133	6,344	47.7	6	24	6	$18,000.00
03194	3	195	5,402	27.7	3	18	5	$15,000.00
03196	1	64	8,480	132.5	18	36	9	$27,000.00
03197	3	201	8547	42.5	6	36	9	$27,000.00
03198	3	138	6,030	43.7	6	36	9	$27,000.00
03200	6	703	19,332	27.5	3	36	9	$27,000.00
03201	4	362	3620	10.0	1	8	2	$6,000.00
03203A	1	134	9,058	67.6	9	18	5	$15,000.00
03203B	1	134	8,589	64.1	9	18	5	$15,000.00
03203C	1	134	4,234	31.6	4	8	2	$6,000.00
03205	1	117	12,648	108.1	15	30	8	$24,000.00
03207	3	288	15120	52.5	7	42	11	$33,000.00
03209	1	141	5,798	41.1	5	10	3	$9,000.00
04318	3	545	37,333	68.5	9	54	14	$42,000.00
							TOTAL	$1,668,000.00

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	1	94	2914	31	4	376	4011.92	$120,357.60
01715	1	96	12,048	125.5	17	1632	17413.44	$522,403.20
01716	3	261	11,432	43.800766	6	1566	16709.22	$501,276.60
03183A	1	94	4,089	43.5	6	564	6017.88	$180,536.40
03183B	1	94	4,089	43.5	6	564	6017.88	$180,536.40
03184A	1	95	4,132	43.494737	6	570	6081.9	$182,457.00
03184B	1	95	4,133	43.505263	6	570	6081.9	$182,457.00
03185	1	73	3,176	43.506849	6	438	4673.46	$140,203.80
03186	1	77	3,350	43.506494	6	462	4929.54	$147,886.20
03187	3	199	11,681	58.698492	8	1592	16986.64	$509,599.20
03188	2	165	7,210	43.69697	6	990	10563.3	$316,899.00
03189	1	106	2,915	27.5	3	318	3393.06	$101,791.80
03190A	36	2,634	131,987	50.10896	7	18438	196733.46	$5,902,003.80
03190B	21	1,589	75,312	47.395846	6	9534	101727.78	$3,051,833.40
03190C	9	877	24,188	27.580388	3	2631	0	$0.00
03190D	9	778	21,395	27.5	3	2334	24903.78	$747,113.40
03190E	7	495	13,613	27.50101	3	1485	15844.95	$475,348.50
03190F	10	652	17,930	27.5	3	1956	20870.52	$626,115.60
03191A	46	3,766	231,227	61.398566	8	30128	0	$0.00
03191B	30	2,461	154,873	62.930922	8	19688	210070.96	$6,302,128.80
03191C	4	408	11,220	27.5	3	1224	0	$0.00
03191D	10	781	27,726	35.50064	5	3905	41666.35	$1,249,990.50
03191E	8	630	22,365	35.5	5	3150	33610.5	$1,008,315.00
03191F	11	672	18,480	27.5	3	2016	0	$0.00
03191G	3	228	6,316	27.701754	3	684	7298.28	$218,948.40
03191H	1	70	1,890	27	3	210	2240.7	$67,221.00
03191I	3	296	10,508	35.5	5	1480	0	$0.00
03192	1	81	2,729	33.691358	4	324	0	$0.00
03193	2	133	6,344	47.699248	6	798	8514.66	$255,439.80
03194	3	195	5,402	27.702564	3	585	6241.95	$187,258.50
03196	1	64	8,480	132.5	18	1152	12291.84	$368,755.20
03197	3	201	8547	42.522388	6	1206	12868.02	$386,040.60
03198	3	138	6,030	43.695652	6	828	8834.76	$265,042.80
03200	6	703	19,332	27.499289	3	2109	22503.03	$675,090.90
03201	4	362	3620	10	1	362	3862.54	$115,876.20
03203A	1	134	9,058	67.597015	9	1206	12868.02	$386,040.60
03203B	1	134	8,589	64.097015	9	1206	12868.02	$386,040.60
03203C	1	134	4,234	31.597015	4	536	5719.12	$171,573.60
03205	1	117	12,648	108.10256	15	1755	18725.85	$561,775.50
03207	3	288	15120	52.5	7	2016	21510.72	$645,321.60
03209	1	141	5,798	41.120567	5	705	7522.35	$225,670.50
04318	3	545	37,333	68.500917	9	4905	52336.35	$1,570,090.50
							TOTAL	$28,935,439.50

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		
	Rehabilitation				12,059	$ 160	$ 1,929,440
	Reconstruct				12,059	$ 420	$ 5,064,780
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ 674	$ 149,363,950
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
	Rehabilitation				3,740	$ 160	$ 598,400
	Reconstruct				7,480	$ 420	$ 3,141,600
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		
	Rehabilitation				18,484	$ 160	$ 2,957,440
	Reconstruct				9,242	$ 420	$ 3,881,640
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ -	$ -
	Rehabilitation						$ -
	Reconstruct				14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
	Rehabilitation						$ -
	Reconstruct				10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 5,485,280
						Reconstruct	**$ 172,072,090**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option A

ALTERNATE 6 Bridges		**Crossing**	Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	$ 1,900,800
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	$ 4,309,200
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ 9,320,400**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option A
Core Interchange

Core Interchange - Cost Verification on FCA Option A

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option A

			revised Alternate 6			FCA Option A
Earth Exc			$ 251,642			$ 2,000,000
Rock Exc			$ 146,850			$ 500,000
Unsuitable Exc						
Contaminated			$ 46,600			$ 1,000,000
Hazardous Waste			$ 29,957			$ 750,000
Borrow						$ 1,000,000
Drainage System			$ 150,000			**$ 250,000**
Ex Drainage System			$ -			**$ 7,500,000**
Bituminous Concrete			$ 100,000			**$ 7,500,000**
Concrete Base Widen			$ -			**$ 1,000,000**
Milling			$ -			**$ 4,500,000**
Concrete Pavement Replace						$ 87,000
Subbase			$ 35,000			**$ 1,500,000**
Major Pipe Culverts			$ -			
Concrete Box Culverts			$ -			
Bridge Proposed by 2025			**$ 14,332,000**			
Bridge Proposed by 2045						**$ 172,072,090**
Bridge Demolition			$ -			**$ 2,354,100**
Bridge Rehabilitation by 2025			**$ 9,346,725**			
Bridge Rehabilitation by 2045						**$ 104,593,166**
other Structures Miscellaneous			$ 760,049			**$ 12,000,000**
Retaining Walls			$ -			**$ 30,000,000**
Standpipes						
Concrete Median Barrier			$ -			**$ 4,000,000**
Major Traffic Signal Mods						$ 2,482,278
New Traffic Signal						$ 300,000
Concrete Sidewalk			$ 50,000			$ 1,330,000
Roadway Lighting			$ 40,000			$ 7,615,034
BCLC						$ 478,395
Concrete Curbing			$ 25,000			$ 687,400
Guide Rail			$ 20,000			$ 2,947,306
Signing & Striping			$ 10,000			**$ 15,000,000**
Stage Construction			$ -			**$ 25,000,000**
Noise Barriers						
Mitigation			$ 300,000			**$ 5,000,000**
IMS						**$ 10,000,000**
SubTotals			**$ 25,643,823**			**$ 423,446,769**

Engineering Design Costs						
Program Management Costs	4%		$ 1,025,753			$ 16,937,871
Engineering Design Costs	9%		$ 2,307,944			$ 38,110,209
CTDOT Design/Administration Costs	13%		$ 3,333,697			$ 55,048,080
Subtotal			**$ 6,667,394**			**$ 110,096,160**

			Alternate 6			FCA Option A	
Civil Highway Items			$ 1,205,049			$ 102,427,413	
Structural Bridge Items			$ 24,438,774			$ 321,019,356	
SubTotal (Major Items)			**$ 25,643,823**			**$ 423,446,769**	
Engineering Design Costs				**$ 6,667,394**			**$ 110,096,160**
Minor Items (25%)			$ 6,410,956			$ 105,861,692	
SubTotal			**$ 32,054,779**			**$ 529,308,461**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 641,096			$ 10,586,169	
MPT	10%		$ 3,205,478			$ 52,930,846	
Mobilization	8%		$ 2,404,108			$ 39,698,135	
Construction Staking	1%		$ 320,548			$ 5,293,085	
Subtotal			**$ 38,626,008**			**$ 637,816,696**	
Additional Items							
Incidentals	21%		$ 8,111,462			$ 133,941,506	
Contingencies	30%		$ 11,587,803			$ 191,345,009	
Utility Cost	3%		$ 1,158,780			$ 19,134,501	
Right of Way			$ 500,000			$ 30,000,000	
Total Cost 2017			**$ 59,984,053**	**$ 6,667,394**		**$ 1,012,237,711**	**$ 110,096,160**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 59,984,053	$ 6,667,394	$ 1,012,237,711	$ 110,096,160	$ 1,188,985,318
	Inflation Costs	$ 2,099,442	$ 233,359	$ 35,428,320	$ 3,853,366	
2018		$ 62,083,495	$ 6,900,753	$ 1,047,666,031	$ 113,949,526	$ 1,230,599,804
	Inflation Costs	$ 2,172,922	$ 241,526	$ 36,668,311	$ 3,988,233	
2019		$ 64,256,417	$ 7,142,279	$ 1,084,334,342	$ 117,937,759	$ 1,273,670,797
	Inflation Costs	$ 2,248,975	$ 249,980	$ 37,951,702	$ 4,127,822	
2020		$ 66,505,392	$ 7,392,259	$ 1,122,286,044	$ 122,065,580	$ 1,318,249,275
	Inflation Costs	$ 2,327,689	$ 258,729	$ 39,280,012	$ 4,272,295	
2021		$ 68,833,080	$ 7,650,988	$ 1,161,566,056	$ 126,337,876	$ 1,364,388,000
	Inflation Costs	$ 2,409,158	$ 267,785	$ 40,654,812	$ 4,421,826	
2022		$ 71,242,238	$ 7,918,773	$ 1,202,220,868	$ 130,759,701	$ 1,412,141,580
	Inflation Costs	$ 2,493,478	$ 277,157	$ 42,077,730	$ 4,576,590	
2023		$ 73,735,717	$ 8,195,930	$ 1,244,298,598	$ 135,336,291	$ 1,461,566,535
	Inflation Costs	$ 2,580,750	$ 286,858	$ 43,550,451	$ 4,736,770	
2024		$ 76,316,467	$ 8,482,787	$ 1,287,849,049	$ 140,073,061	$ 1,512,721,364
	Inflation Costs	$ 2,671,076	$ 288,402	$ 45,074,717	$ 4,902,557	
2025		$ 78,987,543	$ 8,771,189	$ 1,332,923,766	$ 144,975,618	$ 1,565,658,116
	Inflation Costs	$ 2,764,564		$ 46,652,332	$ 5,074,147	
2026		$ 81,752,107	$ 8,771,189	$ 1,379,576,098	$ 150,049,765	$ 1,620,149,159
	Inflation Costs			$ 48,285,163	$ 5,251,742	
2027		$ 81,752,107	$ 8,771,189	$ 1,427,861,261	$ 155,301,507	$ 1,673,686,064
	Inflation Costs			$ 49,975,144	$ 5,435,553	
2028		$ 81,752,107	$ 8,771,189	$ 1,477,836,405	$ 160,737,059	$ 1,729,096,761
	Inflation Costs			$ 51,724,274	$ 5,625,797	
2029				$ 1,529,560,679	$ 166,362,857	$ 1,786,446,832
	Inflation Costs			$ 53,534,624	$ 5,822,700	
2030				$ 1,583,095,303	$ 172,185,557	$ 1,845,804,156
	Inflation Costs			$ 55,408,336	$ 6,026,494	
2031				$ 1,638,503,639	$ 178,212,051	$ 1,907,238,986
	Inflation Costs			$ 57,347,627	$ 6,237,422	
2032				$ 1,695,851,266	$ 184,449,473	$ 1,970,824,035
	Inflation Costs			$ 59,354,794	$ 6,455,732	
2033				$ 1,755,206,060	$ 190,905,204	$ 2,036,634,561
	Inflation Costs			$ 61,432,212	$ 6,681,682	
2034				$ 1,816,638,273	$ 197,586,886	$ 2,104,748,455
	Inflation Costs			$ 63,582,340	$ 6,915,541	
2035				$ 1,880,220,612	$ 204,502,428	$ 2,175,246,336
	Inflation Costs			$ 65,807,721	$ 7,157,585	
2036				$ 1,946,028,333	$ 211,660,012	$ 2,248,211,642
	Inflation Costs			$ 68,110,992	$ 7,408,100	
2037				$ 2,014,139,325	$ 219,068,113	$ 2,323,730,734
	Inflation Costs			$ 70,494,876	$ 7,667,384	
2038				$ 2,084,634,202	$ 226,735,497	$ 2,401,892,995
	Inflation Costs			$ 72,962,197	$ 7,708,670	
2039				$ 2,157,596,399	$ 234,444,167	$ 2,482,563,862
	Inflation Costs			$ 75,515,874		
2040				$ 2,233,112,273	$ 234,444,167	$ 2,558,079,735
	Inflation Costs			$ 78,158,930		
2041				$ 2,311,271,202	$ 234,444,167	$ 2,636,238,665
	Inflation Costs			$ 80,894,492		
2042				$ 2,392,165,694	$ 234,444,167	$ 2,717,133,157
	Inflation Costs					
2043				$ 2,392,165,694	$ 234,444,167	$ 2,717,133,157
	Inflation Costs					
2044				$ 2,392,165,694	$ 234,444,167	$ 2,717,133,157
	Inflation Costs					
2045				$ 2,392,165,694	$ 234,444,167	$ 2,717,133,157

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Core Interchange - Structure Items - FCA Option A

Bridge New 2025	$	14,332,000		
Total Rehab Cost			$	14,332,000
Bridge Rehab 2025	$	9,346,725		
Total Rehab Cost			$	9,346,725
Bridge Rehab 2045	$	99,107,886		
Rehab Cost			$	76,551,365
			$	-
Bearing Replacement Cost			$	1,299,000
Painting Cost			$	21,257,521
Bridge Combined 2045	$	177,557,370		
Rehab Cost			$	5,485,280
Rebuild Cost			$	172,072,090
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100

Cost Estimate on Fiscally Constrained Alternatives

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CTDOT Project #151-331
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Structure Items - Option A - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
	Route 8	SR 846 SB	1715		11,759	$ 135	
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
	Highland Avenue	I-84	3207		15,120	$ 135	
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
					248,334		**$ 9,346,725**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
2	Route 8	SR 846 SB	1715		11,759	$ 135	
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ 160	$ 3,423,200
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 160	$ 2,178,080
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050	$ 160	$ 25,288,000
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 135	$ 3,019,275
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729		$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
40	Highland Avenue	I-84	3207		15,120	$ 135	
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
							$ 76,551,365

Cost Estimate on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	1	94	2914	31.0	4	8	2	
01715	1	96	12,048	125.5	17	34	9	
01716	3	261	11,432	43.8	6	36	9	
03183A	1	94	4,089	43.5	6	12	3	
03183B	1	94	4,089	43.5	6	12	3	
03184A	1	95	4,132	43.5	6	12	3	
03184B	1	95	4,133	43.5	6	12	3	
03185	1	73	3,176	43.5	6	12	3	
03186	1	77	3,350	43.5	6	12	3	
03187	3	199	11,681	58.7	8	48	12	
03188	2	165	7,210	43.7	6	24	6	
03189	1	106	2,915	27.5	3	6	2	
03190A	36	2,634	131,987	50.1	7	504	126	$378,000.00
03190B	21	1,589	75,312	47.4	6	252	63	$189,000.00
03190C	9	877	24,188	27.6	3	54	0	$0.00
03190D	9	778	21,395	27.5	3	54	14	$42,000.00
03190E	7	495	13,613	27.5	3	42	11	$33,000.00
03190F	10	652	17,930	27.5	3	60	15	$45,000.00
03191A	46	3,766	231,227	61.4	8	736	0	$0.00
03191B	30	2,461	154,873	62.9	8	480	120	$360,000.00
03191C	4	408	11,220	27.5	3	24	0	$0.00
03191D	10	781	27,726	35.5	5	100	25	$75,000.00
03191E	8	630	22,365	35.5	5	80	20	$60,000.00
03191F	11	672	18,480	27.5	3	66	0	$0.00
03191G	3	228	6,316	27.7	3	18	5	$15,000.00
03191H	1	70	1,890	27.0	3	6	2	$6,000.00
03191I	3	296	10,508	35.5	5	30	0	$0.00
03192	1	81	2,729	33.7	4	8	0	$0.00
03193	2	133	6,344	47.7	6	24	6	$18,000.00
03194	3	195	5,402	27.7	3	18	5	$15,000.00
03196	1	64	8,480	132.5	18	36	9	
03197	3	201	8547	42.5	6	36	9	
03198	3	138	6,030	43.7	6	36	9	$27,000.00
03200	6	703	19,332	27.5	3	36	9	$27,000.00
03201	4	362	3620	10.0	1	8	2	
03203A	1	134	9,058	67.6	9	18	5	
03203B	1	134	8,589	64.1	9	18	5	
03203C	1	134	4,234	31.6	4	8	2	
03205	1	117	12,648	108.1	15	30	8	
03207	3	288	15120	52.5	7	42	11	
03209	1	141	5,798	41.1	5	10	3	$9,000.00
04318	3	545	37,333	68.5	9	54	14	
							TOTAL	$1,299,000.00

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	1	94	2914	31	4	376	4011.92	
01715	1	96	12,048	125.5	17	1632	17413.44	
01716	3	261	11,432	43.800766	6	1566	16709.22	
03183A	1	94	4,089	43.5	6	564	6017.88	
03183B	1	94	4,089	43.5	6	564	6017.88	
03184A	1	95	4,132	43.494737	6	570	6081.9	
03184B	1	95	4,133	43.505263	6	570	6081.9	
03185	1	73	3,176	43.506849	6	438	4673.46	
03186	1	77	3,350	43.506494	6	462	4929.54	
03187	3	199	11,681	58.698492	8	1592	16986.64	
03188	2	165	7,210	43.69697	6	990	10563.3	
03189	1	106	2,915	27.5	3	318	3393.06	
03190A	36	2,634	131,987	50.10896	7	18438	196733.46	$5,902,003.80
03190B	21	1,589	75,312	47.395846	6	9534	101727.78	$3,051,833.40
03190C	9	877	24,188	27.580388	3	2631	0	$0.00
03190D	9	778	21,395	27.5	3	2334	24903.78	$747,113.40
03190E	7	495	13,613	27.50101	3	1485	15844.95	$475,348.50
03190F	10	652	17,930	27.5	3	1956	20870.52	$626,115.60
03191A	46	3,766	231,227	61.398566	8	30128	0	$0.00
03191B	30	2,461	154,873	62.930922	8	19688	210070.96	$6,302,128.80
03191C	4	408	11,220	27.5	3	1224	0	$0.00
03191D	10	781	27,726	35.50064	5	3905	41666.35	$1,249,990.50
03191E	8	630	22,365	35.5	5	3150	33610.5	$1,008,315.00
03191F	11	672	18,480	27.5	3	2016	0	$0.00
03191G	3	228	6,316	27.701754	3	684	7298.28	$218,948.40
03191H	1	70	1,890	27	3	210	2240.7	$67,221.00
03191I	3	296	10,508	35.5	5	1480	0	$0.00
03192	1	81	2,729	33.691358	4	324	0	$0.00
03193	2	133	6,344	47.699248	6	798	8514.66	$255,439.80
03194	3	195	5,402	27.702564	3	585	6241.95	$187,258.50
03196	1	64	8,480	132.5	18	1152	12291.84	
03197	3	201	8547	42.522388	6	1206	12868.02	
03198	3	138	6,030	43.695652	6	828	8834.76	$265,042.80
03200	6	703	19,332	27.499289	3	2109	22503.03	$675,090.90
03201	4	362	3620	10	1	362	3862.54	
03203A	1	134	9,058	67.597015	9	1206	12868.02	
03203B	1	134	8,589	64.097015	9	1206	12868.02	
03203C	1	134	4,234	31.597015	4	536	5719.12	
03205	1	117	12,648	108.10256	15	1755	18725.85	
03207	3	288	15120	52.5	7	2016	21510.72	
03209	1	141	5,798	41.120567	5	705	7522.35	$225,670.50
04318	3	545	37,333	68.500917	9	4905	52336.35	
							TOTAL	$21,257,520.90

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option A - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		
	Rehabilitation				12,059	$ 160	$ 1,929,440
	Reconstruct				12,059	$ 420	$ 5,064,780
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ 674	$ 149,363,950
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
	Rehabilitation				3,740	$ 160	$ 598,400
	Reconstruct				7,480	$ 420	$ 3,141,600
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		
	Rehabilitation				18,484	$ 160	$ 2,957,440
	Reconstruct				9,242	$ 420	$ 3,881,640
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
	Rehabilitation					$ 135	$ -
	Reconstruct				14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
	Rehabilitation					$ 135	$ -
	Reconstruct				10,508.00	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 5,485,280
						Reconstruct	**$ 172,072,090**

Cost Estimation on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665

Date: 17-Oct-18

New Structures - Alternate 6 and Option A

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ -	$ -
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ -	$ -
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ -	$ -
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ -	$ -
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ -**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option B

Cost Verification on FCA Option B

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option B

			revised Alternate 6			FCA Option B	
Earth Exc			$ 251,642			**$ 2,000,000**	
Rock Exc			$ 146,850			**$ 500,000**	
Unsuitable Exc							
Contaminated			$ 46,600			**$ 1,000,000**	
Hazardous Waste			$ 29,957			**$ 750,000**	
Borrow						**$ 1,000,000**	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 10,000,000**	
Superpave			$ 100,000			**$ 10,000,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 6,000,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 2,000,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			**$ 14,332,000**				
Bridge Proposed by 2045						**$ 118,758,116**	
Bridge Demolition			$ -			**$ 2,354,100**	
Bridge Rehabilitation by 2025			**$ 33,525,090**				
Bridge Rehabilitation by 2045						**$ 132,532,205**	
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**	CD Roadway - Concept Station
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			**$ 3,500,000**	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns - Concept Station
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 49,822,188**			**$ 456,956,801**	

Engineering Design Costs					
Program Management Costs	4%	$ 1,992,888		$ 18,278,272	
Engineering Design Costs	9%	$ 4,483,997		$ 41,126,112	
CTDOT Design/Administration Costs	13%	$ 6,476,884		$ 59,404,384	
Subtotal		**$ 12,953,769**		**$ 118,808,768**	

			Alternate 6			FCA Option B	
Civil Highway Items			$ 1,205,049			$ 103,312,379	
Structural Bridge Items			$ 48,617,139			$ 353,644,422	
SubTotal (Major Items)			**$ 49,822,188**			**$ 456,956,801**	
Engineering Design Costs				**$ 12,953,769**			**$ 118,808,768**
Minor Items (25%)			$ 12,455,547			$ 114,239,200	
SubTotal			**$ 62,277,735**			**$ 571,196,001**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,555			$ 11,423,920	
MPT	10%		$ 6,227,774			$ 57,119,600	
Mobilization	8%		$ 4,670,830			$ 42,839,700	
Construction Staking	1%		$ 622,777			$ 5,711,960	
Subtotal			**$ 75,044,671**			**$ 688,291,181**	
Additional Items							
Incidentals	21%		$ 15,759,381			$ 144,541,148	
Contingencies	30%		$ 22,513,401			$ 206,487,354	
Utility Cost	3%		$ 2,251,340			$ 20,648,735	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 116,068,793**	**$ 12,953,769**		**$ 1,099,968,419**	**$ 118,808,768**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,068,793	$ 12,953,769	$ 1,099,968,419	$ 118,808,768	$ 1,347,799,749
	Inflation Costs	$ 4,062,408	$ 453,382	$ 38,498,895	$ 4,158,307	
2018		$ 120,131,201	$ 13,407,151	$ 1,138,467,313	$ 122,967,075	$ 1,394,972,740
	Inflation Costs	$ 4,204,592	$ 469,250	$ 39,846,356	$ 4,303,848	
2019		$ 124,335,793	$ 13,876,401	$ 1,178,313,669	$ 127,270,923	$ 1,443,796,786
	Inflation Costs	$ 4,351,753	$ 485,674	$ 41,240,978	$ 4,454,482	
2020		$ 128,687,545	$ 14,362,075	$ 1,219,554,648	$ 131,725,405	$ 1,494,329,673
	Inflation Costs	$ 4,504,064	$ 502,673	$ 42,684,413	$ 4,610,389	
2021		$ 133,191,609	$ 14,864,748	$ 1,262,239,060	$ 136,335,794	$ 1,546,631,212
	Inflation Costs	$ 4,661,706	$ 520,266	$ 44,178,367	$ 4,771,753	
2022		$ 137,853,316	$ 15,385,014	$ 1,306,417,428	$ 141,107,547	$ 1,600,763,304
	Inflation Costs	$ 4,824,866	$ 538,475	$ 45,724,610	$ 4,938,764	
2023		$ 142,678,182	$ 15,923,489	$ 1,352,142,038	$ 146,046,311	$ 1,656,790,020
	Inflation Costs	$ 4,993,736	$ 557,322	$ 47,324,971	$ 5,111,621	
2024		$ 147,671,918	$ 16,480,812	$ 1,399,467,009	$ 151,157,932	$ 1,714,777,671
	Inflation Costs	$ 5,168,517	$ 560,323	$ 48,981,345	$ 5,290,528	
2025		$ 152,840,435	$ 17,041,135	$ 1,448,448,354	$ 156,448,460	$ 1,774,778,384
	Inflation Costs	$ 5,349,415		$ 50,695,692	$ 5,475,696	
2026		$ 158,189,851	$ 17,041,135	$ 1,499,144,047	$ 161,924,156	$ 1,836,299,187
	Inflation Costs			$ 52,470,042	$ 5,667,345	
2027		$ 158,189,851	$ 17,041,135	$ 1,551,614,088	$ 167,591,501	$ 1,894,436,574
	Inflation Costs			$ 54,306,493	$ 5,865,703	
2028		$ 158,189,851	$ 17,041,135	$ 1,605,920,581	$ 173,457,204	$ 1,954,608,770
	Inflation Costs			$ 56,207,220	$ 6,071,002	
2029				$ 1,662,127,802	$ 179,528,206	$ 2,016,886,993
	Inflation Costs			$ 58,174,473	$ 6,283,487	
2030				$ 1,720,302,275	$ 185,811,693	$ 2,081,344,953
	Inflation Costs			$ 60,210,580	$ 6,503,409	
2031				$ 1,780,512,854	$ 192,315,102	$ 2,148,058,942
	Inflation Costs			$ 62,317,950	$ 6,731,029	
2032				$ 1,842,830,804	$ 199,046,131	$ 2,217,107,920
	Inflation Costs			$ 64,499,078	$ 6,966,615	
2033				$ 1,907,329,882	$ 206,012,745	$ 2,288,573,613
	Inflation Costs			$ 66,756,546	$ 7,210,446	
2034				$ 1,974,086,428	$ 213,223,192	$ 2,362,540,605
	Inflation Costs			$ 69,093,025	$ 7,462,812	
2035				$ 2,043,179,453	$ 220,686,003	$ 2,439,096,442
	Inflation Costs			$ 71,511,281	$ 7,724,010	
2036				$ 2,114,690,734	$ 228,410,013	$ 2,518,331,733
	Inflation Costs			$ 74,014,176	$ 7,994,350	
2037				$ 2,188,704,910	$ 236,404,364	$ 2,600,340,259
	Inflation Costs			$ 76,604,672	$ 8,274,153	
2038				$ 2,265,309,582	$ 244,678,517	$ 2,685,219,083
	Inflation Costs			$ 79,285,835	$ 8,318,706	
2039				$ 2,344,595,417	$ 252,997,222	$ 2,772,823,624
	Inflation Costs			$ 82,060,840	$ 8,854,903	
2040				$ 2,426,656,256	$ 261,852,125	$ 2,863,739,367
	Inflation Costs			$ 84,932,969		
2041				$ 2,511,589,225	$ 261,852,125	$ 2,948,672,336
	Inflation Costs			$ 87,905,623		
2042				$ 2,599,494,848	$ 261,852,125	$ 3,036,577,959
	Inflation Costs					
2043				$ 2,599,494,848	$ 261,852,125	$ 3,036,577,959
	Inflation Costs					
2044				$ 2,599,494,848	$ 261,852,125	$ 3,036,577,959
	Inflation Costs					
2045				$ 2,599,494,848	$ 261,852,125	$ 3,036,577,959

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option B

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	33,525,090		
Total Rehab Cost			$	33,525,090
Bridge Rehab 2045	$	127,677,485		
Rehab Cost			$	76,673,490
			$	9,320,400
Bearing Replacement Cost			$	2,262,000
Painting Cost			$	39,421,595
Bridge Combined 2045	$	123,612,836		
Rehab Cost			$	4,854,720
Rebuild Cost			$	118,758,116
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100
Total Bridge Rehabilitation 2045			$	132,532,205

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2025 Rehab

	Bridge	**Crossing**	**Number**		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
2	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ -	$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ -	$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ -	$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
40	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
							$ 76,673,490

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.0	4	8	2	$6,000
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	$27,000
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.8	6	36	9	$27,000
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.5	6	12	3	$9,000
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.5	6	12	3	$9,000
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.5	6	12	3	$9,000
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.5	6	12	3	$9,000
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.7	8	48	12	$36,000
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.7	6	24	6	$18,000
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	$6,000
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.1	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.4	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.6	3	54	14	$42,000
03190D	-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.4	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.9	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.7	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.0	3	6	2	$6,000
03191I	-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.7	4	8	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.7	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	$27,000
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.5	6	36	9	$27,000
03198	RTE 8 NB over Freight Street	3	138	6,030	43.7	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.5	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.0	1	8	2	$6,000
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.6	9	18	5	$15,000
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.1	9	18	5	$15,000
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.6	4	8	2	$6,000
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1	15	30	8	$24,000
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	$33,000
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.1	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.5	9	54	14	$42,000
								TOTAL	$2,262,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.0	4	376	4012	$120,358
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	$522,403
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.8	6	1566	16709	$501,277
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.5	6	570	6082	$182,457
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.5	6	570	6082	$182,457
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.5	6	438	4673	$140,204
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.5	6	462	4930	$147,886
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.7	8	1592	16987	$509,599
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.7	6	990	10563	$316,899
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	$101,792
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.1	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.4	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.6	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.4	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.9	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.7	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.0	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.7	4	324	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.7	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	$368,755
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.5	6	1206	12868	$386,041
03198	RTE 8 NB over Freight Street	3	138	6,030	43.7	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.5	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.0	1	362	3863	$115,876
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.6	9	1206	12868	$386,041
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.1	9	1206	12868	$386,041
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.6	4	536	5719	$171,574
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1	15	1755	18726	$561,776
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	$645,322
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.1	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.5	9	4905	52336	$1,570,091
								TOTAL	$39,421,595

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation Simple Spans				110,056	$ 296	$ 32,576,576
	Rehabilitation Fracture Critical				111,643	$ 296	$ 33,029,582
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Rehabilitation Simple Spans				140,308	$ 296	$ 41,531,168
	Rehabilitation Fracture Critical				17,742	$ 296	$ 5,248,971
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	**$ 4,854,720**
						Reconstruct	**$ 118,758,116**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option B

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	$ 1,900,800
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	$ 4,309,200
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ 9,320,400**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option B
Core Interchange

Core Interchange - Cost Verification on FCA Option B

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option B

			revised Alternate 6			FCA Option B	
Earth Exc			$ 251,642			**$ 2,000,000**	
Rock Exc			$ 146,850			**$ 500,000**	
Unsuitable Exc							
Contaminated			$ 46,600			**$ 1,000,000**	
Hazardous Waste			$ 29,957			**$ 750,000**	
Borrow						**$ 1,000,000**	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 7,500,000**	
Superpave			$ 100,000			**$ 7,500,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 4,500,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 1,500,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			**$ 14,332,000**				
Bridge Proposed by 2045						**$ 118,758,116**	
Bridge Demolition			$ -			**$ 2,354,100**	
Bridge Rehabilitation by 2025			**$ 9,346,725**				
Bridge Rehabilitation by 2045						**$ 90,986,522**	
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**	CD Roadway - Concept Station
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			**$ 3,500,000**	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns - Concept Station
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 25,643,823**			**$ 408,411,117**	

Engineering Design Costs					
Program Management Costs	4%	$	1,025,753	$	16,336,445
Engineering Design Costs	9%	$	2,307,944	$	36,757,001
CTDOT Design/Administration Costs	13%	$	3,333,697	$	53,093,445
Subtotal		**$**	**6,667,394**	**$**	**106,186,890**

			Alternate 6			FCA Option B	
Civil Highway Items			$ 1,205,049			$ 96,312,379	
Structural Bridge Items			$ 24,438,774			$ 312,098,738	
SubTotal (Major Items)			**$ 25,643,823**			**$ 408,411,117**	
Engineering Design Costs				**$ 6,667,394**			**$ 106,186,890**
Minor Items (25%)			$ 6,410,956			$ 102,102,779	
SubTotal			**$ 32,054,779**			**$ 510,513,896**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 641,096			$ 10,210,278	
MPT	10%		$ 3,205,478			$ 51,051,390	
Mobilization	8%		$ 2,404,108			$ 38,288,542	
Construction Staking	1%		$ 320,548			$ 5,105,139	
Subtotal			**$ 38,626,008**			**$ 615,169,245**	
Additional Items							
Incidentals	21%		$ 8,111,462			$ 129,185,541	
Contingencies	30%		$ 11,587,803			$ 184,550,774	
Utility Cost	3%		$ 1,158,780			$ 18,455,077	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 59,984,053**	**$ 6,667,394**		**$ 987,360,637**	**$ 106,186,890**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 59,984,053	$ 6,667,394	$ 987,360,637	$ 106,186,890	$ 1,160,198,975
	Inflation Costs	$ 2,099,442	$ 233,359	$ 34,557,622	$ 3,716,541	
2018		$ 62,083,495	$ 6,900,753	$ 1,021,918,260	$ 109,903,432	$ 1,200,805,939
	Inflation Costs	$ 2,172,922	$ 241,526	$ 35,767,139	$ 3,846,620	
2019		$ 64,256,417	$ 7,142,279	$ 1,057,685,399	$ 113,750,052	$ 1,242,834,147
	Inflation Costs	$ 2,248,975	$ 249,980	$ 37,018,989	$ 3,981,252	
2020		$ 66,505,392	$ 7,392,259	$ 1,094,704,388	$ 117,731,304	$ 1,286,333,342
	Inflation Costs	$ 2,327,689	$ 258,729	$ 38,314,654	$ 4,120,596	
2021		$ 68,833,080	$ 7,650,988	$ 1,133,019,041	$ 121,851,899	$ 1,331,355,009
	Inflation Costs	$ 2,409,158	$ 267,785	$ 39,655,666	$ 4,264,816	
2022		$ 71,242,238	$ 7,918,773	$ 1,172,674,708	$ 126,116,716	$ 1,377,952,434
	Inflation Costs	$ 2,493,478	$ 277,157	$ 41,043,615	$ 4,414,085	
2023		$ 73,735,717	$ 8,195,930	$ 1,213,718,323	$ 130,530,801	$ 1,426,180,769
	Inflation Costs	$ 2,580,750	$ 286,858	$ 42,480,141	$ 4,568,578	
2024		$ 76,316,467	$ 8,482,787	$ 1,256,198,464	$ 135,099,379	$ 1,476,097,096
	Inflation Costs	$ 2,671,076	$ 288,402	$ 43,966,946	$ 4,728,478	
2025		$ 78,987,543	$ 8,771,189	$ 1,300,165,410	$ 139,827,857	$ 1,527,751,999
	Inflation Costs	$ 2,764,564		$ 45,505,789	$ 4,893,975	
2026		$ 81,752,107	$ 8,771,189	$ 1,345,671,199	$ 144,721,832	$ 1,580,916,328
	Inflation Costs			$ 47,098,492	$ 5,065,264	
2027		$ 81,752,107	$ 8,771,189	$ 1,392,769,691	$ 149,787,096	$ 1,633,080,084
	Inflation Costs			$ 48,746,939	$ 5,242,548	
2028		$ 81,752,107	$ 8,771,189	$ 1,441,516,631	$ 155,029,644	$ 1,687,069,571
	Inflation Costs			$ 50,453,082	$ 5,426,038	
2029				$ 1,491,969,713	$ 160,455,682	$ 1,742,948,691
	Inflation Costs			$ 52,218,940	$ 5,615,949	
2030				$ 1,544,188,653	$ 166,071,631	$ 1,800,783,580
	Inflation Costs			$ 54,046,603	$ 5,812,507	
2031				$ 1,598,235,255	$ 171,884,138	$ 1,860,642,690
	Inflation Costs			$ 55,938,234	$ 6,015,945	
2032				$ 1,654,173,489	$ 177,900,083	$ 1,922,596,868
	Inflation Costs			$ 57,896,072	$ 6,226,503	
2033				$ 1,712,069,562	$ 184,126,586	$ 1,986,719,443
	Inflation Costs			$ 59,922,435	$ 6,444,430	
2034				$ 1,771,991,996	$ 190,571,016	$ 2,053,086,308
	Inflation Costs			$ 62,019,720	$ 6,669,986	
2035				$ 1,834,011,716	$ 197,241,002	$ 2,121,776,014
	Inflation Costs			$ 64,190,410	$ 6,903,435	
2036				$ 1,898,202,126	$ 204,144,437	$ 2,192,869,859
	Inflation Costs			$ 66,437,074	$ 7,145,055	
2037				$ 1,964,639,200	$ 211,289,492	$ 2,266,451,989
	Inflation Costs			$ 68,762,372	$ 7,395,132	
2038				$ 2,033,401,573	$ 218,684,624	$ 2,342,609,493
	Inflation Costs			$ 71,169,055	$ 7,434,952	
2039				$ 2,104,570,628	$ 226,119,576	$ 2,421,213,500
	Inflation Costs			$ 73,659,972	$ 7,914,185	
2040				$ 2,178,230,600	$ 234,033,762	$ 2,502,787,657
	Inflation Costs			$ 76,238,071		
2041				$ 2,254,468,671	$ 234,033,762	$ 2,579,025,728
	Inflation Costs			$ 78,906,403		
2042				$ 2,333,375,074	$ 234,033,762	$ 2,657,932,132
	Inflation Costs					
2043				$ 2,333,375,074	$ 234,033,762	$ 2,657,932,132
	Inflation Costs					
2044				$ 2,333,375,074	$ 234,033,762	$ 2,657,932,132
	Inflation Costs					
2045				$ 2,333,375,074	$ 234,033,762	$ 2,657,932,132

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option B

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	9,346,725		
Total Rehab Cost			$	9,346,725
Bridge Rehab 2045	$	86,131,802		
Rehab Cost			$	52,495,125
			$	-
Bearing Replacement Cost			$	1,893,000
Painting Cost			$	31,743,677
Bridge Combined 2045	$	123,612,836		
Rehab Cost			$	4,854,720
Rebuild Cost			$	118,758,116
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100
Total Bridge Rehabilitation 2045			$	90,986,522

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
	Route 8	SR 846 SB	1715		11,759	$ 135	
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
	Highland Avenue	I-84	3207		15,120	$ 135	
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
					248,334		**$ 9,346,725**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
2	Route 8	SR 846 SB	1715		11,759	$ 135	
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ -	$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ -	$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ -	$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
40	Highland Avenue	I-84	3207		15,120	$ 135	
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
							$ 52,495,125

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.0	4	8	2	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.8	6	36	9	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.5	6	12	3	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.5	6	12	3	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.5	6	12	3	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.5	6	12	3	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.7	8	48	12	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.7	6	24	6	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.1	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.4	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.6	3	54	14	$42,000
03190D	-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.4	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.9	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.7	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.0	3	6	2	$6,000
03191I	-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.7	4	8	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.7	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.5	6	36	9	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.7	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.5	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.0	1	8	2	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.6	9	18	5	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.1	9	18	5	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.6	4	8	2	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1	15	30	8	
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.1	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.5	9	54	14	
								TOTAL	$1,893,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.0	4	376	4012	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.8	6	1566	16709	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.5	6	570	6082	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.5	6	570	6082	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.5	6	438	4673	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.5	6	462	4930	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.7	8	1592	16987	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.7	6	990	10563	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.1	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.4	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.6	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.4	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.9	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.7	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.0	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.7	4	324	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.7	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.5	6	1206	12868	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.7	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.5	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.0	1	362	3863	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.6	9	1206	12868	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.1	9	1206	12868	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.6	4	536	5719	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1	15	1755	18726	
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.1	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.5	9	4905	52336	
								TOTAL	$31,743,677

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option B - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation Simple Spans				110,056	$ 296	$ 32,576,576
	Rehabilitation Fracture Critical				111,643	$ 296	$ 33,029,582
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Rehabilitation Simple Spans				140,308	$ 296	$ 41,531,168
	Rehabilitation Fracture Critical				17,742	$ 296	$ 5,248,971
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	**$ 4,854,720**
						Reconstruct	**$ 118,758,116**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option B

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ -**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option C

Cost Verification on FCA Option C

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option C

			revised Alternate 6			FCA Option C	
Earth Exc			$ 251,642			**$ 2,000,000**	
Rock Exc			$ 146,850			**$ 500,000**	
Unsuitable Exc							
Contaminated			$ 46,600			**$ 1,000,000**	
Hazardous Waste			$ 29,957			**$ 750,000**	
Borrow						**$ 1,000,000**	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 10,000,000**	
Superpave			$ 100,000			**$ 10,000,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 6,000,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 2,000,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			**$ 14,322,000**				
Bridge Proposed by 2045						**$ 6,371,820**	
Bridge Demolition			$ -			**$ 2,354,100**	
Bridge Rehabilitation by 2025			**$ 33,525,090**				
Bridge Rehabilitation by 2045						**$ 195,798,389**	
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**	CD Roadway - Concept Station
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			**$ 3,500,000**	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns - Concept Station
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 49,812,188**			**$ 407,836,688**	

Engineering Design Costs					
Program Management Costs	4%	$	1,992,488	$	16,313,468
Engineering Design Costs	9%	$	4,483,097	$	36,705,302
CTDOT Design/Administration Costs	13%	$	6,475,584	$	53,018,769
Subtotal		**$**	**12,951,169**	**$**	**106,037,539**

			Alternate 6			FCA Option C	
Civil Highway Items			$ 1,205,049			$ 103,312,379	
Structural Bridge Items			$ 48,607,139			$ 304,524,309	
SubTotal (Major Items)			**$ 49,812,188**			**$ 407,836,688**	
Engineering Design Costs				**$ 12,951,169**			**$ 106,037,539**
Minor Items (25%)			$ 12,453,047			$ 101,959,172	
SubTotal			**$ 62,265,235**			**$ 509,795,860**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,305			$ 10,195,917	
MPT	10%		$ 6,226,524			$ 50,979,586	
Mobilization	8%		$ 4,669,893			$ 38,234,689	
Construction Staking	1%		$ 622,652			$ 5,097,959	
Subtotal			**$ 75,029,608**			**$ 614,304,011**	
Additional Items							
Incidentals	21%		$ 15,756,218			$ 129,003,842	
Contingencies	30%		$ 22,508,882			$ 184,291,203	
Utility Cost	3%		$ 2,250,888			$ 18,429,120	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 116,045,597**	**$ 12,951,169**		**$ 986,028,177**	**$ 106,037,539**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,045,597	$ 12,951,169	$ 986,028,177	$ 106,037,539	$ 1,221,062,481
	Inflation Costs	$ 4,061,596	$ 453,291	$ 34,510,986	$ 3,711,314	
2018		$ 120,107,192	$ 13,404,460	$ 1,020,539,163	$ 109,748,853	$ 1,263,799,668
	Inflation Costs	$ 4,203,752	$ 469,156	$ 35,718,871	$ 3,841,210	
2019		$ 124,310,944	$ 13,873,616	$ 1,056,258,034	$ 113,590,063	$ 1,308,032,656
	Inflation Costs	$ 4,350,883	$ 485,577	$ 36,969,031	$ 3,975,652	
2020		$ 128,661,827	$ 14,359,192	$ 1,093,227,065	$ 117,565,715	$ 1,353,813,799
	Inflation Costs	$ 4,503,164	$ 502,572	$ 38,262,947	$ 4,114,800	
2021		$ 133,164,991	$ 14,861,764	$ 1,131,490,012	$ 121,680,515	$ 1,401,197,282
	Inflation Costs	$ 4,660,775	$ 520,162	$ 39,602,150	$ 4,258,818	
2022		$ 137,825,766	$ 15,381,926	$ 1,171,092,163	$ 125,939,333	$ 1,450,239,187
	Inflation Costs	$ 4,823,902	$ 538,367	$ 40,988,226	$ 4,407,877	
2023		$ 142,649,668	$ 15,920,293	$ 1,212,080,388	$ 130,347,209	$ 1,500,997,559
	Inflation Costs	$ 4,992,738	$ 557,210	$ 42,422,814	$ 4,562,152	
2024		$ 147,642,406	$ 16,477,504	$ 1,254,503,202	$ 134,909,362	$ 1,553,532,473
	Inflation Costs	$ 5,167,484	$ 560,211	$ 43,907,612	$ 4,721,828	
2025		$ 152,809,890	$ 17,037,714	$ 1,298,410,814	$ 139,631,189	$ 1,607,889,608
	Inflation Costs	$ 5,348,346		$ 45,444,378	$ 4,887,092	
2026		$ 158,158,236	$ 17,037,714	$ 1,343,855,193	$ 144,518,281	$ 1,663,569,424
	Inflation Costs			$ 47,034,932	$ 5,058,140	
2027		$ 158,158,236	$ 17,037,714	$ 1,390,890,124	$ 149,576,421	$ 1,715,662,496
	Inflation Costs			$ 48,681,154	$ 5,235,175	
2028		$ 158,158,236	$ 17,037,714	$ 1,439,571,279	$ 154,811,596	$ 1,769,578,825
	Inflation Costs			$ 50,384,995	$ 5,418,406	
2029				$ 1,489,956,273	$ 160,230,001	$ 1,825,382,226
	Inflation Costs			$ 52,148,470	$ 5,608,050	
2030				$ 1,542,104,743	$ 165,838,051	$ 1,883,138,745
	Inflation Costs			$ 53,973,666	$ 5,804,332	
2031				$ 1,596,078,409	$ 171,642,383	$ 1,942,916,743
	Inflation Costs			$ 55,862,744	$ 6,007,483	
2032				$ 1,651,941,153	$ 177,649,867	$ 2,004,786,971
	Inflation Costs			$ 57,817,940	$ 6,217,745	
2033				$ 1,709,759,094	$ 183,867,612	$ 2,068,822,656
	Inflation Costs			$ 59,841,568	$ 6,435,366	
2034				$ 1,769,600,662	$ 190,302,978	$ 2,135,099,591
	Inflation Costs			$ 61,936,023	$ 6,660,604	
2035				$ 1,831,536,685	$ 196,963,583	$ 2,203,696,219
	Inflation Costs			$ 64,103,784	$ 6,893,725	
2036				$ 1,895,640,469	$ 203,857,308	$ 2,274,693,728
	Inflation Costs			$ 66,347,416	$ 7,135,006	
2037				$ 1,961,987,886	$ 210,992,314	$ 2,348,176,150
	Inflation Costs			$ 68,669,576	$ 7,384,731	
2038				$ 2,030,657,462	$ 218,377,045	$ 2,424,230,457
	Inflation Costs			$ 71,073,011	$ 7,424,495	
2039				$ 2,101,730,473	$ 225,801,540	$ 2,502,727,963
	Inflation Costs			$ 73,560,567		
2040				$ 2,175,291,039	$ 225,801,540	$ 2,576,288,530
	Inflation Costs			$ 76,135,186		
2041				$ 2,251,426,226	$ 225,801,540	$ 2,652,423,716
	Inflation Costs			$ 78,799,918		
2042				$ 2,330,226,143	$ 225,801,540	$ 2,731,223,634
	Inflation Costs					
2043				$ 2,330,226,143	$ 225,801,540	$ 2,731,223,634
	Inflation Costs					
2044				$ 2,330,226,143	$ 225,801,540	$ 2,731,223,634
	Inflation Costs					
2045				$ 2,330,226,143	$ 225,801,540	$ 2,731,223,634

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option C

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	33,525,090		
Total Rehab Cost			$	33,525,090
Bridge Rehab 2045	$	127,677,485		
Rehab Cost			$	76,673,490
			$	9,320,400
Bearing Replacement Cost			$	2,262,000
Painting Cost			$	39,421,595
Bridge Combined 2045	$	74,492,723		
Rehab Cost			$	68,120,903
Rebuild Cost			$	6,371,820
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100
Total Bridge Rehabilitation 2045			$	195,798,389

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
2	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 135	
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
40	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
							$ 76,673,490

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	8	2	$6,000
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	$27,000
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	36	9	$27,000
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	12	3	$9,000
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	12	3	$9,000
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	12	3	$9,000
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	12	3	$9,000
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	48	12	$36,000
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	24	6	$18,000
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	$6,000
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	54	14	$42,000
03190D	-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	17	
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	6	2	$6,000
03191I	-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	8	
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	8	2	
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	$27,000
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	36	9	$27,000
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	8	2	$6,000
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	18	5	$15,000
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	18	5	$15,000
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	8	2	$6,000
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	30	8	$24,000
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	$33,000
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	54	14	$42,000
								TOTAL	$2,262,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	376	4012	$120,358
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	$522,403
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	1566	16709	$501,277
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	570	6082	$182,457
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	570	6082	$182,457
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	438	4673	$140,204
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	462	4930	$147,886
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	1592	16987	$509,599
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	990	10563	$316,899
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	$101,792
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	21511	
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	15792	
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	324	3457	
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	$368,755
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	1206	12868	$386,041
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	362	3863	$115,876
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	1206	12868	$386,041
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	1206	12868	$386,041
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	536	5719	$171,574
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	1755	18726	$561,776
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	$645,322
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	4905	52336	$1,570,091
								TOTAL	$39,421,595

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation				221,699	$ 167	$ 36,935,053
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Rehabilitation				158,050	$ 167	$ 26,331,130
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 68,120,903
						Reconstruct	**$ 6,371,820**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option C

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option C			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	$ 1,900,800
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	$ 4,309,200
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ 9,320,400**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option C
Core Interchange

Core Interchange - Cost Verification on FCA Option C

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option C

			revised Alternate 6			FCA Option C	
Earth Exc			$ 251,642			**$ 2,000,000**	
Rock Exc			$ 146,850			**$ 500,000**	
Unsuitable Exc							
Contaminated			$ 46,600			**$ 1,000,000**	
Hazardous Waste			$ 29,957			**$ 750,000**	
Borrow						**$ 1,000,000**	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 7,500,000**	
Superpave			$ 100,000			**$ 7,500,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 4,500,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 1,500,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			**$ 14,332,000**				
Bridge Proposed by 2045						**$ 6,371,820**	
Bridge Demolition			$ -			**$ 2,354,100**	
Bridge Rehabilitation by 2025			**$ 9,346,725**				
Bridge Rehabilitation by 2045						**$ 154,252,705**	
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**	CD Roadway - Concept Station
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			**$ 3,500,000**	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns - Concept Station
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 25,643,823**			**$ 359,291,004**	

Engineering Design Costs					
Program Management Costs	4%	$	1,025,753	$	14,371,640
Engineering Design Costs	9%	$	2,307,944	$	32,336,190
CTDOT Design/Administration Costs	13%	$	3,333,697	$	46,707,831
Subtotal		**$**	**6,667,394**	**$**	**93,415,661**

			Alternate 6			FCA Option C	
Civil Highway Items			$ 1,205,049			$ 96,312,379	
Structural Bridge Items			$ 24,438,774			$ 262,978,625	
SubTotal (Major Items)			**$ 25,643,823**			**$ 359,291,004**	
Engineering Design Costs				**$ 6,667,394**			**$ 93,415,661**
Minor Items (25%)			$ 6,410,956			$ 89,822,751	
SubTotal			**$ 32,054,779**			**$ 449,113,755**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 641,096			$ 8,982,275	
MPT	10%		$ 3,205,478			$ 44,911,376	
Mobilization	8%		$ 2,404,108			$ 33,683,532	
Construction Staking	1%		$ 320,548			$ 4,491,138	
Subtotal			**$ 38,626,008**			**$ 541,182,075**	
Additional Items							
Incidentals	21%		$ 8,111,462			$ 113,648,236	
Contingencies	30%		$ 11,587,803			$ 162,354,623	
Utility Cost	3%		$ 1,158,780			$ 16,235,462	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 59,984,053**	**$ 6,667,394**		**$ 873,420,396**	**$ 93,415,661**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 59,984,053	$ 6,667,394	$ 873,420,396	$ 93,415,661	$ 1,033,487,504
	Inflation Costs	$ 2,099,442	$ 233,359	$ 30,569,714	$ 3,269,548	
2018		$ 62,083,495	$ 6,900,753	$ 903,990,109	$ 96,685,209	$ 1,069,659,566
	Inflation Costs	$ 2,172,922	$ 241,526	$ 31,639,654	$ 3,383,982	
2019		$ 64,256,417	$ 7,142,279	$ 935,629,763	$ 100,069,192	$ 1,107,097,651
	Inflation Costs	$ 2,248,975	$ 249,980	$ 32,747,042	$ 3,502,422	
2020		$ 66,505,392	$ 7,392,259	$ 968,376,805	$ 103,571,613	$ 1,145,846,069
	Inflation Costs	$ 2,327,689	$ 258,729	$ 33,893,188	$ 3,625,006	
2021		$ 68,833,080	$ 7,650,988	$ 1,002,269,993	$ 107,196,620	$ 1,185,950,681
	Inflation Costs	$ 2,409,158	$ 267,785	$ 35,079,450	$ 3,751,882	
2022		$ 71,242,238	$ 7,918,773	$ 1,037,349,443	$ 110,948,501	$ 1,227,458,955
	Inflation Costs	$ 2,493,478	$ 277,157	$ 36,307,231	$ 3,883,198	
2023		$ 73,735,717	$ 8,195,930	$ 1,073,656,673	$ 114,831,699	$ 1,270,420,019
	Inflation Costs	$ 2,580,750	$ 286,858	$ 37,577,984	$ 4,019,109	
2024		$ 76,316,467	$ 8,482,787	$ 1,111,234,657	$ 118,850,808	$ 1,314,884,719
	Inflation Costs	$ 2,671,076	$ 288,402	$ 38,893,213	$ 4,159,778	
2025		$ 78,987,543	$ 8,771,189	$ 1,150,127,870	$ 123,010,587	$ 1,360,897,189
	Inflation Costs	$ 2,764,564		$ 40,254,475	$ 4,305,371	
2026		$ 81,752,107	$ 8,771,189	$ 1,190,382,345	$ 127,315,957	$ 1,408,221,599
	Inflation Costs			$ 41,663,382	$ 4,456,059	
2027		$ 81,752,107	$ 8,771,189	$ 1,232,045,728	$ 131,772,016	$ 1,454,341,040
	Inflation Costs			$ 43,121,600	$ 4,612,021	
2028		$ 81,752,107	$ 8,771,189	$ 1,275,167,328	$ 136,384,036	$ 1,502,074,661
	Inflation Costs			$ 44,630,856	$ 4,773,441	
2029				$ 1,319,798,185	$ 141,157,478	$ 1,551,478,958
	Inflation Costs			$ 46,192,936	$ 4,940,512	
2030				$ 1,365,991,121	$ 146,097,989	$ 1,602,612,406
	Inflation Costs			$ 47,809,689	$ 5,113,430	
2031				$ 1,413,800,810	$ 151,211,419	$ 1,655,535,525
	Inflation Costs			$ 49,483,028	$ 5,292,400	
2032				$ 1,463,283,839	$ 156,503,819	$ 1,710,310,953
	Inflation Costs			$ 51,214,934	$ 5,477,634	
2033				$ 1,514,498,773	$ 161,981,452	$ 1,767,003,521
	Inflation Costs			$ 53,007,457	$ 5,669,351	
2034				$ 1,567,506,230	$ 167,650,803	$ 1,825,680,329
	Inflation Costs			$ 54,862,718	$ 5,867,778	
2035				$ 1,622,368,948	$ 173,518,581	$ 1,886,410,825
	Inflation Costs			$ 56,782,913	$ 6,073,150	
2036				$ 1,679,151,861	$ 179,591,732	$ 1,949,266,889
	Inflation Costs			$ 58,770,315	$ 6,285,711	
2037				$ 1,737,922,176	$ 185,877,442	$ 2,014,322,915
	Inflation Costs			$ 60,827,276	$ 6,505,710	
2038				$ 1,798,749,452	$ 192,383,153	$ 2,081,655,901
	Inflation Costs			$ 62,956,231	$ 6,540,741	
2039				$ 1,861,705,683	$ 198,923,894	$ 2,151,152,873
	Inflation Costs			$ 65,159,699		
2040				$ 1,926,865,382	$ 198,923,894	$ 2,216,312,572
	Inflation Costs			$ 67,440,288		
2041				$ 1,994,305,671	$ 198,923,894	$ 2,283,752,861
	Inflation Costs			$ 69,800,698		
2042				$ 2,064,106,369	$ 198,923,894	$ 2,353,553,559
	Inflation Costs					
2043				$ 2,064,106,369	$ 198,923,894	$ 2,353,553,559
	Inflation Costs					
2044				$ 2,064,106,369	$ 198,923,894	$ 2,353,553,559
	Inflation Costs					
2045				$ 2,064,106,369	$ 198,923,894	$ 2,353,553,559

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option C

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	9,346,725		
Total Rehab Cost			$	9,346,725
Bridge Rehab 2045	$	86,131,802		
Rehab Cost			$	52,495,125
			$	-
Bearing Replacement Cost			$	1,893,000
Painting Cost			$	31,743,677
Bridge Combined 2045	$	74,492,723		
Rehab Cost			$	68,120,903
Rebuild Cost			$	6,371,820
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100
Total Bridge Rehabilitation 2045			$	154,252,705

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
	Route 8	SR 846 SB	1715		11,759	$ 135	
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
	Highland Avenue	I-84	3207		15,120	$ 135	
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
					248,334		**$ 9,346,725**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
2	Route 8	SR 846 SB	1715		11,759	$ 135	
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 135	
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
40	Highland Avenue	I-84	3207		15,120	$ 135	
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
							$ 52,495,125

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	8	2	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	36	9	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	12	3	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	12	3	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	12	3	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	12	3	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	48	12	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	24	6	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	54	14	$42,000
03190D	-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	17	
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	6	2	$6,000
03191I	-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	8	
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	8	2	
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	36	9	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	8	2	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	18	5	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	18	5	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	8	2	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	30	8	
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	54	14	
								TOTAL	$1,893,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	376	4012	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	1566	16709	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	570	6082	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	570	6082	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	438	4673	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	462	4930	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	1592	16987	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	990	10563	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	21511	
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	15792	
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	324	3457	
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	1206	12868	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	362	3863	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	1206	12868	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	1206	12868	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	536	5719	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	1755	18726	
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	4905	52336	
								TOTAL	$31,743,677

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option C - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation				221,699	$ 167	$ 36,935,053
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Rehabilitation				158,050	$ 167	$ 26,331,130
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 68,120,903
						Reconstruct	**$ 6,371,820**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option C

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option C			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ -**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option D

Cost Verification on FCA Option D

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option D

			revised Alternate 6			FCA Option D	
Earth Exc			$ 251,642			$ 2,000,000	
Rock Exc			$ 146,850			$ 500,000	
Unsuitable Exc							
Contaminated			$ 46,600			$ 1,000,000	
Hazardous Waste			$ 29,957			$ 750,000	
Borrow						$ 1,000,000	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 10,000,000**	
Superpave			$ 100,000			**$ 10,000,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 6,000,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 2,000,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			$ 14,332,000				
Bridge Proposed by 2045						**$ 111,460,555**	
Bridge Demolition			$ -			**$ 673,200**	
Bridge Rehabilitation by 2025			**$ 33,525,090**				
Bridge Rehabilitation by 2045						**$ 138,041,732**	
other Structures Miscellaneous			$ 760,049			**$ 55,000,000**	
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			$ 7,615,034	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 49,822,188**			**$ 442,602,900**	

Engineering Design Costs						
Program Management Costs	4%	$	1,992,888		$	17,704,116
Engineering Design Costs	9%	$	4,483,997		$	39,834,261
CTDOT Design/Administration Costs	13%	$	6,476,884		$	57,538,377
Subtotal		**$**	**12,953,769**		**$**	**115,076,754**

			Alternate 6			FCA Option D	
Civil Highway Items			$ 1,205,049			$ 107,427,413	
Structural Bridge Items			$ 48,617,139			$ 335,175,487	
SubTotal (Major Items)			**$ 49,822,188**			**$ 442,602,900**	
Engineering Design Costs				**$ 12,953,769**			**$ 115,076,754**
Minor Items (25%)			$ 12,455,547			$ 110,650,725	
SubTotal			**$ 62,277,735**			**$ 553,253,626**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,555			$ 11,065,073	
MPT	10%		$ 6,227,774			$ 55,325,363	
Mobilization	8%		$ 4,670,830			$ 41,494,022	
Construction Staking	1%		$ 622,777			$ 5,532,536	
Subtotal			**$ 75,044,671**			**$ 666,670,619**	
Additional Items							
Incidentals	21%		$ 15,759,381			$ 140,000,830	
Contingencies	30%		$ 22,513,401			$ 200,001,186	
Utility Cost	3%		$ 2,251,340			$ 20,000,119	
Right of Way			$ 500,000			$ 100,000,000	
Total Cost 2017			**$ 116,068,793**	**$ 12,953,769**		**$ 1,126,672,753**	**$ 115,076,754**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,068,793	$ 12,953,769	$ 1,126,672,753	$ 115,076,754	$ 1,370,772,069
	Inflation Costs	$ 4,062,408	$ 453,382	$ 39,433,546	$ 4,027,686	
2018		$ 120,131,201	$ 13,407,151	$ 1,166,106,299	$ 119,104,440	$ 1,418,749,091
	Inflation Costs	$ 4,204,592	$ 469,250	$ 40,813,720	$ 4,168,655	
2019		$ 124,335,793	$ 13,876,401	$ 1,206,920,020	$ 123,273,096	$ 1,468,405,309
	Inflation Costs	$ 4,351,753	$ 485,674	$ 42,242,201	$ 4,314,558	
2020		$ 128,687,545	$ 14,362,075	$ 1,249,162,220	$ 127,587,654	$ 1,519,799,495
	Inflation Costs	$ 4,504,064	$ 502,673	$ 43,720,678	$ 4,465,568	
2021		$ 133,191,609	$ 14,864,748	$ 1,292,882,898	$ 132,053,222	$ 1,572,992,477
	Inflation Costs	$ 4,661,706	$ 520,266	$ 45,250,901	$ 4,621,863	
2022		$ 137,853,316	$ 15,385,014	$ 1,338,133,799	$ 136,675,085	$ 1,628,047,214
	Inflation Costs	$ 4,824,866	$ 538,475	$ 46,834,683	$ 4,783,628	
2023		$ 142,678,182	$ 15,923,489	$ 1,384,968,482	$ 141,458,713	$ 1,685,028,867
	Inflation Costs	$ 4,993,736	$ 557,322	$ 48,473,897	$ 4,951,055	
2024		$ 147,671,918	$ 16,480,812	$ 1,433,442,379	$ 146,409,768	$ 1,744,004,877
	Inflation Costs	$ 5,168,517	$ 560,323	$ 50,170,483	$ 5,124,342	
2025		$ 152,840,435	$ 17,041,135	$ 1,483,612,863	$ 151,534,110	$ 1,805,028,542
	Inflation Costs	$ 5,349,415		$ 51,926,450	$ 5,303,694	
2026		$ 158,189,851	$ 17,041,135	$ 1,535,539,313	$ 156,837,804	$ 1,867,608,102
	Inflation Costs			$ 53,743,876	$ 5,489,323	
2027		$ 158,189,851	$ 17,041,135	$ 1,589,283,189	$ 162,327,127	$ 1,926,841,301
	Inflation Costs			$ 55,624,912	$ 5,681,449	
2028		$ 158,189,851	$ 17,041,135	$ 1,644,908,100	$ 168,008,576	$ 1,988,147,662
	Inflation Costs			$ 57,571,784	$ 5,880,300	
2029				$ 1,702,479,884	$ 173,888,876	$ 2,051,599,745
	Inflation Costs			$ 59,586,796	$ 6,086,111	
2030				$ 1,762,066,680	$ 179,974,987	$ 2,117,272,652
	Inflation Costs			$ 61,672,334	$ 6,299,125	
2031				$ 1,823,739,014	$ 186,274,112	$ 2,185,244,110
	Inflation Costs			$ 63,830,865	$ 6,519,594	
2032				$ 1,887,569,879	$ 192,793,705	$ 2,255,594,570
	Inflation Costs			$ 66,064,946	$ 6,747,780	
2033				$ 1,953,634,825	$ 199,541,485	$ 2,328,407,295
	Inflation Costs			$ 68,377,219	$ 6,983,952	
2034				$ 2,022,012,044	$ 206,525,437	$ 2,403,768,466
	Inflation Costs			$ 70,770,422	$ 7,228,390	
2035				$ 2,092,782,465	$ 213,753,827	$ 2,481,767,278
	Inflation Costs			$ 73,247,386	$ 7,481,384	
2036				$ 2,166,029,852	$ 221,235,211	$ 2,562,496,048
	Inflation Costs			$ 75,811,045	$ 7,743,232	
2037				$ 2,241,840,896	$ 228,978,444	$ 2,646,050,325
	Inflation Costs			$ 78,464,431	$ 8,014,246	
2038				$ 2,320,305,328	$ 236,992,689	$ 2,732,529,002
	Inflation Costs			$ 81,210,686	$ 8,057,399	
2039				$ 2,401,516,014	$ 245,050,088	$ 2,821,797,088
	Inflation Costs			$ 84,053,060		
2040				$ 2,485,569,075	$ 245,050,088	$ 2,905,850,148
	Inflation Costs			$ 86,994,918		
2041				$ 2,572,563,992	$ 245,050,088	$ 2,992,845,066
	Inflation Costs			$ 90,039,740		
2042				$ 2,662,603,732	$ 245,050,088	$ 3,082,884,806
	Inflation Costs					
2043				$ 2,662,603,732	$ 245,050,088	$ 3,082,884,806
	Inflation Costs					
2044				$ 2,662,603,732	$ 245,050,088	$ 3,082,884,806
	Inflation Costs					
2045				$ 2,662,603,732	$ 245,050,088	$ 3,082,884,806

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option D

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	33,525,090		
Total Rehab Cost			$	33,525,090
Bridge Rehab 2045	$	132,030,812		
Rehab Cost			$	79,723,035
			$	9,320,400
Bearing Replacement Cost			$	2,343,000
Painting Cost			$	40,644,377
Bridge Combined 2045	$	117,471,475		
Rehab Cost			$	6,010,920
Rebuild Cost			$	111,460,555
Bridge Demolition 2045	$	673,200		
Demolition Cost			$	673,200
Total Bridge Rehabilitation 2045			$	138,041,732

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - Work in 2045 - Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729		$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 673,200

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
2	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ 160	$ 3,858,880
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ 160	$ 3,423,200
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ -	$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ -	$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 135	$ 1,995,030
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
40	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
							$ 79,723,035

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	8	2	$6,000
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	$27,000
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	36	9	$27,000
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	$9,000
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	12	3	$9,000
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	12	3	$9,000
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	12	3	$9,000
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	12	3	$9,000
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	48	12	$36,000
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	24	6	$18,000
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	$6,000
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	54	14	$42,000
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	17	$51,000
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	6	2	$6,000
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	8	$24,000
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	8	2	$6,000
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	$27,000
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	36	9	$27,000
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	8	2	$6,000
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	18	5	$15,000
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	18	5	$15,000
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	8	2	$6,000
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	30	8	$24,000
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	$33,000
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	54	14	$42,000
								TOTAL	$2,343,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	376	4012	$120,358
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	$522,403
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	1566	16709	$501,277
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	$180,536
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	570	6082	$182,457
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	570	6082	$182,457
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	438	4673	$140,204
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	462	4930	$147,886
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	1592	16987	$509,599
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	990	10563	$316,899
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	$101,792
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	21511	$645,322
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	15792	$473,748
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	324	3457	$103,712
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	$368,755
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	1206	12868	$386,041
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	362	3863	$115,876
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	1206	12868	$386,041
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	1206	12868	$386,041
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	536	5719	$171,574
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	1755	18726	$561,776
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	$645,322
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	4905	52336	$1,570,091
								TOTAL	$40,644,377

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Reconstruct/Widening				221,699	$ 305	$ 67,589,334
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Reconstruct/Widening				158,050	$ 244	$ 38,611,666
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
	Rehab				20,795	$ 160	$ 3,327,120
	Reconstruct				6,932	$ 420	$ 2,911,230
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
	Rehab				16,774	$ 160	$ 2,683,800
	Reconstruct				5,591	$ 420	$ 2,348,325
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729		$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 6,010,920
						Reconstruct	**$ 111,460,555**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option D

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	$ 1,900,800
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	$ 4,309,200
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ 9,320,400**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option D
Core Interchange

Core Interchange - Cost Verification on FCA Option D

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option D

			revised Alternate 6			FCA Option D
Earth Exc			$ 251,642			$ 2,000,000
Rock Exc			$ 146,850			$ 500,000
Unsuitable Exc						
Contaminated			$ 46,600			$ 1,000,000
Hazardous Waste			$ 29,957			$ 750,000
Borrow						$ 1,000,000
Drainage System			$ 150,000			**$ 250,000**
Ex Drainage System			$ -			**$ 7,500,000**
Superpave			$ 100,000			**$ 7,500,000**
Concrete Base Widen			$ -			**$ 1,000,000**
Milling			$ -			**$ 4,500,000**
Concrete Pavement Replace						$ 87,000
Subbase			$ 35,000			**$ 1,500,000**
Major Pipe Culverts			$ -			
Concrete Box Culverts			$ -			
Bridge Proposed by 2025			$ 14,332,000			
Bridge Proposed by 2045						**$ 111,460,555**
Bridge Demolition			$ -			**$ 673,200**
Bridge Rehabilitation by 2025			**$ 9,346,725**			
Bridge Rehabilitation by 2045						**$ 96,496,049**
other Structures Miscellaneous			$ 760,049			**$ 55,000,000**
Retaining Walls			$ -			**$ 30,000,000**
Standpipes						
Concrete Median Barrier			$ -			**$ 2,000,000**
Major Traffic Signal Mods						$ 2,482,278
New Traffic Signal						$ 300,000
Concrete Sidewalk			$ 50,000			$ 1,330,000
Roadway Lighting			$ 40,000			$ 7,615,034
BCLC						$ 478,395
Concrete Curbing			$ 25,000			$ 687,400
Guide Rail			$ 20,000			$ 2,947,306
Signing & Striping			$ 10,000			**$ 15,000,000**
Stage Construction			$ -			**$ 25,000,000**
Noise Barriers						
Mitigation			$ 300,000			**$ 5,000,000**
IMS						**$ 10,000,000**
SubTotals			**$ 25,643,823**			**$ 394,057,217**

U Turns

Engineering Design Costs						
Program Management Costs	4%		$ 1,025,753			$ 15,762,289
Engineering Design Costs	9%		$ 2,307,944			$ 35,465,150
CTDOT Design/Administration Costs	13%		$ 3,333,697			$ 51,227,438
Subtotal			**$ 6,667,394**			**$ 102,454,876**

			Alternate 6			FCA Option D	
Civil Highway Items			$ 1,205,049			$ 100,427,413	
Structural Bridge Items			$ 24,438,774			$ 293,629,804	
SubTotal (Major Items)			**$ 25,643,823**			**$ 394,057,217**	
Engineering Design Costs				**$ 6,667,394**			**$ 102,454,876**
Minor Items (25%)			$ 6,410,956			$ 98,514,304	
SubTotal			**$ 32,054,779**			**$ 492,571,521**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 641,096			$ 9,851,430	
MPT	10%		$ 3,205,478			$ 49,257,152	
Mobilization	8%		$ 2,404,108			$ 36,942,864	
Construction Staking	1%		$ 320,548			$ 4,925,715	
Subtotal			**$ 38,626,008**			**$ 593,548,683**	
Additional Items							
Incidentals	21%		$ 8,111,462			$ 124,645,223	
Contingencies	30%		$ 11,587,803			$ 178,064,605	
Utility Cost	3%		$ 1,158,780			$ 17,806,460	
Right of Way			$ 500,000			$ 100,000,000	
Total Cost 2017			**$ 59,984,053**	**$ 6,667,394**		**$ 1,014,064,972**	**$ 102,454,876**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 59,984,053	$ 6,667,394	$ 1,014,064,972	$ 102,454,876	$ 1,183,171,295
	Inflation Costs	$ 2,099,442	$ 233,359	$ 35,492,274	$ 3,585,921	
2018		$ 62,083,495	$ 6,900,753	$ 1,049,557,246	$ 106,040,797	$ 1,224,582,290
	Inflation Costs	$ 2,172,922	$ 241,526	$ 36,734,504	$ 3,711,428	
2019		$ 64,256,417	$ 7,142,279	$ 1,086,291,749	$ 109,752,225	$ 1,267,442,670
	Inflation Costs	$ 2,248,975	$ 249,980	$ 38,020,211	$ 3,841,328	
2020		$ 66,505,392	$ 7,392,259	$ 1,124,311,960	$ 113,593,553	$ 1,311,803,164
	Inflation Costs	$ 2,327,689	$ 258,729	$ 39,350,919	$ 3,975,774	
2021		$ 68,833,080	$ 7,650,988	$ 1,163,662,879	$ 117,569,327	$ 1,357,716,274
	Inflation Costs	$ 2,409,158	$ 267,785	$ 40,728,201	$ 4,114,926	
2022		$ 71,242,238	$ 7,918,773	$ 1,204,391,080	$ 121,684,254	$ 1,405,236,344
	Inflation Costs	$ 2,493,478	$ 277,157	$ 42,153,688	$ 4,258,949	
2023		$ 73,735,717	$ 8,195,930	$ 1,246,544,767	$ 125,943,202	$ 1,454,419,616
	Inflation Costs	$ 2,580,750	$ 286,858	$ 43,629,067	$ 4,408,012	
2024		$ 76,316,467	$ 8,482,787	$ 1,290,173,834	$ 130,351,215	$ 1,505,324,303
	Inflation Costs	$ 2,671,076	$ 288,402	$ 45,156,084	$ 4,562,293	
2025		$ 78,987,543	$ 8,771,189	$ 1,335,329,919	$ 134,913,507	$ 1,558,002,158
	Inflation Costs	$ 2,764,564		$ 46,736,547	$ 4,721,973	
2026		$ 81,752,107	$ 8,771,189	$ 1,382,066,466	$ 139,635,480	$ 1,612,225,242
	Inflation Costs			$ 48,372,326	$ 4,887,242	
2027		$ 81,752,107	$ 8,771,189	$ 1,430,438,792	$ 144,522,722	$ 1,665,484,810
	Inflation Costs			$ 50,065,358	$ 5,058,295	
2028		$ 81,752,107	$ 8,771,189	$ 1,480,504,150	$ 149,581,017	$ 1,720,608,463
	Inflation Costs			$ 51,817,645	$ 5,235,336	
2029				$ 1,532,321,795	$ 154,816,352	$ 1,777,661,444
	Inflation Costs			$ 53,631,263	$ 5,418,572	
2030				$ 1,585,953,058	$ 160,234,925	$ 1,836,711,279
	Inflation Costs			$ 55,508,357	$ 5,608,222	
2031				$ 1,641,461,415	$ 165,843,147	$ 1,897,827,858
	Inflation Costs			$ 57,451,150	$ 5,804,510	
2032				$ 1,698,912,564	$ 171,647,657	$ 1,961,083,518
	Inflation Costs			$ 59,461,940	$ 6,007,668	
2033				$ 1,758,374,504	$ 177,655,325	$ 2,026,553,126
	Inflation Costs			$ 61,543,108	$ 6,217,936	
2034				$ 1,819,917,612	$ 183,873,262	$ 2,094,314,170
	Inflation Costs			$ 63,697,116	$ 6,435,564	
2035				$ 1,883,614,728	$ 190,308,826	$ 2,164,446,850
	Inflation Costs			$ 65,926,515	$ 6,660,809	
2036				$ 1,949,541,244	$ 196,969,635	$ 2,237,034,175
	Inflation Costs			$ 68,233,944	$ 6,893,937	
2037				$ 2,017,775,187	$ 203,863,572	$ 2,312,162,055
	Inflation Costs			$ 70,622,132	$ 7,135,225	
2038				$ 2,088,397,319	$ 210,998,797	$ 2,389,919,412
	Inflation Costs			$ 73,093,906	$ 7,173,645	
2039				$ 2,161,491,225	$ 218,172,442	$ 2,470,186,964
	Inflation Costs			$ 75,652,193		
2040				$ 2,237,143,418	$ 218,172,442	$ 2,545,839,156
	Inflation Costs			$ 78,300,020		
2041				$ 2,315,443,437	$ 218,172,442	$ 2,624,139,176
	Inflation Costs			$ 81,040,520		
2042				$ 2,396,483,958	$ 218,172,442	$ 2,705,179,696
	Inflation Costs					
2043				$ 2,396,483,958	$ 218,172,442	$ 2,705,179,696
	Inflation Costs					
2044				$ 2,396,483,958	$ 218,172,442	$ 2,705,179,696
	Inflation Costs					
2045				$ 2,396,483,958	$ 218,172,442	$ 2,705,179,696

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option D

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	9,346,725		
Total Rehab Cost			$	9,346,725
Bridge Rehab 2045	$	90,485,129		
Rehab Cost			$	55,544,670
			$	-
Bearing Replacement Cost			$	1,974,000
Painting Cost			$	32,966,459
Bridge Combined 2045	$	117,471,475		
Rehab Cost			$	6,010,920
Rebuild Cost			$	111,460,555
Bridge Demolition 2045	$	673,200		
Demolition Cost			$	673,200
Total Bridge Rehabilitation 2045			$	96,496,049

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
	Route 8	SR 846 SB	1715		11,759	$ 135	
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
	Highland Avenue	I-84	3207		15,120	$ 135	
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
					248,334		**$ 9,346,725**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699	$ -	$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729		$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 673,200

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
2	Route 8	SR 846 SB	1715		11,759	$ 135	
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ 160	$ 3,858,880
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ 160	$ 3,423,200
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ -	$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ -	$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 135	$ 1,995,030
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
40	Highland Avenue	I-84	3207		15,120	$ 135	
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
							$ 55,544,670

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	8	2	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	34	9	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	36	9	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	12	3	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	12	3	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	12	3	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	12	3	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	12	3	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	12	3	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	48	12	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	24	6	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	6	2	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	54	14	$42,000
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	66	17	$51,000
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	6	2	$6,000
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	30	8	$24,000
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	8	2	$6,000
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	36	9	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	36	9	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	8	2	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	18	5	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	18	5	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	8	2	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	30	8	
03207	Highland Ave over I-84	3	288	15120	52.5	7	42	11	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	54	14	
								TOTAL	$1,974,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31	4	376	4012	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.5	17	1632	17413	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80076628	6	1566	16709	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.5	6	564	6018	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49473684	6	570	6082	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.50526316	6	570	6082	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.50684932	6	438	4673	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.50649351	6	462	4930	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.69849246	8	1592	16987	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.6969697	6	990	10563	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.5	3	318	3393	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.10895976	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.39584644	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58038769	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.5	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.5010101	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.5	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.39856612	8	30128	321466	$9,643,973
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93092239	8	19688	210071	$6,302,129
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.5	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.5006402	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.5	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.5	3	2016	21511	$645,322
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70175439	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.5	5	1480	15792	$473,748
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69135802	4	324	3457	$103,712
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.69924812	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.7025641	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.5	18	1152	12292	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52238806	6	1206	12868	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.69565217	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.49928876	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10	1	362	3863	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.59701493	9	1206	12868	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.09701493	9	1206	12868	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.59701493	4	536	5719	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.1025641	15	1755	18726	
03207	Highland Ave over I-84	3	288	15120	52.5	7	2016	21511	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12056738	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50091743	9	4905	52336	
								TOTAL	$32,966,459

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option D - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Reconstruct/Widening				221,699	$ 305	$ 67,589,334
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
	Reconstruct/Widening				158,050	$ 244	$ 38,611,666
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
	Rehab				20,795	$ 160	$ 3,327,120
	Reconstruct				6,932	$ 420	$ 2,911,230
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
	Rehab				16,774	$ 160	$ 2,683,800
	Reconstruct				5,591	$ 420	$ 2,348,325
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778		$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508		$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729		$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	$ 6,010,920
						Reconstruct	**$ 111,460,555**

Cost Estimation on Fiscally Constrained Alternatives

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

New Structures - Alternate 6 and Option D

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ -**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option E

Cost Verification on FCA Option E

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option E

			revised Alternate 6			FCA Option E	
Earth Exc			$ 251,642			$ 2,000,000	
Rock Exc			$ 146,850			$ 500,000	
Unsuitable Exc							
Contaminated			$ 46,600			$ 1,000,000	
Hazardous Waste			$ 29,957			$ 750,000	
Borrow						$ 1,000,000	
Drainage System			$ 150,000			**$ 250,000**	
Ex Drainage System			$ -			**$ 10,000,000**	
Bituminous Concrete			$ 100,000			**$ 10,000,000**	
Concrete Base Widen			$ -			**$ 1,000,000**	
Milling			$ -			**$ 6,000,000**	
Concrete Pavement Replace						$ 87,000	
Subbase			$ 35,000			**$ 2,000,000**	
Major Pipe Culverts			$ -				
Concrete Box Culverts			$ -				
Bridge Proposed by 2025			**$ 14,332,000**				
Bridge Proposed by 2045						**$ 129,861,684**	
Bridge Demolition			$ -			**$ 2,354,100**	
Bridge Rehabilitation by 2025			**$ 33,525,090**				
Bridge Rehabilitation by 2045						**$ 126,885,745**	
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**	
Retaining Walls			$ -			**$ 30,000,000**	
Standpipes							
Concrete Median Barrier			$ -			**$ 2,000,000**	
Major Traffic Signal Mods						$ 2,482,278	
New Traffic Signal						$ 300,000	
Concrete Sidewalk			$ 50,000			$ 1,330,000	
Roadway Lighting			$ 40,000			$ 7,615,034	
BCLC						$ 478,395	
Concrete Curbing			$ 25,000			$ 687,400	
Guide Rail			$ 20,000			$ 2,947,306	
Signing & Striping			$ 10,000			**$ 15,000,000**	
Stage Construction			$ -			**$ 25,000,000**	U Turns - Concept Station
Noise Barriers							
Mitigation			$ 300,000			**$ 5,000,000**	
IMS						**$ 10,000,000**	
SubTotals			**$ 49,822,188**			**$ 466,528,942**	

Engineering Design Costs						
Program Management Costs	4%	$	1,992,888		$	18,661,158
Engineering Design Costs	9%	$	4,483,997		$	41,987,605
CTDOT Design/Administration Costs	13%	$	6,476,884		$	60,648,763
Subtotal		**$**	**12,953,769**		**$**	**121,297,525**

			Alternate 6			FCA Option E	
Civil Highway Items			$ 1,205,049			$ 107,427,413	
Structural Bridge Items			$ 48,617,139			$ 359,101,529	
SubTotal (Major Items)			**$ 49,822,188**			**$ 466,528,942**	
Engineering Design Costs				**$ 12,953,769**			**$ 121,297,525**
Minor Items (25%)			$ 12,455,547			$ 116,632,236	
SubTotal			**$ 62,277,735**			**$ 583,161,178**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 1,245,555			$ 11,663,224	
MPT	10%		$ 6,227,774			$ 58,316,118	
Mobilization	8%		$ 4,670,830			$ 43,737,088	
Construction Staking	1%		$ 622,777			$ 5,831,612	
Subtotal			**$ 75,044,671**			**$ 702,709,219**	
Additional Items							
Incidentals	21%		$ 15,759,381			$ 147,568,936	
Contingencies	30%		$ 22,513,401			$ 210,812,766	
Utility Cost	3%		$ 2,251,340			$ 21,081,277	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 116,068,793**	**$ 12,953,769**		**$ 1,122,172,198**	**$ 121,297,525**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 116,068,793	$ 12,953,769	$ 1,122,172,198	$ 121,297,525	$ 1,372,492,285
	Inflation Costs	$ 4,062,408	$ 453,382	$ 39,276,027	$ 4,245,413	
2018		$ 120,131,201	$ 13,407,151	$ 1,161,448,225	$ 125,542,938	$ 1,420,529,515
	Inflation Costs	$ 4,204,592	$ 469,250	$ 40,650,688	$ 4,394,003	
2019		$ 124,335,793	$ 13,876,401	$ 1,202,098,913	$ 129,936,941	$ 1,470,248,048
	Inflation Costs	$ 4,351,753	$ 485,674	$ 42,073,462	$ 4,547,793	
2020		$ 128,687,545	$ 14,362,075	$ 1,244,172,375	$ 134,484,734	$ 1,521,706,729
	Inflation Costs	$ 4,504,064	$ 502,673	$ 43,546,033	$ 4,706,966	
2021		$ 133,191,609	$ 14,864,748	$ 1,287,718,408	$ 139,191,700	$ 1,574,966,465
	Inflation Costs	$ 4,661,706	$ 520,266	$ 45,070,144	$ 4,871,709	
2022		$ 137,853,316	$ 15,385,014	$ 1,332,788,552	$ 144,063,409	$ 1,630,090,291
	Inflation Costs	$ 4,824,866	$ 538,475	$ 46,647,599	$ 5,042,219	
2023		$ 142,678,182	$ 15,923,489	$ 1,379,436,151	$ 149,105,629	$ 1,687,143,451
	Inflation Costs	$ 4,993,736	$ 557,322	$ 48,280,265	$ 5,218,697	
2024		$ 147,671,918	$ 16,480,812	$ 1,427,716,417	$ 154,324,326	$ 1,746,193,472
	Inflation Costs	$ 5,168,517	$ 560,323	$ 49,970,075	$ 5,401,351	
2025		$ 152,840,435	$ 17,041,135	$ 1,477,686,491	$ 159,725,677	$ 1,807,293,738
	Inflation Costs	$ 5,349,415		$ 51,719,027	$ 5,590,399	
2026		$ 158,189,851	$ 17,041,135	$ 1,529,405,519	$ 165,316,076	$ 1,869,952,580
	Inflation Costs			$ 53,529,193	$ 5,786,063	
2027		$ 158,189,851	$ 17,041,135	$ 1,582,934,712	$ 171,102,138	$ 1,929,267,835
	Inflation Costs			$ 55,402,715	$ 5,988,575	
2028		$ 158,189,851	$ 17,041,135	$ 1,638,337,427	$ 177,090,713	$ 1,990,659,125
	Inflation Costs			$ 57,341,810	$ 6,198,175	
2029				$ 1,695,679,237	$ 183,288,888	$ 2,054,199,110
	Inflation Costs			$ 59,348,773	$ 6,415,111	
2030				$ 1,755,028,010	$ 189,703,999	$ 2,119,962,994
	Inflation Costs			$ 61,425,980	$ 6,639,640	
2031				$ 1,816,453,990	$ 196,343,639	$ 2,188,028,615
	Inflation Costs			$ 63,575,890	$ 6,872,027	
2032				$ 1,880,029,880	$ 203,215,667	$ 2,258,476,532
	Inflation Costs			$ 65,801,046	$ 7,112,548	
2033				$ 1,945,830,926	$ 210,328,215	$ 2,331,390,126
	Inflation Costs			$ 68,104,082	$ 7,361,488	
2034				$ 2,013,935,008	$ 217,689,703	$ 2,406,855,696
	Inflation Costs			$ 70,487,725	$ 7,619,140	
2035				$ 2,084,422,733	$ 225,308,842	$ 2,484,962,561
	Inflation Costs			$ 72,954,796	$ 7,885,809	
2036				$ 2,157,377,529	$ 233,194,652	$ 2,565,803,166
	Inflation Costs			$ 75,508,214	$ 8,161,813	
2037				$ 2,232,885,742	$ 241,356,464	$ 2,649,473,192
	Inflation Costs			$ 78,151,001	$ 8,447,476	
2038				$ 2,311,036,743	$ 249,803,941	$ 2,736,071,669
	Inflation Costs			$ 80,886,286	$ 8,492,963	
2039				$ 2,391,923,029	$ 258,296,903	$ 2,825,450,918
	Inflation Costs			$ 83,717,306	$ 9,040,392	
2040				$ 2,475,640,335	$ 267,337,295	$ 2,918,208,616
	Inflation Costs			$ 86,647,412		
2041				$ 2,562,287,747	$ 267,337,295	$ 3,004,856,027
	Inflation Costs			$ 89,680,071		
2042				$ 2,651,967,818	$ 267,337,295	$ 3,094,536,099
	Inflation Costs					
2043				$ 2,651,967,818	$ 267,337,295	$ 3,094,536,099
	Inflation Costs					
2044				$ 2,651,967,818	$ 267,337,295	$ 3,094,536,099
	Inflation Costs					
2045				$ 2,651,967,818	$ 267,337,295	$ 3,094,536,099

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - FCA Option E

Bridge New 2025	$	14,332,000		
Total New Cost			$	14,332,000
Bridge Rehab 2025	$	33,525,090		
Total Rehab Cost			$	33,525,090
Bridge Rehab 2045	$	122,031,025		
Rehab Cost			$	76,673,490
			$	9,320,400
Bearing Replacement Cost			$	2,262,000
Painting Cost			$	33,775,135
Bridge Combined 2045	$	134,716,404		
Rehab Cost			$	4,854,720
Rebuild Cost			$	129,861,684
Bridge Demolition 2045	$	2,354,100		
Demolition Cost			$	2,354,100
Total Bridge Rehabilitation 2045			$	126,885,745

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
					248,334		**$ 33,525,090**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	$ 393,390
2	Route 8	SR 846 SB	1715		11,759	$ 135	$ 1,587,465
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	$ 1,539,675
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	$ 552,015
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	$ 552,015
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	$ 557,820
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	$ 557,820
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	$ 429,705
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	$ 453,195
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	$ 2,078,055
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	$ 973,350
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	$ 393,525
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ -	$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ -	$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ -	$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	$ 1,144,800
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	$ 1,153,305
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	$ 553,635
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	$ 1,222,830
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	$ 1,159,515
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	$ 571,590
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	$ 1,223,505
40	Highland Avenue	I-84	3207		15,120	$ 135	$ 2,041,200
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	$ 5,039,955
							$ 76,673,490

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.00	4	8	2	$6,000
01715	RTE 8 over SR 846 NB	1	96	12,048	125.50	17	34	9	$27,000
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80	6	36	9	$27,000
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.50	6	12	3	$9,000
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.50	6	12	3	$9,000
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49	6	12	3	$9,000
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.51	6	12	3	$9,000
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.51	6	12	3	$9,000
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.51	6	12	3	$9,000
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.70	8	48	12	$36,000
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.70	6	24	6	$18,000
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.50	3	6	2	$6,000
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.11	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.40	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58	3	54	14	$42,000
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.50	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.50	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.50	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.40	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.50	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.50	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.50	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.50	3	66	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.00	3	6	2	$6,000
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.50	5	30	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69	4	8	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.70	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.70	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.50	18	36	9	$27,000
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52	6	36	9	$27,000
03198	RTE 8 NB over Freight Street	3	138	6,030	43.70	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.50	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.00	1	8	2	$6,000
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.60	9	18	5	$15,000
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.10	9	18	5	$15,000
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.60	4	8	2	$6,000
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.10	15	30	8	$24,000
03207	Highland Ave over I-84	3	288	15120	52.50	7	42	11	$33,000
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50	9	54	14	$42,000
								TOTAL	$2,262,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.00	4	376	4012	$120,358
01715	RTE 8 over SR 846 NB	1	96	12,048	125.50	17	1632	17413	$522,403
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80	6	1566	16709	$501,277
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.50	6	564	6018	$180,536
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.50	6	564	6018	$180,536
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49	6	570	6082	$182,457
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.51	6	570	6082	$182,457
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.51	6	438	4673	$140,204
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.51	6	462	4930	$147,886
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.70	8	1592	16987	$509,599
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.70	6	990	10563	$316,899
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.50	3	318	3393	$101,792
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.11	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.40	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.50	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.50	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.50	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.40	8	30128	0	$0
			1,792	110,056	61.40	8	14340	153007	$4,590,195
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93	8	19688	0	$0
			2,230	140,308	62.93	8	17836	190315	$5,709,446
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.50	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.50	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.50	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.50	3	2016	21511	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.00	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.50	5	1480	15792	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69	4	324	3457	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.70	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.70	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.50	18	1152	12292	$368,755
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52	6	1206	12868	$386,041
03198	RTE 8 NB over Freight Street	3	138	6,030	43.70	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.50	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.00	1	362	3863	$115,876
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.60	9	1206	12868	$386,041
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.10	9	1206	12868	$386,041
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.60	4	536	5719	$171,574
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.10	15	1755	18726	$561,776
03207	Highland Ave over I-84	3	288	15120	52.50	7	2016	21511	$645,322
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50	9	4905	52336	$1,570,091
								TOTAL	$33,775,135

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation Simple Spans				83,979	$ 296	$ 24,857,784
	Replace Fracture Critical				137,720	$ 360	$ 49,579,200
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		
	Rehabilitation Simple Spans				122,580	$ 296	$ 36,283,680
	Replace Fracture Critical				35,470	$ 360	$ 12,769,200
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	**$ 4,854,720**
						Reconstruct	**$ 129,861,684**

Cost Estimation on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665

Date: 17-Oct-18

New Structures - Alternate 6 and Option E

ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	$ 1,555,200
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	$ 1,900,800
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	$ 4,309,200
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ 9,320,400**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES
TECHNICAL MEMORANDUM

APPENDIX L
Cost Estimates
Option E
Core Interchange

Core Interchange - Cost Verification on FCA Option E

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Cost Estimates - Alternate 6 and FCA Option E

			revised Alternate 6			FCA Option E
Earth Exc			$ 251,642			$ 2,000,000
Rock Exc			$ 146,850			$ 500,000
Unsuitable Exc						
Contaminated			$ 46,600			$ 1,000,000
Hazardous Waste			$ 29,957			$ 750,000
Borrow						$ 1,000,000
Drainage System			$ 150,000			**$ 250,000**
Ex Drainage System			$ -			**$ 7,500,000**
Bituminous Concrete			$ 100,000			**$ 7,500,000**
Concrete Base Widen			$ -			**$ 1,000,000**
Milling			$ -			**$ 4,500,000**
Concrete Pavement Replace						$ 87,000
Subbase			$ 35,000			**$ 1,500,000**
Major Pipe Culverts			$ -			
Concrete Box Culverts			$ -			
Bridge Proposed by 2025			**$ 14,332,000**			
Bridge Proposed by 2045						**$ 129,861,684**
Bridge Demolition			$ -			**$ 2,354,100**
Bridge Rehabilitation by 2025			**$ 9,346,725**			
Bridge Rehabilitation by 2045						**$ 85,340,062**
other Structures Miscellaneous			$ 760,049			**$ 70,000,000**
Retaining Walls			$ -			**$ 30,000,000**
Standpipes						
Concrete Median Barrier			$ -			**$ 2,000,000**
Major Traffic Signal Mods						$ 2,482,278
New Traffic Signal						$ 300,000
Concrete Sidewalk			$ 50,000			$ 1,330,000
Roadway Lighting			$ 40,000			$ 7,615,034
BCLC						$ 478,395
Concrete Curbing			$ 25,000			$ 687,400
Guide Rail			$ 20,000			$ 2,947,306
Signing & Striping			$ 10,000			**$ 15,000,000**
Stage Construction			$ -			**$ 25,000,000** U Turns - Concept Station
Noise Barriers						
Mitigation			$ 300,000			**$ 5,000,000**
IMS						**$ 10,000,000**
SubTotals			**$ 25,643,823**			**$ 417,983,259**

Engineering Design Costs					
Program Management Costs	4%	$	1,025,753	$	16,719,330
Engineering Design Costs	9%	$	2,307,944	$	37,618,493
CTDOT Design/Administration Costs	13%	$	3,333,697	$	54,337,824
Subtotal		**$**	**6,667,394**	**$**	**108,675,647**

			Alternate 6			FCA Option E	
Civil Highway Items			$ 1,205,049			$ 100,427,413	
Structural Bridge Items			$ 24,438,774			$ 317,555,846	
SubTotal (Major Items)			**$ 25,643,823**			**$ 417,983,259**	
Engineering Design Costs				**$ 6,667,394**			**$ 108,675,647**
Minor Items (25%)			$ 6,410,956			$ 104,495,815	
SubTotal			**$ 32,054,779**			**$ 522,479,073**	
Lump Sum Items							
Clearing and Grubbing	2%		$ 641,096			$ 10,449,581	
MPT	10%		$ 3,205,478			$ 52,247,907	
Mobilization	8%		$ 2,404,108			$ 39,185,931	
Construction Staking	1%		$ 320,548			$ 5,224,791	
Subtotal			**$ 38,626,008**			**$ 629,587,284**	
Additional Items							
Incidentals	21%		$ 8,111,462			$ 132,213,330	
Contingencies	30%		$ 11,587,803			$ 188,876,185	
Utility Cost	3%		$ 1,158,780			$ 18,887,619	
Right of Way			$ 500,000			$ 40,000,000	
Total Cost 2017			**$ 59,984,053**	**$ 6,667,394**		**$ 1,009,564,417**	**$ 108,675,647**

Inflation Rate		3.50%		3.50%		
		Construction Costs	Engineering Costs	Construction Costs	Engineering Costs	Total Costs
2017		$ 59,984,053	$ 6,667,394	$ 1,009,564,417	$ 108,675,647	$ 1,184,891,511
	Inflation Costs	$ 2,099,442	$ 233,359	$ 35,334,755	$ 3,803,648	
2018		$ 62,083,495	$ 6,900,753	$ 1,044,899,171	$ 112,479,295	$ 1,226,362,714
	Inflation Costs	$ 2,172,922	$ 241,526	$ 36,571,471	$ 3,936,775	
2019		$ 64,256,417	$ 7,142,279	$ 1,081,470,642	$ 116,416,070	$ 1,269,285,409
	Inflation Costs	$ 2,248,975	$ 249,980	$ 37,851,472	$ 4,074,562	
2020		$ 66,505,392	$ 7,392,259	$ 1,119,322,115	$ 120,490,633	$ 1,313,710,398
	Inflation Costs	$ 2,327,689	$ 258,729	$ 39,176,274	$ 4,217,172	
2021		$ 68,833,080	$ 7,650,988	$ 1,158,498,389	$ 124,707,805	$ 1,359,690,262
	Inflation Costs	$ 2,409,158	$ 267,785	$ 40,547,444	$ 4,364,773	
2022		$ 71,242,238	$ 7,918,773	$ 1,199,045,832	$ 129,072,578	$ 1,407,279,421
	Inflation Costs	$ 2,493,478	$ 277,157	$ 41,966,604	$ 4,517,540	
2023		$ 73,735,717	$ 8,195,930	$ 1,241,012,436	$ 133,590,118	$ 1,456,534,201
	Inflation Costs	$ 2,580,750	$ 286,858	$ 43,435,435	$ 4,675,654	
2024		$ 76,316,467	$ 8,482,787	$ 1,284,447,872	$ 138,265,772	$ 1,507,512,898
	Inflation Costs	$ 2,671,076	$ 288,402	$ 44,955,676	$ 4,839,302	
2025		$ 78,987,543	$ 8,771,189	$ 1,329,403,547	$ 143,105,074	$ 1,560,267,354
	Inflation Costs	$ 2,764,564		$ 46,529,124	$ 5,008,678	
2026		$ 81,752,107	$ 8,771,189	$ 1,375,932,671	$ 148,113,752	$ 1,614,569,720
	Inflation Costs			$ 48,157,643	$ 5,183,981	
2027		$ 81,752,107	$ 8,771,189	$ 1,424,090,315	$ 153,297,733	$ 1,667,911,345
	Inflation Costs			$ 49,843,161	$ 5,365,421	
2028		$ 81,752,107	$ 8,771,189	$ 1,473,933,476	$ 158,663,154	$ 1,723,119,926
	Inflation Costs			$ 51,587,672	$ 5,553,210	
2029				$ 1,525,521,148	$ 164,216,364	$ 1,780,260,808
	Inflation Costs			$ 53,393,240	$ 5,747,573	
2030				$ 1,578,914,388	$ 169,963,937	$ 1,839,401,621
	Inflation Costs			$ 55,262,004	$ 5,948,738	
2031				$ 1,634,176,391	$ 175,912,675	$ 1,900,612,363
	Inflation Costs			$ 57,196,174	$ 6,156,944	
2032				$ 1,691,372,565	$ 182,069,619	$ 1,963,965,480
	Inflation Costs			$ 59,198,040	$ 6,372,437	
2033				$ 1,750,570,605	$ 188,442,055	$ 2,029,535,956
	Inflation Costs			$ 61,269,971	$ 6,595,472	
2034				$ 1,811,840,576	$ 195,037,527	$ 2,097,401,399
	Inflation Costs			$ 63,414,420	$ 6,826,313	
2035				$ 1,875,254,996	$ 201,863,841	$ 2,167,642,133
	Inflation Costs			$ 65,633,925	$ 7,065,234	
2036				$ 1,940,888,921	$ 208,929,075	$ 2,240,341,292
	Inflation Costs			$ 67,931,112	$ 7,312,518	
2037				$ 2,008,820,033	$ 216,241,593	$ 2,315,584,922
	Inflation Costs			$ 70,308,701	$ 7,568,456	
2038				$ 2,079,128,734	$ 223,810,048	$ 2,393,462,079
	Inflation Costs			$ 72,769,506	$ 7,609,209	
2039				$ 2,151,898,240	$ 231,419,257	$ 2,473,840,794
	Inflation Costs			$ 75,316,438	$ 8,099,674	
2040				$ 2,227,214,679	$ 239,518,931	$ 2,557,256,906
	Inflation Costs			$ 77,952,514		
2041				$ 2,305,167,192	$ 239,518,931	$ 2,635,209,420
	Inflation Costs			$ 80,680,852		
2042				$ 2,385,848,044	$ 239,518,931	$ 2,715,890,272
	Inflation Costs					
2043				$ 2,385,848,044	$ 239,518,931	$ 2,715,890,272
	Inflation Costs					
2044				$ 2,385,848,044	$ 239,518,931	$ 2,715,890,272
	Inflation Costs					
2045				$ 2,385,848,044	$ 239,518,931	$ 2,715,890,272

End of Engineering Design Costs and CTDOT Engineering/Administration Costs)

Midpoint of Construction (End of Inflation)

Cost Backup Material provided

Estimated Cost

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2025 Rehab

	Bridge	Crossing	Number		Square Footage		
	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
	Route 8	SR 846 SB	1715		11,759	$ 135	
	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 135	$ 1,514,700
	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 135	$ 1,418,580
	I-84 Ramp 202	BANK STREET	3192		2,729	$ 135	$ 368,415
	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
	Highland Avenue	I-84	3207		15,120	$ 135	
	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
					248,334		**$ 9,346,725**

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - Work in 2045 Demolition

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ 60	$ 673,200
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 60	$ 886,680
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 60	$ 630,480
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 60	$ 163,740
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
							$ 2,354,100

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Rehab

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914	$ 135	
2	Route 8	SR 846 SB	1715		11,759	$ 135	
3	Route 8 SB	ROUTE 73 WB	1716		11,405	$ 135	
4	Route 8 NB	FIFTH STREET	3183A		4,089	$ 135	
5	Route 8 SB	FIFTH STREET	3183B		4,089	$ 135	
6	Route 8 NB	PORTER STREET	3184A		4,132	$ 135	
7	Route 8 SB	PORTER STREET	3184B		4,132	$ 135	
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183	$ 135	
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357	$ 135	
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393	$ 135	
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210	$ 135	
12	Route 8 Ramp 077	BANK STREET	3189		2,915	$ 135	
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165	$ 160	$ 20,826,400
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312	$ 160	$ 12,049,920
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118	$ -	$ -
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395	$ -	$ -
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613	$ 135	$ 1,837,755
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930	$ 160	$ 2,868,800
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		$ -
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		$ -
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220	$ -	$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726	$ 160	$ 4,436,160
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365	$ 160	$ 3,578,400
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ -	$ -
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316	$ 135	$ 852,660
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890	$ 135	$ 255,150
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ -	$ -
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ -	$ -
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344	$ 135	$ 856,440
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401	$ 135	$ 729,135
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480	$ 135	
32	South Elm Street	I-84 McMAHON STREET	3197		8,543	$ 135	
33	Route 8 NB	FREIGHT STREET	3198		6,030	$ 135	$ 814,050
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332	$ 135	$ 2,609,820
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101	$ 135	
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058	$ 135	
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589	$ 135	
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234	$ 135	
39	Route 8 SB	RIVERSIDE STREET	3205		9,063	$ 135	
40	Highland Avenue	I-84	3207		15,120	$ 135	
41	I-84 TR 806	I-84 WB	3209		5,781	$ 135	$ 780,435
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333	$ 135	
							$ 52,495,125

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Bearing Replacement

Assumed Overhang	3.25	ft	
Assumed Girder Spacing	7.17	ft	
Percentage of Bearings to be Replaced	25%		
Unit Price	$3,000	/ea	CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Total Number of Bearings	Number of Bearings to be Replaced	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.00	4	8	2	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.50	17	34	9	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80	6	36	9	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.50	6	12	3	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.50	6	12	3	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49	6	12	3	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.51	6	12	3	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.51	6	12	3	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.51	6	12	3	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.70	8	48	12	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.70	6	24	6	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.50	3	6	2	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.11	7	504	126	$378,000
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.40	6	252	63	$189,000
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58	3	54	14	$42,000
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.50	3	54	14	$42,000
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.50	3	42	11	$33,000
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.50	3	60	15	$45,000
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.40	8	736	184	$552,000
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93	8	480	120	$360,000
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.50	3	24	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.50	5	100	25	$75,000
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.50	5	80	20	$60,000
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.50	3	66	0	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70	3	18	5	$15,000
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.00	3	6	2	$6,000
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.50	5	30	0	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69	4	8	0	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.70	6	24	6	$18,000
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.70	3	18	5	$15,000
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.50	18	36	9	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52	6	36	9	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.70	6	36	9	$27,000
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.50	3	36	9	$27,000
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.00	1	8	2	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.60	9	18	5	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.10	9	18	5	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.60	4	8	2	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.10	15	30	8	
03207	Highland Ave over I-84	3	288	15120	52.50	7	42	11	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12	5	10	3	$9,000
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50	9	54	14	
								TOTAL	$1,893,000

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - 2045 Structure Painting

Assumed Overhang	3.25	ft
Assumed Girder Spacing	7.17	ft
Assumed Girder Size	W36x160	
Depth	36	in
Flange Width	12	in
Flange Thickness	1.02	in
Web Thickness	0.65	in
Girder Surface Area	106.7	in2/in
Girder Surface Area	8.89	sf/ft
Additional for Stiffeners/Diaphragms	20%	
Total Surface Area per foot of girder	10.67	sf/ft
Unit Price	$30	/sf CTDOT 2017 Cost Estimating Guidelines

Bridge Number	Feature Carried / Crossing	No. of Spans	Length (ft)	Area (sf)	Width (ft)	Number of Girders per Span	Length of Girders (ft)	Paint Area (sf)	Cost
01714	RTE 8 Ramp 079 over SR 846 NB	1	94	2914	31.00	4	376	4012	
01715	RTE 8 over SR 846 NB	1	96	12,048	125.50	17	1632	17413	
01716	RTE 8 SB over RTE 73 WB	3	261	11,432	43.80	6	1566	16709	
03183A	RTE 8 NB over Fifth Street	1	94	4,089	43.50	6	564	6018	
03183B	RTE 8 SB over Fifth Street	1	94	4,089	43.50	6	564	6018	
03184A	RTE 8 NB over Porter Street	1	95	4,132	43.49	6	570	6082	
03184B	RTE 8 SB over Porter Street	1	95	4,133	43.51	6	570	6082	
03185	RTE 8 NS over Washington Ave	1	73	3,176	43.51	6	438	4673	
03186	RTE 8 SB over Washington Ave	1	77	3,350	43.51	6	462	4930	
03187	RTE 8 SB over Bank Street & S. Leonard Street	3	199	11,681	58.70	8	1592	16987	
03188	RTE 8 NB over Bank Street & S. Leonard Street	2	165	7,210	43.70	6	990	10563	
03189	RTE 8 Ramp 077 over Bank Street	1	106	2,915	27.50	3	318	3393	
03190A	RTE 8 NB over RTE 8 SB & Local Roads	36	2,634	131,987	50.11	7	18438	196733	$5,902,004
03190B	RTE 8 SB over Riverside Street and Sunnyside Avenue	21	1,589	75,312	47.40	6	9534	101728	$3,051,833
03190C	I-84 TR 811 over I-84 TR 812 & Naugatuck River	9	877	24,188	27.58	3	2631	28073	$842,183
03190D	I-84 TR 812 over Riverside Street and Naugatuck River	9	778	21,395	27.50	3	2334	24904	$747,113
03190E	RTE 8 Ramp 128 over Riverside Street SB	7	495	13,613	27.50	3	1485	15845	$475,349
03190F	I-84 TR 808 over RTE-8 SB & RAMP 129	10	652	17,930	27.50	3	1956	20871	$626,116
03191A	I-84 EB over I-84 WB,RTE 8 and Naugatuck River	46	3,766	231,227	61.40	8	30128	0	$0
			1,792	110,056	61.40	8	14340	153007	$4,590,195
03191B	I-84 WB over RTE 8 and Naugatuck River	30	2,461	154,873	62.93	8	19688	0	$0
			2,230	140,308	62.93	8	17836	190315	$5,709,446
03191C	I-84 Ramp 169 over I-84 TR 805 & 808	4	408	11,220	27.50	3	1224	0	$0
03191D	I-84 TR 809 over RTE 8 NB & Riverside Street	10	781	27,726	35.50	5	3905	41666	$1,249,991
03191E	I-84 TR 810 over RTE 8 NB & Ramp 128	8	630	22,365	35.50	5	3150	33611	$1,008,315
03191F	I-84 Ramp 197 over RAMP 202 Meadow Street	11	672	18,480	27.50	3	2016	21511	$0
03191G	I-84 Ramp 199 over Meadow Street	3	228	6,316	27.70	3	684	7298	$218,948
03191H	I-84 Ramp 198 over No Notable Feature	1	70	1,890	27.00	3	210	2241	$67,221
03191I	I-84 Ramp 200 over I-84 Ramps 199&202, Bank Street	3	296	10,508	35.50	5	1480	15792	$0
03192	I-84 Ramp 202 over Bank Street	1	81	2,729	33.69	4	324	3457	$0
03193	I-84 WB over Bank Street & Ramp 198	2	133	6,344	47.70	6	798	8515	$255,440
03194	I-84 Ramp 201 over I-84 Ramp 198 & Bank Street	3	195	5,402	27.70	3	585	6242	$187,259
03196	I-84 over SR 847 (South Main St.)	1	64	8,480	132.50	18	1152	12292	
03197	South Elm St. over I-84 & Mcmahon St.	3	201	8547	42.52	6	1206	12868	
03198	RTE 8 NB over Freight Street	3	138	6,030	43.70	6	828	8835	$265,043
03200	I-84 TR 806 over I-84 TR 808, 809, Riverside	6	703	19,332	27.50	3	2109	22503	$675,091
03201	Pedestrian Walk over RTE 8 SB	4	362	3620	10.00	1	362	3863	
03203A	RTE 8 NB over West Main Street No. 1	1	134	9,058	67.60	9	1206	12868	
03203B	RTE 8 SB over Main Street No. 1	1	134	8,589	64.10	9	1206	12868	
03203C	RTE 8 Ramp 131 over West Main Street #1	1	134	4,234	31.60	4	536	5719	
03205	RTE 8 SB over Riverside Street	1	117	12,648	108.10	15	1755	18726	
03207	Highland Ave over I-84	3	288	15120	52.50	7	2016	21511	
03209	I-84 EB TR 806 over I-84 WB	1	141	5,798	41.12	5	705	7522	$225,671
04318	Baldwin Street #1 over I-84, Ramps & Local Roads	3	545	37,333	68.50	9	4905	52336	
								TOTAL	$26,097,217

Cost Estimate on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665 Date: 17-Oct-18

Structure Items - Option E - Combined Work in 2045

	Bridge	Crossing	Number		Square FT	Unit Cost	Cost
1	Route 8 Ramp 079	SR 846 NB	1714		2,914		$ -
2	Route 8	SR 846 SB	1715		11,759		$ -
3	Route 8 SB	ROUTE 73 WB	1716		11,405		$ -
4	Route 8 NB	FIFTH STREET	3183A		4,089		$ -
5	Route 8 SB	FIFTH STREET	3183B		4,089		$ -
6	Route 8 NB	PORTER STREET	3184A		4,132		$ -
7	Route 8 SB	PORTER STREET	3184B		4,132		$ -
8	Route 8 NB	WASHINGTON AVENUE	3185		3,183		$ -
9	Route 8 SB	WASHINGTON AVENUE	3186		3,357		$ -
10	Route 8 SB	BANK ST & SOUTH LEONARD ST	3187		15,393		$ -
11	Route 8 NB	BANK ST & SOUTH LEONARD ST	3188		7,210		$ -
12	Route 8 Ramp 077	BANK STREET	3189		2,915		$ -
13	Route 8 NB	ROUTE 8 SB RIVERSIDE STREET	3190A		130,165		$ -
14	Route 8 SB	RIVERSIDE STREET & SUNNYSIDE AVE	3190B		75,312		$ -
15	I-84 TR 811	I-84 TR 812 & NAUGATUCK RIVER	3190C		24,118		$ -
	Rehabilitation				16,079	$ 160	$ 2,572,587
	Reconstruct				8,039	$ 420	$ 3,376,520
16	I-84 TR 812	RIVERSIDE STREET SOUTHBOUND	3190D		21,395		$ -
	Rehabilitation				14,263	$ 160	$ 2,282,133
	Reconstruct				7,132	$ 420	$ 2,995,300
17	Route 8 Ramp 128	ROUTE 8 SOUTHBOUND	3190E		13,613		$ -
18	I-84 TR 808	ROUTE 8 SOUTHBOUND & RAMP 129	3190F		17,930		$ -
19	I-84 EB	I-84 WB ROUTE 8 SB NAUGATUCK RIVER	3191A		221,699		
	Rehabilitation Simple Spans				83,979	$ 296	$ 24,857,784
	Replace Fracture Critical				137,720	$ 360	$ 49,579,200
20	I-84 WB	ROUTE 8 NAUGATUCK RIVER	3191B		158,050		
	Rehabilitation Simple Spans				122,580	$ 296	$ 36,283,680
	Replace Fracture Critical				35,470	$ 360	$ 12,769,200
21	I-84 Ramp 169	I-84 TR 805 & TR 808	3191C		11,220		$ -
22	I-84 TR 809	ROUTE 8 NB RIVERSIDE STREET	3191D		27,726		$ -
23	I-84 TR 810	ROUTE 8 NB & RAMP 128	3191E		22,365		$ -
24	I-84 Ramp 197	RAMP 202 MEADOW STREET	3191F		14,778	$ 420	$ 6,206,760
25	I-84 Ramp 199	MEADOW STREET	3191G		6,316		$ -
26	I-84 Ramp 198	NO NOTABLE FEATURE	3191H		1,890		$ -
27	I-84 Ramp 200	I-84 RAMPS 199 & 202	3191I		10,508	$ 420	$ 4,413,360
28	I-84 Ramp 202	BANK STREET	3192		2,729	$ 420	$ 1,146,180
29	I-84 WB	BANK STREET & RAMP 198	3193		6,344		$ -
30	I-84 Ramp 201	I-84 RAMP 198	3194		5,401		$ -
31	I-84	SR 847 SOUTH MAIN STREET	3196		8,480		$ -
32	South Elm Street	I-84 McMAHON STREET	3197		8,543		$ -
33	Route 8 NB	FREIGHT STREET	3198		6,030		$ -
34	I-84 TR 806	I-84 TR 808, 809 AND RIVERSIDE STREET	3200		19,332		$ -
35	Pedestrian Walk	ROUTE 8 SOUTHBOUND	3201		4,101		$ -
36	Route 8 NB	SR 849 WEST MAIN ST NO 1	3203A		9,058		$ -
37	Route 8 SB	SR 849 WEST MAIN ST NO 1	3203B		8,589		$ -
38	Route 8 Ramp 131	WEST MAIN STREET NO 1	3203C		4,234		$ -
39	Route 8 SB	RIVERSIDE STREET	3205		9,063		$ -
40	Highland Avenue	I-84	3207		15,120		$ -
41	I-84 TR 806	I-84 WB	3209		5,781		$ -
42	Baldwin Street No. 1	I-84 SR 830 & I-84 RAMPS	4318		37,333		$ -
						Rehabilitate	**$ 4,854,720**
						Reconstruct	**$ 129,861,684**

Cost Estimation on Fiscally Constrained Alternatives

HNTB

CTDOT Project #151-331
HNTB Project #65665

Date: 17-Oct-18

New Structures - Alternate 6 and Option E

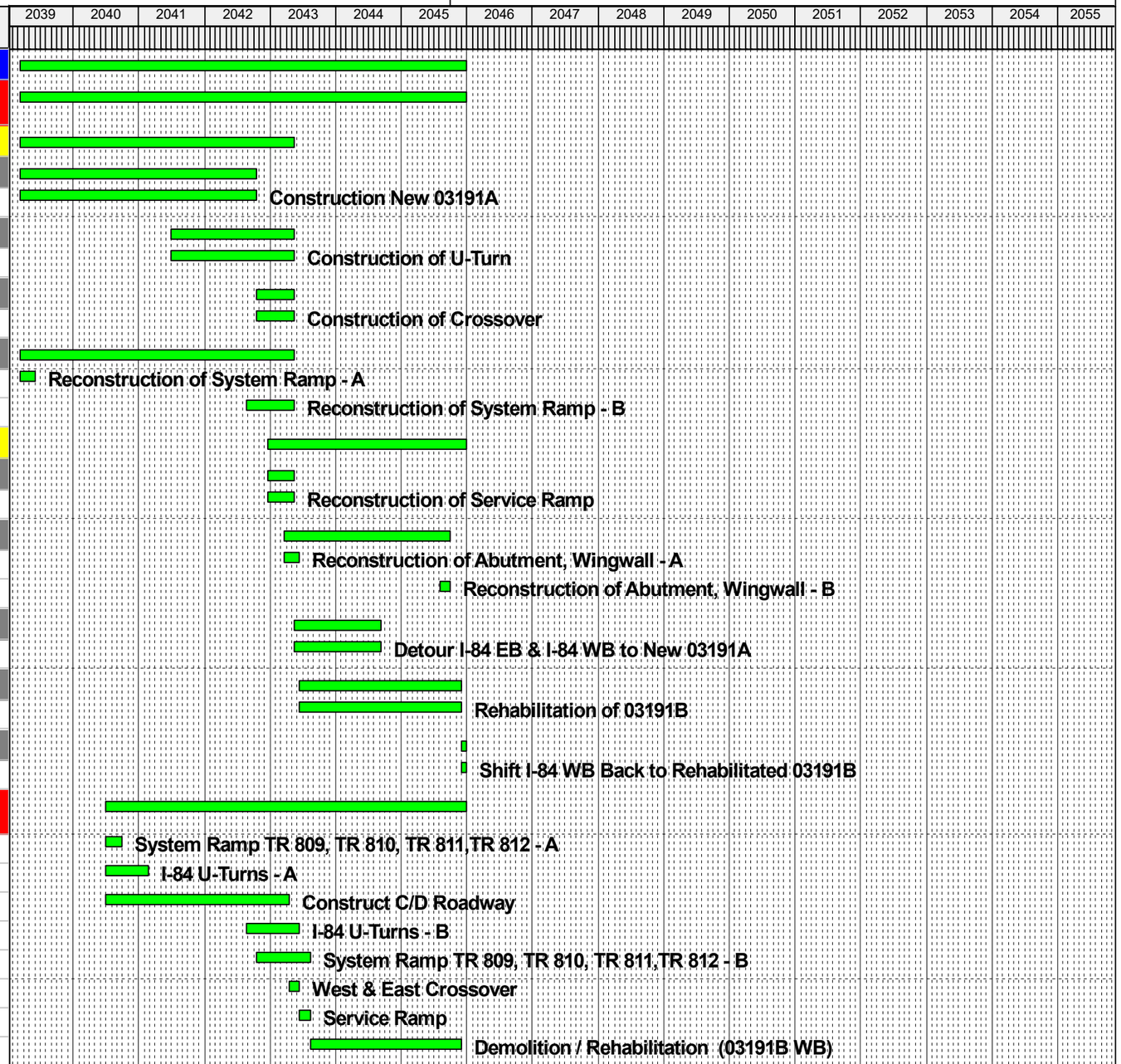
ALTERNATE 6 Bridges			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Avenue	Naugatuck River	740	24	8	8	40	29,600	$ 365	$ 10,804,000
2	Sunnyside Avenue	Metro North, Meadow Street	210	24	8	8	40	8,400	$ 420	$ 3,528,000
3	I-84 EB Off Ramp to Meadow Street	Metro North, Meadow Street, Bank Street	These Bridges are duplicated in Alternate 8 or will not be required							
4	West Main Street to Bank Street Connector	Metro North								
									Subtotal	$ 14,332,000
Option A			Length	Lanes	Left Shldr	Right Shldr	Total Width	**Area**		
1	Sunnyside Ave to Union Street Connector	Naugatuck River	These Bridges are duplicated in Alternate 6 or will not be required							
2	Sunnyside Ave to Union Street Connector	Metro North, Meadow Street								
3	Sunnyside Ave to Bank Street Connector	Metro North	60	30	8	8	46	2,760	$ -	$ -
4	I-84 Eastbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	4,600	36	12	12	65	299,000	$ -	$ -
5	I-84 Eastbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
6	I-84 Eastbound	Washington Street	160	48	12	12	72	11,520	$ 135	
7	I-84 Eastbound Exit 22 Off Ramp	Washington Street	160	24	4	8	36	5,760	$ -	$ -
8	I-84 Westbound	Riverside St, Sunnyside Ave, Naugatuck River, Connector, Route 8 SB, Route 8 NB, Ramp Route 8 NB to I-84 WB, Metro North & Bank Street	2,880	36	12	12	60	172,800	$ -	$ -
9	I-84 Westbound	South Main Street	80	60	12	12	84	6,720	$ -	$ -
10	I-84 Westbound	Washington Street	160	48	12	12	72	11,520	$ 135	
11	Chase Parkway	I-84 EB Exit 18 On Ramp, I-84 EB, I-84 WB, I-84 WB Exit 18 Off Ramp	220	48	8	8	64	14,080	$ 135	
12	Highland Avenue	I-84 EB, I-84 WB	340	48	8	8	64	21,760	$ -	$ -
13	Baldwin Street	I-84 EB, I-84 WB	500	48	8	8	64	32,000	$ -	$ -
14	Hamilton Avenue	I-84 EB, I-84 WB	420	60	8	8	76	31,920	$ 135	
15	I-84 Eastbound to Route 8 SB Ramp	Riverside Street, Sunnyside Avenue, Naugatuck River, Sunnyside Ave to Bank Street Connector	2,450	12	4	8	24	58,800	$ -	$ -
16	I-84 Eastbound to Route 8 NB Ramp	I-84 EB, I-84 WB, Naugatuck River, Route 8 NB to I-84 WB Ramp, Route 8 SB Frontage Road, Route 8 SB, Route 8 NB, Route 8 NB Frontage Road	1,500	12	4	8	24	36,000	$ -	$ -
17	I-84 Eastbound Exit 20 Off Ramp	Sunnyside Avenue, Naugatuck River, Route 8 SB, Route 8 NB, Metro North	1,400	12	4	8	24	33,600	$ -	$ -
18	I-84 Eastbound Exit 22 On Ramp	I-84 EB Exit 22 Off Ramp	300	12	4	8	24	7,200	$ -	$ -
19	I-84 Eastbound Exit 23 On Ramp	Frontage Road	120	12	4	8	24	2,880	$ -	$ -
20	Highland Avenue to West Main Street Conn	I-84 WB Exit 19 Off Ramp	330	24	4	8	36	11,880	$ -	$ -
21	I-84 Westbound Exit 20 On Ramp	Riverside Street, Naugatuck River, Sunnyside Avenue, Sunnyside avenue to Bank Street Connector,Route 8 Sb, Route 8 NB,Route 8 NB to I-84 WB Ramp, Metro North	2,250	12	4	8	24	54,000	$ -	$ -
22	I-84 Westbound to Route 8 NB Ramp	I-84 WB Exit 20 On Ramp, Metro North, Sunnyside Avenue	1,930	24	4	8	36	69,480	$ -	$ -
23	I-84 Westbound to Route 8 SB Ramp	I-84 WB Exit 20 On Ramp, I-84 WB, I-84 EB, I-84 EB Exit 20 Off Ramp	1,100	12	4	8	24	26,400	$ -	$ -
24	I-84 Westbound Exit 22 Off Ramp	I-84 WB Exit 22 On Ramp	100	24	4	8	36	3,600	$ -	$ -
25	Sunnyside Avenue	I-84 WB Exit 22 Off Ramp	70	12	8	8	28	1,960	$ -	$ -
26	Route 8 Northbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
27	Route 8 Northbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
28	Route 8 Northbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
29	Route 8 Northbound	Bank Street	400	36	4	10	50	20,000	$ -	$ -
30	Route 8 Northbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	930	24	4	10	38	35,340	$ -	$ -
31	Route 8 Northbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
32	Route 8 Northbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
33	Route 8 Northbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
34	Route 8 Southbound	5th Street	160	24	4	10	38	6,080	$ -	$ -
35	Route 8 Southbound	Porter Street	110	24	4	10	38	4,180	$ -	$ -
36	Route 8 Southbound	Washington Avenue	60	36	4	10	50	3,000	$ -	$ -
37	Route 8 Southbound	Bank Street	500	36	4	10	50	25,000	$ -	$ -
38	Route 8 Southbound	Naugatuck River, Sunnyside Avenue to Bank Street Connector	1,020	24	4	10	38	38,760	$ -	$ -
39	Route 8 Southbound	Sunnyside Avenue	60	36	4	10	50	3,000	$ -	$ -
40	Route 8 Southbound	Freight Street	290	24	4	10	38	11,020	$ -	$ -
41	Route 8 Southbound	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,150	36	4	10	50	57,500	$ -	$ -
42	Route 8 Northbound to I-84 EB Ramp	Sunnyside Avenue to Bank Street Connector, I-84 EB Exit 20 Off Ramp	1,300	12	4	8	24	31,200	$ -	$ -
43	Route 8 Northbound to I-84 WB Ramp	Route 8 NB, Route 8 SB, Route 8 SB Frontage Road, Naugatuck River, Riverside Street	2,100	12	4	8	24	50,400	$ -	$ -
44	Route 8 Northbound to I-84 WB Ramp	I-84 WB Exit 19 Off Ramp	570	24	4	8	36	20,520	$ -	$ -
45	Route 8 Northbound Entrance Ramp	Freight Street	520	36	4	8	48	24,960	$ -	$ -
46	Route 8 Northbound Entrance Ramp	West Main Street Exit Ramp, West Main Street, Naugatuck River	940	24	4	8	36	33,840	$ -	$ -
47	Route 8 Southbound Exit 30 Off Ramp	Porter Street	110	12	4	8	24	2,640	$ -	$ -
48	Route 8 Southbound to I-84 WB Ramp	Naugatuck River	1,000	12	4	8	24	24,000	$ -	$ -
49	Route 8 Southbound to I-84 EB Ramp	I-84 EB to Route 8 NB Ramp, Route 8 NB to I84 WB Ramp, Sunnyside Avenue, I-84 WB Exit 20 On Ramp, I-84 WB, I-84 WB to Route 8 SB Ramp, I-84 EB, Metro North, Bank Street	2,100	12	4	8	24	50,400	$ -	$ -
50	Route 8 Southbound Exit Ramp	Freight Street	430	36	4	8	48	20,640	$ -	$ -
51	Route 8 Southbound Exit Ramp	Naugatuck River, West Main Street Entrance Ramp, West Main Street	1,300	24	4	8	36	46,800	$ -	$ -
52	West Main Street Entrance Ramp	Naugatuck River	380	12	4	8	24	9,120	$ -	$ -
									Rehabilitate	**$ -**
									Reconstruct 2025	**$ 14,332,000**
			39,420					1,563,540	**Reconstruct 2045**	**$ -**

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX M
Schedule/Durations Options A - E

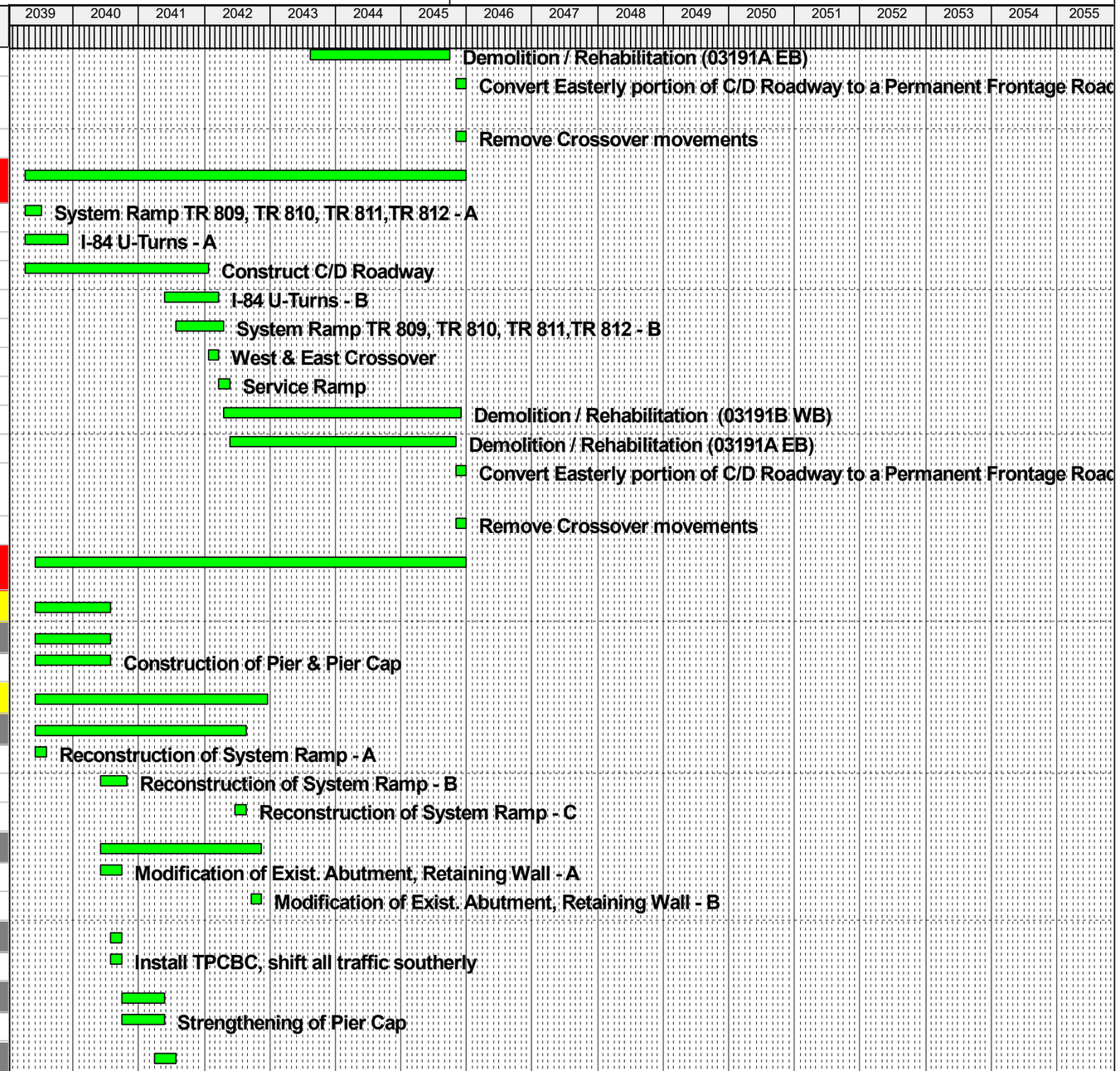
Fiscally Constrained Detailed Schedule

Activity Name	Original Duration	Start	Finish
Mix Master Fiscally Constrained Alternatives - 2018.10.18	1778	09-Mar-39	31-Dec-45
03191A & 03191B OPTION A	2490	09-Mar-39	31-Dec-45
Stage 1	1530	09-Mar-39	16-May-43
03191A (I-84 EB)	1320	09-Mar-39	18-Oct-42
Construction New 03191A	1320	09-Mar-39	18-Oct-42
I-84 & RTE-8 U-Turn	690	26-Jun-41	16-May-43
Construction of U-Turn	690	26-Jun-41	16-May-43
West & East Crossover	210	19-Oct-42	16-May-43
Construction of Crossover	210	19-Oct-42	16-May-43
TR 809, TR 811, TR 805 System Ramp	1530	09-Mar-39	16-May-43
Reconstruction of System Ramp - A	90	09-Mar-39	06-Jun-39
Reconstruction of System Ramp - B	270	20-Aug-42	16-May-43
STAGE 2A & 2B	1110	18-Dec-42	31-Dec-45
I-84 EB Exit 18, Exit 21, Exit 22, I-84 WB Exit 21 Service Ramp	150	18-Dec-42	16-May-43
Reconstruction of Service Ramp	150	18-Dec-42	16-May-43
Abutment, Wingwall	930	18-Mar-43	02-Oct-45
Reconstruction of Abutment, Wingwall - A	90	18-Mar-43	15-Jun-43
Reconstruction of Abutment, Wingwall - B	60	04-Aug-45	02-Oct-45
03191A (I-84 EB)	480	17-May-43	07-Sep-44
Detour I-84 EB & I-84 WB to New 03191A	480	17-May-43	07-Sep-44
03191B (I-84 WB)	900	16-Jun-43	01-Dec-45
Rehabilitation of 03191B	900	16-Jun-43	01-Dec-45
U-Turn & Crossover	30	02-Dec-45	31-Dec-45
Shift I-84 WB Back to Rehabilitated 03191B	30	02-Dec-45	31-Dec-45
03191A & 03191B OPTION B	2010	01-Jul-40	31-Dec-45
System Ramp TR 809, TR 810, TR 811,TR 812 - A	90	01-Jul-40	28-Sep-40
I-84 U-Turns - A	240	01-Jul-40	25-Feb-41
Construct C/D Roadway	1020	01-Jul-40	16-Apr-43
I-84 U-Turns - B	300	20-Aug-42	15-Jun-43
System Ramp TR 809, TR 810, TR 811,TR 812 - B	300	19-Oct-42	14-Aug-43
West & East Crossover	60	17-Apr-43	15-Jun-43
Service Ramp	60	16-Jun-43	14-Aug-43
Demolition / Rehabilitation (03191B WB)	840	15-Aug-43	01-Dec-45



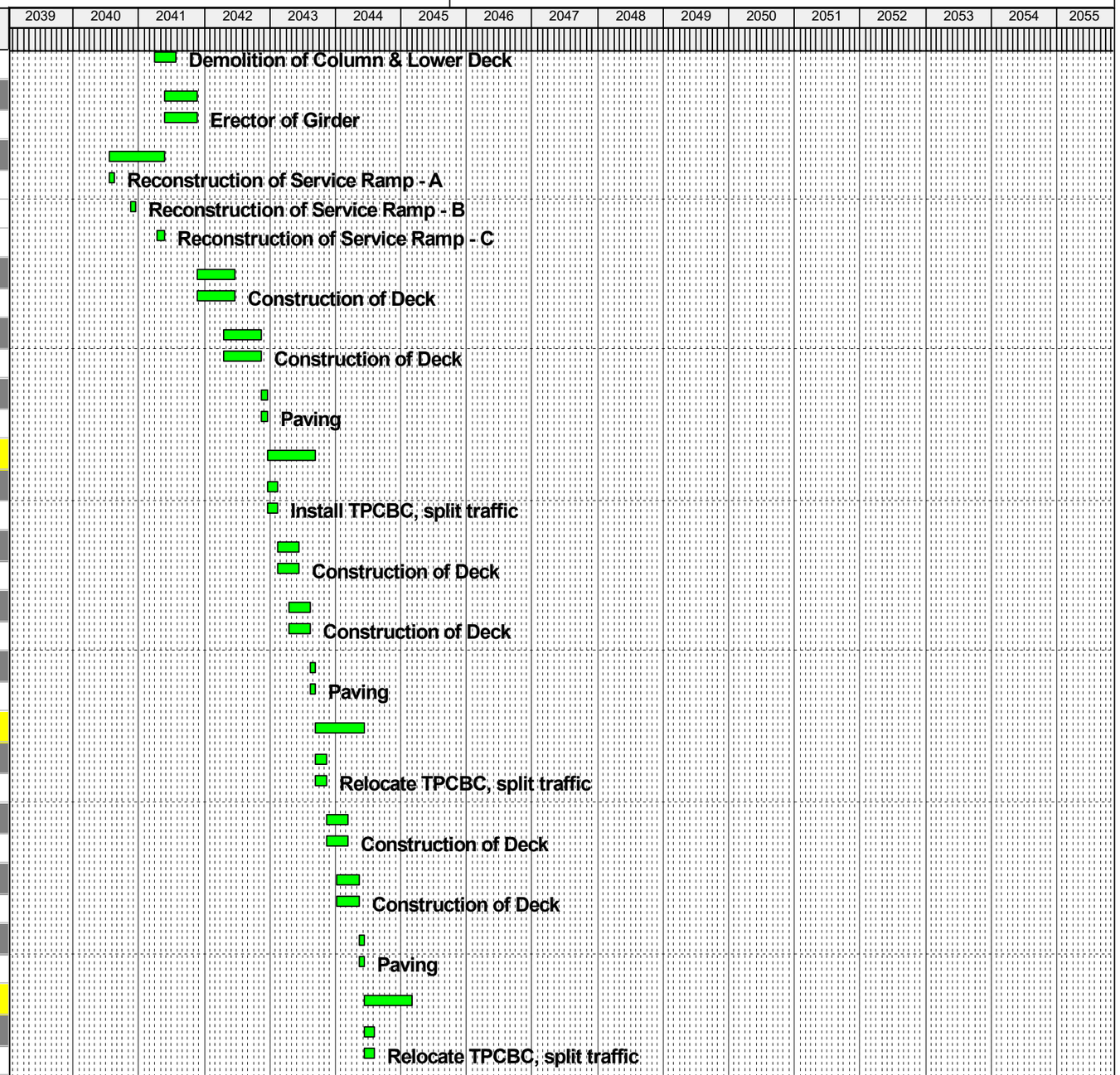
Fiscally Constrained Detailed Schedule

Activity Name	Original Duration	Start	Finish
Demolition / Rehabilitation (03191A EB)	780	15-Aug-43	02-Oct-45
Convert Easterly portion of C/D Roadway to a Permanent Frontage Road	60	02-Nov-45	31-Dec-45
Remove Crossover movements	60	02-Nov-45	31-Dec-45
03191A & 03191B OPTION C	2460	08-Apr-39	31-Dec-45
System Ramp TR 809, TR 810, TR 811,TR 812 - A	90	08-Apr-39	06-Jul-39
I-84 U-Turns - A	240	08-Apr-39	03-Dec-39
Construct C/D Roadway	1020	08-Apr-39	21-Jan-42
I-84 U-Turns - B	300	27-May-41	22-Mar-42
System Ramp TR 809, TR 810, TR 811,TR 812 - B	270	26-Jul-41	21-Apr-42
West & East Crossover	60	22-Jan-42	22-Mar-42
Service Ramp	60	23-Mar-42	21-May-42
Demolition / Rehabilitation (03191B WB)	1320	22-Apr-42	01-Dec-45
Demolition / Rehabilitation (03191A EB)	1260	22-May-42	01-Nov-45
Convert Easterly portion of C/D Roadway to a Permanent Frontage Road	60	02-Nov-45	31-Dec-45
Remove Crossover movements	60	02-Nov-45	31-Dec-45
03191A & 03191B OPTION D	1714	07-Jun-39	31-Dec-45
STAGE 1A	420	07-Jun-39	30-Jul-40
Pier & Cap Girder 3N, 4N, 6N, 8N, 10N, 12N, 13N, 14N.....	420	07-Jun-39	30-Jul-40
Construction of Pier & Pier Cap	420	07-Jun-39	30-Jul-40
STAGE 1B	922	07-Jun-39	17-Dec-42
System Ramp TR 805, 806, 807, 809, 810	1170	07-Jun-39	19-Aug-42
Reconstruction of System Ramp - A	60	07-Jun-39	05-Aug-39
Reconstruction of System Ramp - B	150	01-Jun-40	28-Oct-40
Reconstruction of System Ramp - C	60	21-Jun-42	19-Aug-42
Exist. Abutment, Retaining Wall	900	01-Jun-40	17-Nov-42
Modification of Exist. Abutment, Retaining Wall - A	120	01-Jun-40	28-Sep-40
Modification of Exist. Abutment, Retaining Wall - B	60	19-Sep-42	17-Nov-42
03191A	60	31-Jul-40	28-Sep-40
Install TPCBC, shift all traffic southerly	60	31-Jul-40	28-Sep-40
Cap Girder Pier 3, 4, 6, 8, 10, 12-16, 18-29, 31-46	240	29-Sep-40	26-May-41
Strengthening of Pier Cap	240	29-Sep-40	26-May-41
03191B	120	28-Mar-41	25-Jul-41



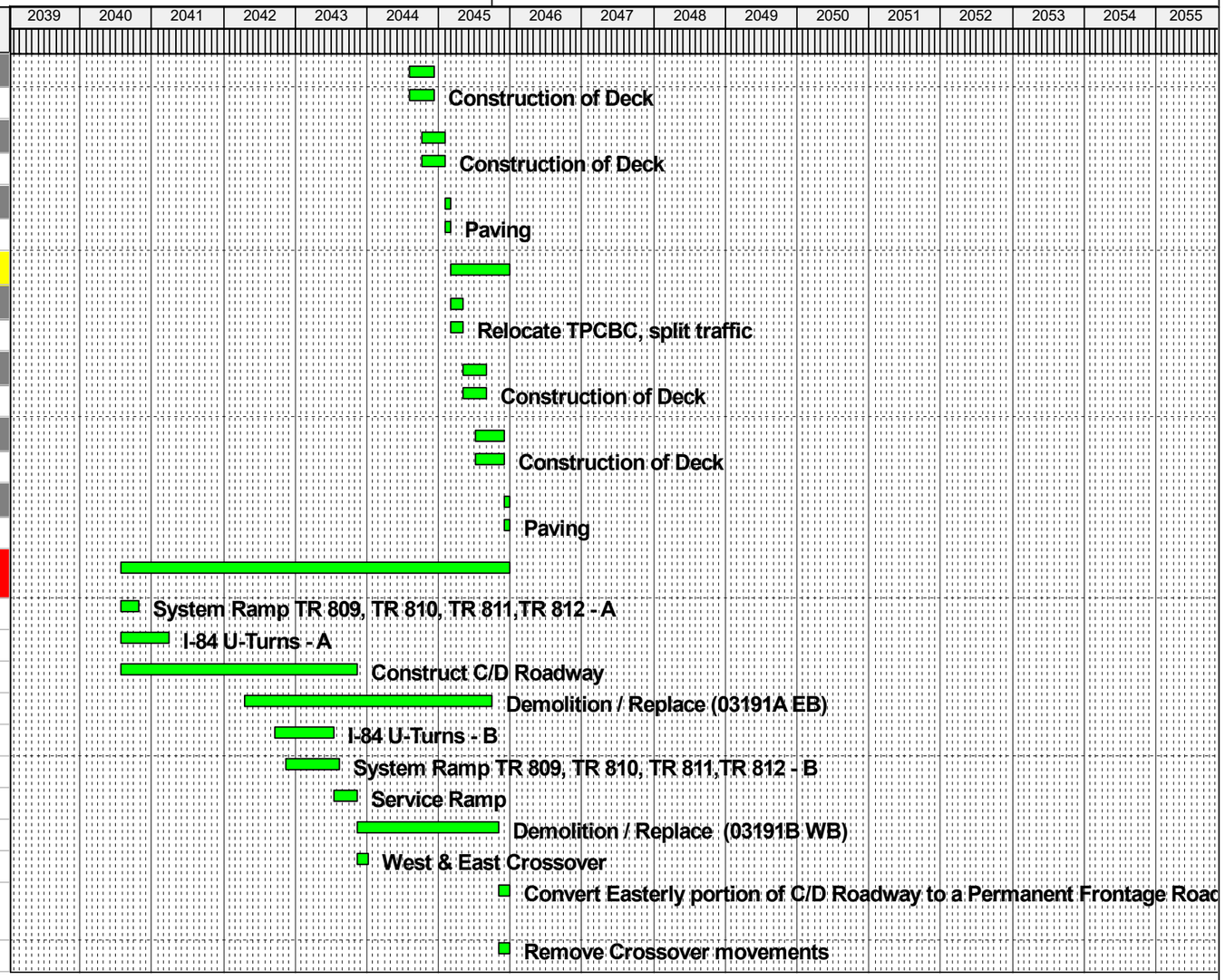
Fiscally Constrained Detailed Schedule

Activity Name	Original Duration	Start	Finish
Demolition of Column & Lower Deck	120	28-Mar-41	25-Jul-41
03191A & 03191B	180	27-May-41	22-Nov-41
Erector of Girder	180	27-May-41	22-Nov-41
Service Ramp I-84 EB Exit 21, 22, I-84 WB Exit 21	222	19-Jul-40	24-May-41
Reconstruction of Service Ramp - A	30	19-Jul-40	17-Aug-40
Reconstruction of Service Ramp - B	30	16-Nov-40	15-Dec-40
Reconstruction of Service Ramp - C	30	15-Apr-41	24-May-41
03191A-1	210	23-Nov-41	20-Jun-42
Construction of Deck	210	23-Nov-41	20-Jun-42
03191B-1	210	22-Apr-42	17-Nov-42
Construction of Deck	210	22-Apr-42	17-Nov-42
03191A & 03191B-1	30	18-Nov-42	17-Dec-42
Paving	30	18-Nov-42	17-Dec-42
STAGE 1C	270	18-Dec-42	13-Sep-43
03191A & 03191B	60	18-Dec-42	15-Feb-43
Install TPCBC, split traffic	60	18-Dec-42	15-Feb-43
03191A	120	16-Feb-43	15-Jun-43
Construction of Deck	120	16-Feb-43	15-Jun-43
03191B	120	17-Apr-43	14-Aug-43
Construction of Deck	120	17-Apr-43	14-Aug-43
Wearing Surface	30	15-Aug-43	13-Sep-43
Paving	30	15-Aug-43	13-Sep-43
STAGE 2	270	14-Sep-43	09-Jun-44
03191A & 03191B	60	14-Sep-43	12-Nov-43
Relocate TPCBC, split traffic	60	14-Sep-43	12-Nov-43
03191A	120	13-Nov-43	11-Mar-44
Construction of Deck	120	13-Nov-43	11-Mar-44
03191B	120	12-Jan-44	10-May-44
Construction of Deck	120	12-Jan-44	10-May-44
Wearing Surface	30	11-May-44	09-Jun-44
Paving	30	11-May-44	09-Jun-44
STAGE 3	270	10-Jun-44	06-Mar-45
03191A & 03191B	60	10-Jun-44	08-Aug-44
Relocate TPCBC, split traffic	60	10-Jun-44	08-Aug-44



Fiscally Constrained Detailed Schedule

Activity Name	Original Duration	Start	Finish
03191A	120	09-Aug-44	06-Dec-44
Construction of Deck	120	09-Aug-44	06-Dec-44
03191B	120	08-Oct-44	04-Feb-45
Construction of Deck	120	08-Oct-44	04-Feb-45
Wearing Surface	30	05-Feb-45	06-Mar-45
Paving	30	05-Feb-45	06-Mar-45
STAGE 4	300	07-Mar-45	31-Dec-45
03191A & 03191B	60	07-Mar-45	05-May-45
Relocate TPCBC, split traffic	60	07-Mar-45	05-May-45
03191A	120	06-May-45	02-Sep-45
Construction of Deck	120	06-May-45	02-Sep-45
03191B	150	05-Jul-45	01-Dec-45
Construction of Deck	150	05-Jul-45	01-Dec-45
Wearing Surface	30	02-Dec-45	31-Dec-45
Paving	30	02-Dec-45	31-Dec-45
03191A & 03191B OPTION E-1	1980	31-Jul-40	31-Dec-45
System Ramp TR 809, TR 810, TR 811,TR 812 - A	90	31-Jul-40	28-Oct-40
I-84 U-Turns - A	240	31-Jul-40	27-Mar-41
Construct C/D Roadway	1200	31-Jul-40	12-Nov-43
Demolition / Replace (03191A EB)	1260	22-Apr-42	02-Oct-45
I-84 U-Turns - B	300	19-Sep-42	15-Jul-43
System Ramp TR 809, TR 810, TR 811,TR 812 - B	270	18-Nov-42	14-Aug-43
Service Ramp	120	16-Jul-43	12-Nov-43
Demolition / Replace (03191B WB)	720	13-Nov-43	01-Nov-45
West & East Crossover	60	13-Nov-43	11-Jan-44
Convert Easterly portion of C/D Roadway to a Permanent Frontage Road	60	02-Nov-45	31-Dec-45
Remove Crossover movements	60	02-Nov-45	31-Dec-45



FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX N
Risk Register Options A - E

Risk Register: 151-331 -- Mixmaster Interchange Study- Fiscally Constrained Alternates

Updated: 09-11-18

Project Manager: Schweitzer
Project Executive: Carrier

Risk Identification							Response		Monitoring & Control	
No.	Name	Overall Risk Rank	Schedule Impact Rank	Cost Impact Rank	Phase	Description (Cause, Effect)	Approach	Response Plan and Mitigation Options	Status	Status Notes as of 09-11-2018
1	**Inadequate Funding for Rehabilitation or replacement in 2045**	**High**	**High**	**High**	Planning	In 2045, the exisiting I-84 decks will be 80 years old. Although there have been several projects that have rehabilitated the decks, the portions of the decks that have not yet been patched will continue to deteriorate at an accelerated rate due to the excessive chloride levels		At a minimum- a 2045 project should replace all "original" decks. Also- Need to attempt to break project in more easily fundable projects (sub $Billion dollar projects)		
2	**Reuse of Existing Steel Members**	**Medium/High**	**N/A**	**Medium/High**	Post Construction	Reuse maintains numerous fracture critical spans and details throughout the interchange. Potential Fatigue related issues (connections, webs, flanges) associated with a non rendundant spans (5 spans). Expect crack migration (& initiation) to continue after 2018 rehabilitation project		retrofit all known/active crack locations and retrofit all other known susceptible areas. Inspection frequency will likley need to be increased. Funding will be required for full painting in 40 years		
3	**Full or Partial Reuse of Existing Concrete Substructure Units**	**Medium/High**	**N/A**	**Medium/High**	Post Construction	Potential corrosion of H-piles. Costly reoccuring maintenance requirements. Traffic impacts due to maintenance and inspection activities		Require additional funding for 1) annual maintenance 2) full substructure rehabilitation project to occur in 40 years		
4	**Maintaining Existing Parapets**	**Low**	**N/A**	**Low**	Post Construction	Re-use of existing or modified parapet. Not a crash tested system that will remain in use		Modify geometrics of interchange to reduce probability of failure.		
5	**Geometrics**	**Medium**	**N/A**	**Low**	Post Construction	Areas of reduced traffic flow efficiency due to inadequate shoulders, lack of breakdown/refuge area, overdimensional loads impacts. Continueance of accident history associated with weaves.		Close specific ramps to reduce conflicts, Overbuild in allowable areas to increase shoulder width.		
6	**Congestion within interchange**	**Medium**	**N/A**	**Low**	Post Construction	without the addition of temporary/permanent C/D roadway, users will continue to use interchanges as a local access roadway (current estimate is that 62% of use is for local traffic crossing).		Create local roadway enhancements to promote usage of local roads.		
7	**Traffic Split (Option D)**	**Medium**	**N/A**	**Low**	Construction	Option D requires mainline traffic to be split during several stages resulting in decreased work zone safety.				
8	**Lateral Slide (Option E)**	**Medium**	**N/A**	**Medium**	Construction	complexity of sliding a multi span continuous section at significant elevation and 4% grade during weekend closures. Potential for delay claims.		Create additional detour options to extend outages		
9	**Visual**	**Medium**	**N/A**	**Low**	Post Construction	Rehabilitation will either present look of a non symetric system with mix of old and new elements (options A & D), or maintain look of aging structure (options B,C or E). Potential city/stakeholder discourse.		Outreach to stakeholders. PI/Marketing plan.		
10	**I-84 & Rt 8 U-Turns**	**Low**	**N/A**	**Low**	Construction	This manuever does not match with Driver Expectancy, which could result in higher incident rates and/or slower speeds. It is possible that a significant traffic incident would cause this U-Turn to be closed.	Mitigate	Design controls have been included in the Contract (illuminated chevrons), public outreach will continue through construction, and a possibly contingency plan for use just in the event of a shutdown.		
11	**Emergency Response Coordination and Access**	**Low**	**N/A**	**Low**	Construction	There will be multiple ramp closures and detours used throughout construction. Some closures may impact typical response routes.	Mitigate	Hold monthly meeting with Emergency Responders and continuous outreach, to ensure that the impacts and routes are planned and known in advance. Ensure requirements of the TMP are followed.		

FISCALLY CONSTRAINED ALTERNATIVES TECHNICAL MEMORANDUM

APPENDIX O
Life Cycle Costs Options A - E

Life Cycle Cost Comparison:
Preliminary Analysis Summary

Overview:

As part of the Waterbury Mixmaster Replacement, several Fiscally Constrained Alternatives were developed to present lower cost alternatives to the full replacement of the Mixmaster interchange. While the initial construction costs are easily calculated and comparable, a more comprehensive approach was investigated in order to fully capture the longer-term Operations, Maintenance & Rehabilitation (OM&R) costs associated with each option.

In addition, since each option has various staging and traffic management strategies, simplified Road User Cost (RUC) calculations were performed for each of the options. These calculations make an effort to capture the costs imparted on the traveling public through delays and detours associated with the various options.

All costs were calculated by hand, and input into BridgeLCC, a program that consolidates the various costs and calculates an equivalent single present-day value based on an input interest rate and inflation. These present-day costs can then be directly compared between the various options. Additionally, since these are present day values, they require escalation accordingly for a 2045 construction year.

Although the study limits include 62 bridges, the Life Cycle Cost comparison focused specifically on the Interstate 84 Eastbound and Westbound mainline structures only.

Life Cycle Costs were calculated for the following options:

Full Replacement -Alternate 8 (from 2010 study) and the Fiscally Constrained Alternatives (FCA) Options A, B, C, D and E

Cost Approach – "per Bridge"

The Mixmaster FCA Replacement study encompasses improvements for both bounds of I-84 (EB & WB) and Route 8 (NB & SB). In order to more effectively manage the various cost components, especially in terms of Road User Costs, the calculations were calculated per bound of I-84 exclusively.

1. Construction cost for replacement & FCA options for Bridge Nos. 03191A and 03191B
2. OM&R costs based in part on available current rehab cost estimates
3. RUC Costs associated with:
    a. Queue delays due to loss of available lanes on I-84, and based on available ADT values for I-84 EB.
    b. Circuity delays due to detours for any transfers *from* I-84 *to* Rt. 8 NB or SB

Construction Costs:

The construction costs for the bridges have been calculated based on the estimates prepared as part of the Fiscally Constrained Alternatives (FCA) reports. These values are as follows (rounded up to nearest $0.1 million):

	Initial Construction Cost (I-84 EB)	Initial Construction Cost (I-84 WB)
Full Replacement	$63,500,000	$67,000,000
FCA – Option A	$149,363,950	$32,000,000
FCA – Option B	$75,900,000	$53,500,000
FCA – Option C	$47,200,000	$33,000,000
FCA – Option D	$77,900,000	$45,300,000
FCA – Option E	$79,600,000	$55,200,000

Operations, Maintenance & Rehabilitation (OM&R) Costs:

The following OM&R costs have been calculated for each of the structures:

1. Painting

Painting costs were calculated as part of the rehabilitation study and applied to any option which utilizes existing steel. For options which replaced only certain members, the full cost is scaled down by a factor of (Rehab SF)/(Replaced SF). Option A has new steel for I-84 EB, which is expected to have a surface coating which lasts for the design life, therefore no painting cost is included. Painting cost is assumed to take place at year 40.

	Painting Cost (I-84 EB)	Painting Cost (I-84 WB)
Full Replacement	-	-
FCA – Option A	-	$7,600,000
FCA – Option B	$11,600,000	$7,600,000
FCA – Option C	$11,600,000	$7,600,000
FCA – Option D	$11,600,000	$7,600,000
FCA – Option E	$4,100,000	$5,400,000

2. Repaving

Paving was anticipated to occur every 10 years, and was based on a cost of $350,000 per two-lane interstate mile. This was scaled for a bridge length of 0.71 miles and an average roadway width. The values were scaled for the increased square footage of Options A and/or D. Paving of the C/D roadway for Options B, C and E are included in the repaving cost (added to the WB cost).

	Repaving Cost (I-84 EB)	Repaving Cost (I-84 WB)
Full Replacement	$680,000	$680,000
FCA – Option A	$680,000	$550,000
FCA – Option B	$580,000	$1,530,000
FCA – Option C	$580,000	$1,530,000
FCA – Option D	$740,000	$740,000
FCA – Option E	$580,000	$1,530,000

3. Annual Maintenance Costs

These costs are meant to include all yearly maintenance costs such as steel (spot repairs) and patching of the substructure. The costs increase over various time frames depending on whether the structures are new, existing or rehabbed. These values are applied to both I-84 EB & WB.

Option A & Alternate 8		Option B		Option C		Option D		Option E	
Cost	*Years*	Cost	*Years*	Cost	*Years*	Cost	*Years*	Cost	*Years*
$25,000	*5-10*	$75,000	*5-20*	$75,000	*5-20*	$50,000	*5-10*	$75,000	*5-20*
$50,000	*11-20*	$100,000	*21-75*	$100,000	*21-75*	$65,000	*11-20*	$100,000	*21-75*
$75,000	*21-75*					$85,000	*21-75*		

4. Full Deck Rehabilitation

Similar to painting, it is assumed that a full deck rehabilitation with miscellaneous steel repairs will be necessary at some point during the service life of the structure. This cost was derived using the relevant estimating as well as bid pricing from the current rehabilitation project. The deck rehab costs for Options A and/or D was then scaled up by square footage. This cost was also assumed to take place at year 40.

	Full Deck Rehab (I-84 EB)	**Full Deck Rehab (I-84 WB)**
Full Replacement	$5,600,000	$5,600,000
FCA – Option A	$5,600,000	$4,000,000
FCA – Option B	$6,600,000	$4,700,000
FCA – Option C	$6,600,000	$4,700,000
FCA – Option D	$8,600,000	$5,600,000
FCA – Option E	$6,600,000	$4,700,000

Life Cycle Cost Results Summary:

Total Present Day Costs - Bridge Nos. 03191A & 03191B			
	Initial Construction	**OM&R Costs***	**Total Present day (2018) Cost**
Full Replacement	$130,500,000	$30,300,000	$160,800,000
FCA – Option A	$179,200,000	$35,400,000	$216,700,000
FCA – Option B	$129,400,000	$58,700,000	$188,100,000
FCA – Option C	$80,200,000	$58,700,000	$138,900,000
FCA – Option D	$123,200,000	$55,100,000	$178,200,000
FCA – Option E	$134,800,000	$49,000,000	$183,700,000

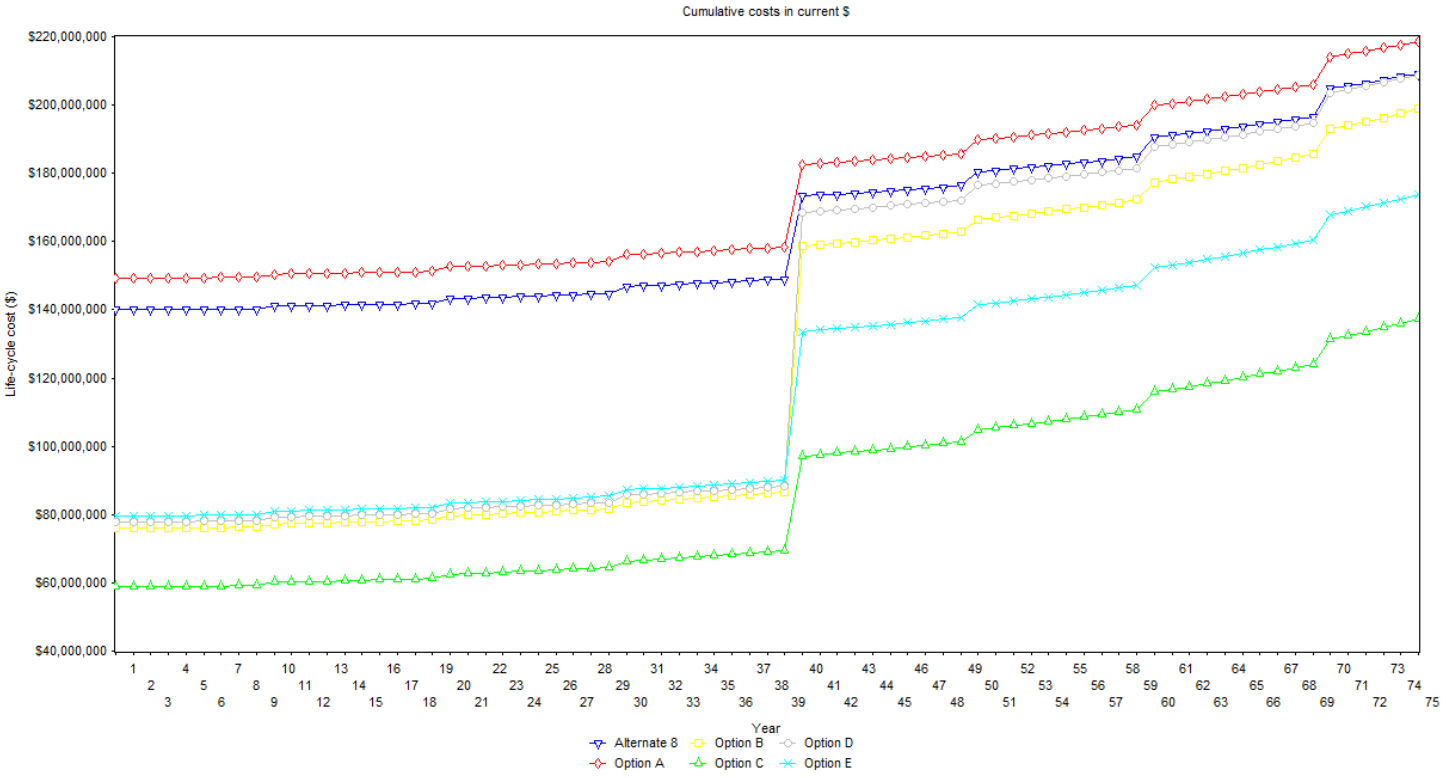
*OM&R Costs are present day dollars required for future preservation expenditures at indicated milestones assuming a rate of return which keeps pace with inflation.

The following tables show the above costs "per bound":

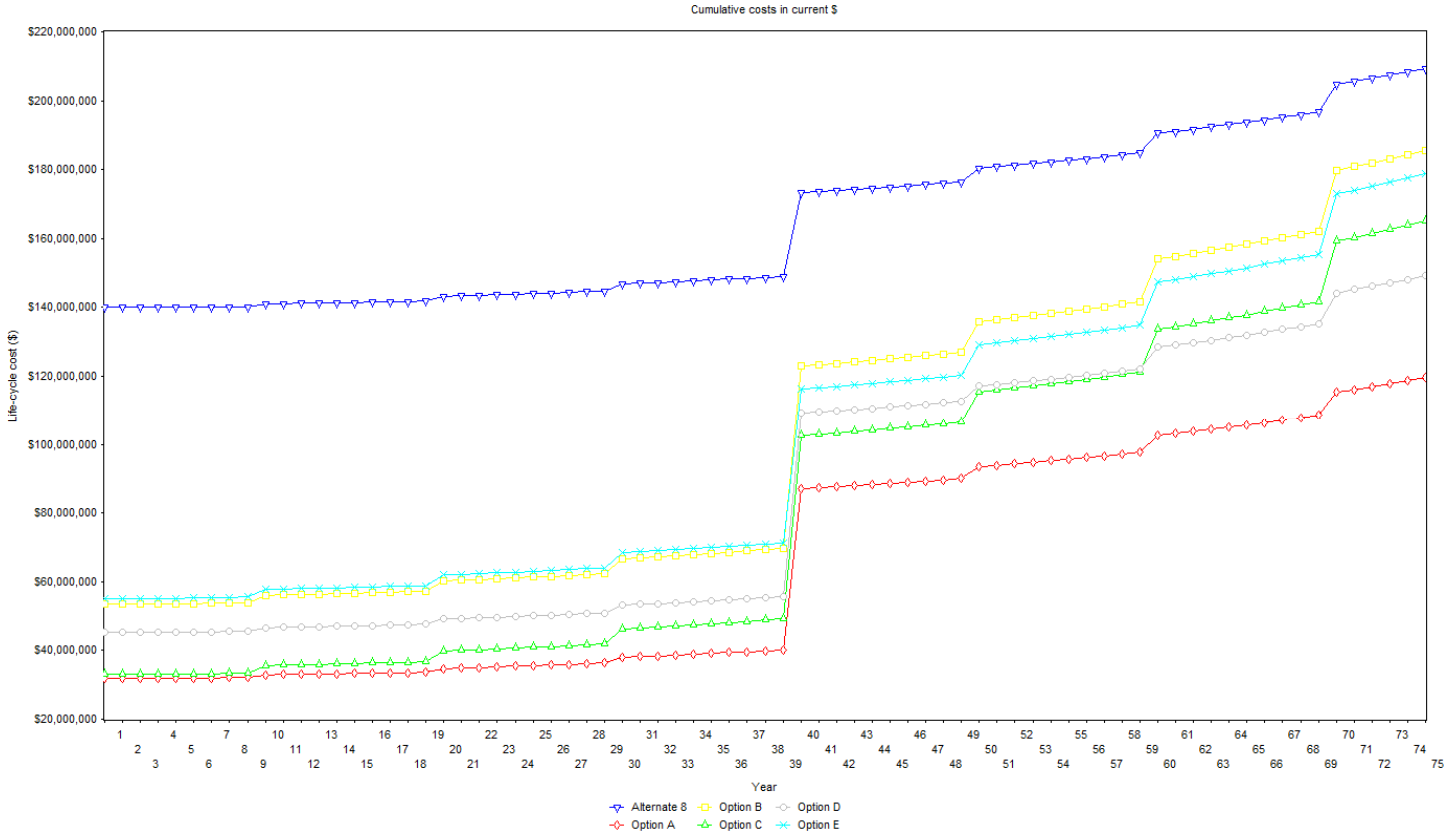
	Initial Construction (I-84 EB)	OM&R Costs (I-84 EB)	Total Present Day Cost (I-84 EB)
Full Replacement	$63,500,000	$15,135,000	$78,635,000
FCA – Option A	$147,218,668	$15,135,000	$164,498,950
FCA – Option B	$75,900,000	$28,960,000	$104,860,000
FCA – Option C	$47,200,000	$28,960,000	$76,160,000
FCA – Option D	$77,900,000	$31,005,000	$108,905,000
FCA – Option E	$79,579,179	$21,460,000	$101,039,179

	Initial Construction (I-84 WB)	OM&R Costs (I-84 WB)	Total Present Day Cost (I-84 WB)
Full Replacement	$67,000,000	$15,135,000	$82,135,000
FCA – Option A	$31,950,129	$20,225,000	$52,175,129
FCA – Option B	$53,442,268	$29,710,000	$83,152,268
FCA – Option C	$32,993,259	$29,710,000	$62,703,259
FCA – Option D	$45,273,795	$24,005,000	$69,278,795
FCA – Option E	$55,122,326	$27,510,000	$82,632,326

The following graph represents the initial construction cost and distribution of OM&R costs over the 75 year design life for **I-84 EB**:



The following graph represents the initial construction cost and distribution of OM&R costs over the 75 year design life for **I-84 WB**:



Road User Costs During Construction:

The procedure for calculating road user costs during construction was based on the NJDOT Road User Cost Manual, which suggest calculating the following user costs. A brief description of how the user cost is applied to this project is presented for each.

1. Queue Delay
   This is the added time required for users to wait in a queue at the construction site. This is applied to the construction options which required a decrease in the number of lanes, whether due to a lane closure or a C/D roadway with 2 lanes.
2. Queue Idling VOC (Vehicle Operating Costs)
   This cost is the same as above, but represents the cost of operating the vehicle while in the queue.
3. Work Zone Delay
   Added cost due to the slower movement speed through the construction zone as opposed to normal condition. Note that this cost is not applied to any of the options, as the work zone speed is not anticipated to be much lower than the current speed.
4. Circuity Delay
   This cost is due to the added time required for users to travel through a detour. For the purposes of evaluating this project "per bridge", any detour required to travel *from* the analyzed bridge *to* one of the other routes is included. For example, when analyzing I-84EB, the only detour included was for the options which require travelers wanting to get to Rt. 8 NB to first enter Rt. 8 SB and then use a U-turn. This specific case results in an increase of 3.1 miles travel distance and 4 minutes of travel time.
5. Circuity VOC
   This cost is the same as above, but represents the cost of operating the vehicle while in the queue.

Road User Costs Assumptions:

The following are some assumptions used to calculate the road user costs listed above:

1. ADT for the queue calculations is taken as the I-84 EB ADT prior to reaching the interchange (37,900) plus 90% of the ADT from Route 8 NB & SB (17,000+11,400), which equals 63,460. For I-84 WB, the entire AADT prior to the interchange is used, since there is a net decrease in traffic through the interchange.
2. The ADT distribution throughout the day is based on the charted mainline traffic distribution (% of peak) which is applied to the total ADT to get an ADT per hour. This allows for a more accurate distribution of queue buildup (see next page).
3. A roadway capacity of 1900 vph per lane is assumed, both for normal conditions as well as construction and detours.
4. The queue travel speed is based on the ratio of normal capacity/queue capacity, and is generally 15 mph when the lane decreases from 3 lanes to 2 lanes.
5. An unrestricted speed (normal speed without construction) of 40 mph was used to calculate the increase in travel time.
6. For transfers from I-84 EB, the only detour included is for traffic traveling to Route 8 Northbound. An increase in travel distance of 3.1 miles and an increase in travel time of about 4 minutes is used for calculate costs for this detour. The full ADT has been used for the user costs in this calculation (8400

vehicles). For transfers from I-84 WB, detours to both Route 8 Northbound and Southbound are included as applicable.

7. An ADTT of 9% was assumed for all traffic.
8. For Options B, C and E, it is assumed that only weekend work is used. Therefore, when the daily cost is calculated, it is multiplied by 104 for the yearly cost. Options A and D are assumed to impact traffic for the duration of the projects. The number of months of construction are as shown below:

	Months of Construction with Traffic Impacts (EB/WB)
FCA - Option A	22 / 22
FCA - Option B	24 / 27
FCA - Option C	40 / 42
FCA - Option D	0 / 6
FCA - Option E	22 / 27

Additional Notes:

- Based on these assumptions, Option D only has road user costs associated with the detour from I-84 WB to Route 8 NB. This detour is assumed to be active for only 6 months of construction.
- Based on the assumptions used to calculate road user costs, it is assumed that no user costs occur for Alternate 8 construction, which is built off line.

Road User Costs Summary Tables:

Road User Costs - Bridge No. 03191A				
Costs per Year			**Total Cost**	
FCA - Option A	$	20,829,453	$	38,187,330
FCA - Option B	$	6,828,406	$	13,656,812
FCA - Option C	$	6,828,406	$	22,761,353
FCA - Option D	$	-	$	-
FCA - Option E	$	6,828,406	$	12,518,744

Road User Costs - Bridge No. 03191B				
Costs per Year			**Total Cost**	
FCA - Option A	$	77,381,027	$	141,865,215
FCA - Option B	$	51,341,303	$	115,517,933
FCA - Option C	$	57,382,008	$	200,837,028
FCA - Option D	$	33,215,408	$	16,607,704
FCA - Option E	$	57,382,008	$	129,109,518

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APPENDIX P
Fiscally Constrained Alternatives Matrix