I-95 Corridor
Branford to Rhode Island
Feasibility Study Update

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Final Report
May 2018

INTERSTATE 95

CDM Smith
77 Hartland Street
Suite 201
East Hartford, CT 06108
860-529-7615

Table of Contents

List of Figures

List of Tables

Appendices

Executive Summary

The purpose of this document is to provide an update to the 2004 I-95 Corridor Branford to Rhode Island Feasibility Study conducted by Clough, Harbor, and Associates (CHA), which evaluated the feasibility of adding one operational lane in each direction along I-95 between Exit 54 in Branford and the Connecticut/Rhode Island State Line. This report provides an update to the 2004 Feasibility Study, to reflect current conditions. The report also includes an analysis of operations, existing conditions, and provides conceptual improvements between Exit 75 (Route 1) to Exit 80 (Waterford Parkway) which was not included in the 2004 Study because that area was being evaluated as part of the Route 11 project that was ongoing at the time the 2004 study was being prepared.

Methodology

The update of the 2004 Feasibility Study:

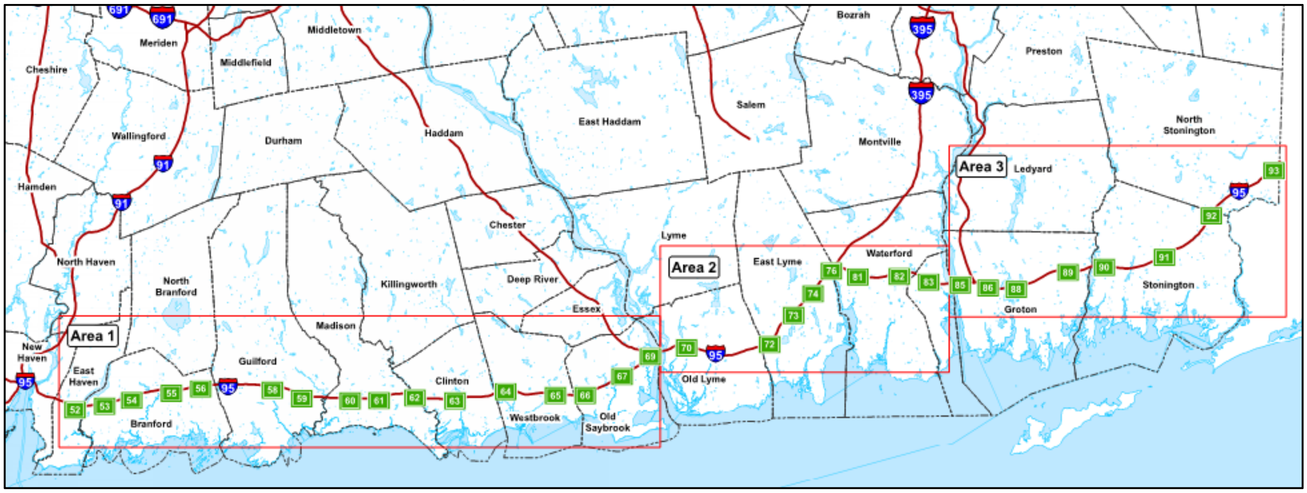
- Identifies the impacts and issues associated with adding an operational lane on I-95 between Exit 54 in Branford and the Connecticut/Rhode Island State Line.
- Estimates Average Summer Weekday Existing 2016 I-95 Mainline/Ramp traffic volumes; and perform Mainline and Weaving segments Level of Service (LOS) analyses.
- Estimates Average Summer Weekday Future No-Build 2045 (2 lanes) and Future Build 2045 (3 lanes) I-95 Mainline/Ramp traffic volumes; and perform Mainline and Weaving segments LOS analyses.
- Estimates Existing 2016 LOS analyses based on Average Summer Weekday AM and PM Peak hour volumes provided by the CTDOT.
- Estimates Future No-Build 2045 and Future Build 2045 LOS analyses based on forecasted volumes that were estimated by applying model growth rates (from the CT Statewide Travel Demand model) to the 2016 Peak hour volumes.
- Summarizes structures within the study area and identify structures with a condition rating less than 5.
- Updates the Crash analysis to reflect the most recent available 3-year Crash data (2014-2016).
- Summarizes projects and improvements that have been made to Mainline I-95 and the Interchanges within the study area since the inception if the 2004 Feasibility Study Report.
- Updates the Existing Cultural resource, Surface waters and Watercourse, Groundwater resource, and Surface water resource mapping.
- Revises the Construction cost estimate to construct the additional operational lane from Exit 54 in Branford to the Connecticut/Rhode Island State Line, as well as provide costs for future recommended projects. The methodology used for developing cost was the same risk-based

analysis associated with the development of costs for the widening of I-95 West of Bridgeport.

Corridor Characteristics

Since the existing characteristics of I-95 differ greatly throughout the corridor, the study area has been divided into three separate areas for the analysis necessary to complete the update to the 2004 Feasibility Study (see Figure ES-1).

Figure ES-1 Project Study Area



Area 1: This area is located between the western limit of the study area at Exit 54 and the Baldwin Bridge in Old Saybrook. It is approximately 25 miles in length. This section of I-95 features left and right shoulders with varying widths of 10 ft. to 12 ft., along with a paved median with concrete barrier curb separating the northbound and southbound travel lanes. The existing pavement is comprised of concrete ridged pavement overlaid with several bituminous layers. The existing available right-of-way is fairly a wide swath along this segment, varying from approximately 250' to 300' in total width (centered off the I-95 median). This width limits the number of parcels required to be taken to widen the freeway to the ultimate proposed cross section.

In 2016, Average Summer Weekday Daily Traffic Volumes (ASWDT- both directions combined) range from approximately 105,000 vehicles per day (vpd) in Branford to approximately 97,000 vpd on the Baldwin Bridge. By 2045, under the Future No-Build condition, the volumes are anticipated to increase to 135,000 vpd in Branford to 126,000 vpd on the Baldwin Bridge, an approximate increase of 30% from 2016. The planned addition of an extra lane (additional capacity) in future is anticipated to attract more trips to the corridor (also known as induced demand). As a result, volumes are anticipated to range increase to approximately 140,000 vpd in Branford to approximately 130,000 vpd on the Baldwin Bridge- increase of approximately 33% from 2016.

In 2016, during the AM Peak hour, all of the Area 1 northbound segments operate at a Level of Service (LOS) of D or better. In the southbound direction, most segments operate at a LOS of D or better, except the segment between Exits 54 and 55 in Branford. Under the Future No-Build 2045 condition, the northbound direction is anticipated to continue operating at LOS D or better. However, the southbound operations are anticipated to deteriorate (LOS E and worse) between

Exit 54 in Branford and Exit 61 in Madison. With the planned addition of an operational lane in each direction (Future Build 2045 condition), both the northbound and southbound segments are anticipated to operate at acceptable LOS of D or better.

In 2016, during the PM Peak hour, most of the Area 1 northbound and southbound segments operate at a Level of Service (LOS) of D or better, except the northbound and southbound segment between Exits 54 and 55 in Branford. By 2045, under the Future No-Build condition, almost all segments in both directions are anticipated to experience a deterioration in traffic operations (LOS E and worse). With the planned addition of an operational lane in each direction (Future Build 2045 condition), both the northbound and southbound segments are anticipated to operate at acceptable LOS of D or better.

Crash records for I-95 from the most recent three-year period, 2014-2016, were assembled and analyzed for Area 1. In the northbound direction, high crash rates (greater than 2.5 crashes per 100 million vehicle-miles traveled- MVMT) were observed in Branford at Exit 54, and in Madison at Exit 61. In the southbound direction, high crash rates were observed in Branford between the Exit 54 Off ramp and On ramp, in Branford at Exit 56, in Madison between the Exit 61 off and On ramps, and in Clinton at Exit 63.

Area 2: This area is located between the Baldwin Bridge in Old Lyme and the Gold Star Memorial Bridge in New London and is approximately 15 miles in length. The cross-sectional characteristics of the roadway differ greatly as you pass through this area. Between the Baldwin Bridge and the I-95/I-395 interchange, the northbound and southbound lanes of I-95 feature narrow left shoulders varying between 4 ft. and 8 ft. in width, and right shoulders varying between 8 ft. and 10 ft. in width. This segment of I-95 also features steep longitudinal grades and has been the location of several deadly crashes over the years. State Projects 104-164, 44-151, and 172-442 were recently completed between 2014 and 2017 and addressed some of the safety concerns throughout this section. The existing metal beam rail separating the northbound and southbound I-95 travel lanes was removed and replaced with concrete median barrier with a grassed median. State Project 44-156 is currently under design and will addresses vehicular safety on I-95 at Interchange 74, as well as addressing traffic operations between Interchange 74 and Interchange 75 in East Lyme. The existing available right-of-way is a fairly wide swath along this segment, varying approximately from 200’ to 300’ in total width centered off the I-95 median, but due to the topography, several existing properties will be impacted from widening the roadway to the ultimate proposed cross section.

The original 2004 Feasibility Study included assumptions associated with the future improvements at the I-95/ I-395 interchange. At the time the 2004 Feasibility Study was published, a study of the I-95/I-395 interchange was in progress, which considered the feasibility of reconstructing the interchange to include the missing connections from southbound I-95 to northbound I-395 and southbound I-395 to northbound I-95. The study also included extending Route 11 to the I-95/I-395 interchange and providing an interchange with direct connections to Route 11 from both I-95 and I-395. The extension of Route 11 to the I-95/I-395 interchange has since been cancelled, and the I-95/I-395 interchange concepts have been revised under this study to remove the Route 11 connection. This re-evaluation has resulted in reduction in the footprint for the interchange.

In 2016, Average Summer Weekday Daily Traffic Volumes (ASWDT- both directions combined) range from approximately 84,000 vehicles per day (vpd) in Old Lyme to approximately 121,000 vpd on the Goldstar Bridge. By 2045, under the Future No-Build condition, the volumes are anticipated to increase to 110,000 vpd in Old Lyme to 158,000 vpd on the Goldstar Bridge- an approximate increase of 31% from 2016. With the planned addition of an extra lane along the corridor and expected induced demand, volumes are anticipated to range from approximately 112,000 vpd in Old Lyme to approximately 160,000 vpd on the Goldstar Bridge- increase of approximately 34% from 2016.

In 2016, during the AM Peak hour, all Area 2 northbound and southbound segments operate at a Level of Service (LOS) of D or better. By 2045, under the Future No-Build condition, most segments in the northbound and southbound directions are anticipated to continue operating at LOS D or better, except the northbound segment between Exits 74 and 76 in Niantic and the southbound segment between Exits 70 and 72 in Old Lyme. With the planned addition of an operational lane in each direction (Future Build 2045 condition), both the northbound and southbound segments are anticipated to operate at acceptable LOS of D or better.

In 2016, during the PM Peak hour, most Area 2 northbound and southbound segments operate at a Level of Service (LOS) of D or better, except the northbound segment between Exits 75 and 76 in East Lyme and the southbound segment between Exits 82 and 82A in New London. By 2045, under the Future No-Build condition, almost all segments in both directions are anticipated to experience a deterioration in traffic operations (LOS E and worse). With the planned addition of an operational lane in each direction (Future Build 2045 condition), most of the northbound and southbound segments are anticipated to operate at LOS of D or better, except the southbound segments between Exits 75 and 76 in East Lyme and Exits 82 and 82A in New London (which are projected to deteriorate to LOS E as a result of induced demand due to the planned operational lane). Improvements to these and other areas will be addressed in detail in the next phase of the study i.e. I-95 East Traffic Operations Study using Average Summer Friday and Weekday Traffic Volumes.

Crash records for I-95 from the most recent three-year period, 2014-2016, were assembled and analyzed for Area 2. In the northbound direction, high crash rates were observed in East Lyme at between Exit 74 and Exit 76, with the highest crash rate occurring between the Exit 74 off and on ramps. In the southbound direction, high crash rates were observed in Old Lyme at Exit 71, in Niantic at Exit 74, and in New London at Exit 82, with the highest crash rate occurring between the Exit 74 off and on ramps.

Area 3: This area is located between the Gold Star Memorial Bridge in Groton and the Connecticut/Rhode Island State Line and is approximately 16 miles in length. The cross-sectional characteristics of the roadway are fairly consistent as you pass through this area. The northbound and southbound lanes of I-95 feature 8 ft. +/- left shoulders and right shoulders varying between 10 ft. and 12 ft. in width. This section of I-95 also features steep longitudinal grades and a wide grassed median separating the northbound and southbound travel lanes. State Project 58-307 is currently under design, which provides safety improvements to the acceleration and deceleration lanes along I-95, as well as improvements to the interchange operations at Exit 88, Exit 89, Exit 90, Exit 91, Exit 92, and Exit 93, in the towns of Gorton, Stonington, and North Stonington. The existing available right-of-way is fairly wide swath along this section, varying approximately 330’ to 1,050’ in total width centered off the I-95 grassed median, limiting the number of parcels required to be taken to widen the freeway to the ultimate cross section.

In 2016, Average Summer Weekday Daily Traffic Volumes (ASWDT- both directions combined) range from approximately 104,000 vehicles per day (vpd) in Groton to approximately 50,000 vpd near the Rhode Island border. By 2045, under the Future No-Build condition, the volumes are anticipated to increase to 136,000 vpd in Groton to 72,000 vpd near the Rhode Island border – increase ranging from 31% to 42% compared to 2016 volumes. With the planned addition of an extra lane along the corridor and expected induced demand, volumes are anticipated to increase to 139,000 vpd in Groton to 73,000 vpd near the Rhode Island border – increase ranging from 33% to 44% compared to 2016 volumes.

In 2016, during the AM Peak hour, all Area 3 northbound and southbound segments operate at a Level of Service (LOS) of D or better. By 2045, under the Future No-Build condition, most segments in the northbound and southbound directions are anticipated to continue operating at LOS D or better, except the southbound segment between Exits 89 and 90 in Mystic. With the planned addition of an operational lane in each direction (Future Build 2045 condition), both the northbound and southbound segments are anticipated to operate at acceptable LOS of D or better.

In 2016, during the PM Peak hour, most Area 3 northbound and southbound I-95 segments operate at a Level of Service (LOS) of D or better, except the northbound segment between Exits 89 and 90 in Mystic. By 2045, under the Future No-Build condition, most segments continue to operate at LOS D or better, except the northbound and southbound segments between Exits 89 and 91 in Mystic. With the planned addition of an operational lane in each direction (Future Build 2045 condition), most of the northbound and southbound segments are anticipated to operate at LOS of D or better, except the southbound segment between Exits 85 and 86 in Groton (which deteriorates to LOS E).

Crash records for I-95 from the most recent three-year period, 2014-2016, were assembled and analyzed for Area 3. In the northbound direction, there were no high crash locations identified. In the southbound direction, high crash rates were observed in New London near Exit 82, between Exits 86 and 88 in Groton, and in Stonington north of the southbound service plaza.

In general, high crash rates in all areas could be attributed to the steep longitudinal grades, short acceleration and deceleration lanes, congestion, and excessive vehicle speeds.

Future Project Recommendations

From the update of the traffic and crash data analysis, several projects are recommended for implementation in the near, mid, and long-term future. While the original 2004 Feasibility Study presented the viability of adding one additional operational lane in both the northbound and southbound directions between Exit 54 in Branford and the Rhode Island State Line, this report presents several smaller selective widening projects, aimed at providing immediate improvements to traffic operations and corridor safety. Projects are spaced throughout the three areas of the I-95 East corridor, and since many projects can be constructed independently of the complete widening of the entire corridor, they can be considered as separate single and complete projects with independent utility. The following are the recommended projects that can be implemented along the I-95 East corridor:

Short Term Improvements:

- I-95 northbound Widening from Exit 54 to Exit 55 (Branford), Estimated Cost: $88 Million*
- I-95 southbound Acceleration Lane Improvements at Exit 63 (Clinton), Estimate Cost: $11 Million*
- I-95 southbound Acceleration Lane Improvements at Exit 88 (Groton), Estimated Cost: $5 Million*
- I-95 northbound Acceleration and Truck Climbing Lane Improvements at Exit 90 (Mystic), Estimated Cost: $40 Million*

Mid Term Improvements:

- I-95 / I-395 Interchange Reconstruction and Widening (East Lyme/Waterford), Estimated Cost: $900 Million*
- I-95 northbound and southbound Widening between Exit 70 and Exit 74 (Old Lyme to East Lyme), Estimated Cost: $540 Million*
- I-95 northbound and southbound Widening between Exit 80 and Exit 82A (Waterford to New London), Estimated Cost: $275 Million*

Long Term Improvements:

- I-95 northbound and southbound Widening between Exit 54 and Exit 69 (Branford to Old Saybrook), Estimated Cost: $1.6 Billion*
- I-95 / Route 32 Interchange Reconstruction (New London). Estimated Cost: $40 - $60 Million*

Note:
*Future improvement project costs are based on preliminary concepts and are subject to change pending further study and design.

Section 1

Introduction

The purpose of this report is to provide an update to all applicable sections of the 2004 I-95 Corridor Branford to Rhode Island Border Feasibility Study Report (2004 Report) prepared by Clough, Harbour & Associates LLP (CHA) for the Connecticut Department of Transportation (CTDOT). This update to the Feasibility Study Report should be read in conjunction with the 2004 Feasibility Study.

1.1 Project Background

No updates are provided to this section.

1.2 Study Goals and Objectives

1. **Provide an update to essential sections of the 2004 Feasibility Study Report:**
   This document will provide an update to several sections of the 2004 Feasibility Study Report, to maintain the acceptability of the existing study findings, and present new alternative findings based on the current conditions and updated costs factors.

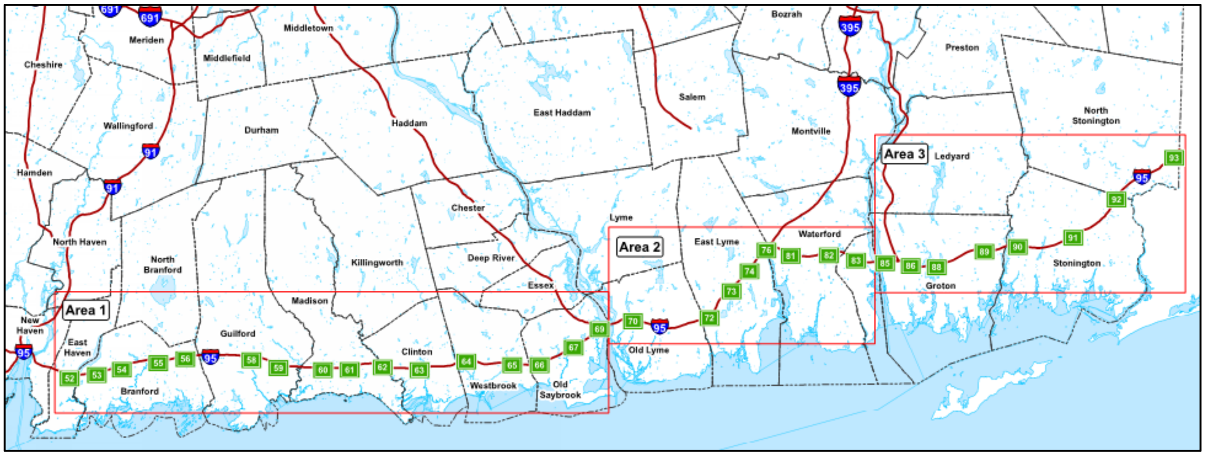
2. **Update Traffic and Crash Data to current year values:**
   This document will update traffic volumes to year Existing 2016 conditions and apply growth factor to calculate year Future No-Build 2045 and Future Build 2045 traffic volumes. Crash data for the years 2014 to 2016 will be analyzed, and high crash areas identified.

3. **Revise the I-95 Corridor Cost Estimate & present independent improvement projects based on current and future corridor safety and capacity needs:**
   This document will update and revise the construction cost estimate associated with adding one operational lane to mainline I-95, in both the northbound and southbound direction, from Exit 54 in Branford to the Rhode Island State Line, in accordance with the 2004 Feasibility Study Preliminary Engineering Plans. From the updated traffic and crash analysis, independent mainline I-95 improvement projects along the corridor will be recommended, based on an analysis of the safety and operational characteristics of the original study corridor.

1.3 Study Area

The I-95 study corridor is between Exit 54 in Branford, and the Connecticut/Rhode Island State Line, which is subsequently the same study area as the 2004 Feasibility Study area (see Figure 1-2).

Figure 1-2 Project Study Area



1.4 Study Process

The update of the 2004 Feasibility Study was performed by the CDM Smith team and the Department's planning, concept development and design staff. Several workshop meetings were held between the CDM Smith consultant design team and the Department's staff, over the course of 2016 to 2018. In addition to the update goals the Department desired to identify lower cost short and mid-term improvements which could be implemented quickly, and which also had the potential to be classified as having independent utility.

1.5 Public Participation

No updates are provided to this section. There was no public outreach nor participation associated with the update of the 2004 Study Report.

1.6 Project Team

The project team involved in the update of the 2004 Feasibility Study Report consisted of staff from CTDOT and the CDM Smith consultant team. The CDM Smith consultant team consisted of staff from STV, Inc. and BL Companies. Key project staff included:

CTDOT – Lead Agency

- David Elder – CTDOT Planning
- Gary Sojka – CTDOT Planning
- Colleen Kissane – CTDOT Planning
- Marissa Washburn – CTDOT PDU
- Peter Brazaitis – CTDOT PDU
- Mark Carlino – CTDOT Traffic
- Fred Kulakowski – CTDOT Traffic

- Tracy Fogarty – CTDOT Traffic
- Susan Libatique – CTDOT Highway Design
- Kevin Burnham – CTDOT Highway Design
- Nilesh Patel – CTDOT Highway Design

CDM Smith – Project Management, Traffic Analysis, Concept Development, Final Report Update

- Paul Schmidt – Principal Civil Engineer
- Sandeep Aysola – Project Manager/Transportation Planner
- Scott Harley – Senior Transportation Engineer
- Brittney Gibbons – GIS Specialist
- Emily Schick – Environmental Engineer

STV, Inc. – Bridges/Structures

- Michael Oliver

BL Companies – I-95/I-395 Concept Development

- Mike Fisher
- Kimberly Lesay
- Andy Chakraborty

Fitzgerald & Halliday, Inc. – Cultural Resources

- Ken Livingston

Section 2

Existing Infrastructure System Inventory

2.1 Existing I-95 Traffic Demand

Traffic count data at each On and Off ramp and several mainlines along I-95 was assembled from Existing CTDOT 2014 count data and imported into a database for processing. This data was used to prepare a balanced hourly traffic profile representative of a 2016 Average Summer Weekday (Tuesday through Thursday- Daily and Peak hour) condition for I-95. CDM Smith could not develop a balanced hourly traffic profile representative of a 2016 Average Summer Weekend condition because of lack of data, primarily at on and Off ramps along the study corridor. Figures A-1 through A-8 in Appendix A display 2016 Mainline Average Summer Weekday Peak hour volumes along I-95 between Branford to the Rhode Island State line.

2.1.1 Daily Volumes

Table 2-1A below summarizes two-way 2016 Average Summer Weekday Daily Traffic (ASWDT) volumes for mainline sections along I-95. As shown in the table, mainline traffic volumes range from approximately 104,360 vehicles per day (vpd) between Exit 54 and 55 in Branford to approximately 50,100 vpd between Exit 92 and 93 near the Rhode Island State line. The highest mainline volume of approximately 121,360 vpd occurs between Exit 84 and 85 in Groton on the Goldstar Memorial Bridge. Five other locations also experience more than 95,000 vpd on an average summer weekday and this occurs in Branford (Exit 55 and 56), Old Saybrook (Exit 69 and 70 on the Baldwin Bridge), East Lyme (Exit 75 and 76, south of the I-395 Interchange) and Groton (Exit 85 and 86).

Table 2-1A I-95 Average Summer Weekday Daily Traffic (ASWDT) Volume

Section	2016 ASWDT
Exit 54 to 55	104360
Exit 55 to 56	98570
Exit 56 to 57	94090
Exit 57 to 58	92330
Exit 58 to 59	89640
Exit 59 to 60	83610
Exit 60 to 61	86990
Exit 61 to 62	81080
Exit 62 to 63	80290
Exit 63 to 64	78150
Exit 64 to 65	77970
Exit 65 to 66	74690
Exit 66 to 67 (Elm St)	73330
Exit 67 (Elm St) to 67 (Rte. 154)	79570

Section	2016 ASWDT
Exit 67 (Rte. 154) to 68	71310
Exit 68 to 69	80810
Exit 69 to 70	96610
Exit 70 to 71	84350
Exit 71 to 72	87050
Exit 72 to 73	85270
Exit 73 to 74	85710
Exit 74 to 75	90650
Exit 75 to 76	98660
Exit 76 to 80	65250
Exit 80 to 81	66100
Exit 81 to 82	71550
Exit 82 to 82A	82750
Exit 82A to 83	71550
Exit 83 to 84	91850
Exit 84 to 85	121360
Exit 85 to 86	103860
Exit 86 to 87 (Rte. 1)	78790
Exit 87 (Rte. 1) to 87 (Rte. 349)	72630
Exit 87 (Rte. 349) to 88	85890
Exit 88 to 89	80090
Exit 89 to 90	75420
Exit 90 to 91	64580
Exit 91 to 92	55970
Exit 92 to 93	50100

CDM Smith compared 2016 ASWDT Volumes to 2000 Average Daily Traffic (ADT) Volumes from the 2004 Report to understand the Traffic growths along the corridor since the previous study (see Figure A-9 in Appendix A). As show in Figure A-9, Average Annual Percent Change (AAPC) in Traffic along the corridor ranges from approximately 1.5% in Branford to approximately 2.3% near the Rhode Island State line. Between I-395 Interchange in East Lyme and Goldstar Memorial Bridge the Average Annual growth rates are relatively lower and they range from 0% to 0.8%.

2.1.2 Peak hour volumes

CDM Smith updated AM and PM Peak hour Traffic Volumes at every On and Off ramp and several mainline locations along I-95 using most recent 2014 CTDOT Summer data to prepare a balanced hourly traffic profile- representative of a 2016 Average Summer Weekday (Tuesday through Thursday) condition. CDM Smith could not develop a balanced hourly traffic profile representative of a 2016 Average Summer Friday or Summer Weekend conditions because of a lack of data, primarily at On and Off ramps along the study corridor. Table 2-2A summarizes 2016 AM and PM

Average Summer Weekday Peak hour Mainline Traffic Volumes along I-95 between Branford and the Rhode Island State line.

Table 2-2A I-95 Average Summer Weekday Mainline Peak hour volumes – Existing 2016 AM and PM Conditions

Section	Existing 2016 AM Peak hour				Existing 2016 PM Peak hour			
	Volume (vph)	% of Daily Traffic	Directional Split (vph) NB/SB	Directional Distribution	Volume (vph)	% of Daily Traffic	Directional Split (vph) NB/SB	Directional Distribution
Exit 54 to 55	6,720	6.4%	2970/3750	56% SB	7,640	7.3%	3820/3820	50% NB
Exit 55 to 56	6,220	6.3%	2820/3400	55% SB	7,200	7.3%	3630/3570	50% NB
Exit 56 to 57	5,730	6.1%	2600/3130	55% SB	6,910	7.3%	3520/3390	51% NB
Exit 57 to 58	5,600	6.1%	2560/3040	54% SB	6,770	7.3%	3400/3370	50% NB
Exit 58 to 59	5,370	6.0%	2500/2870	53% SB	6,580	7.3%	3230/3350	51% SB
Exit 59 to 60	4,720	5.6%	2140/2580	55% SB	6,060	7.2%	3070/2990	51% NB
Exit 60 to 61	5,020	5.8%	2300/2720	54% SB	6,340	7.3%	3230/3110	51% NB
Exit 61 to 62	4,510	5.6%	2100/2410	53% SB	5,880	7.3%	3000/2880	51% NB
Exit 62 to 63	4,410	5.5%	2150/2260	51% SB	5,910	7.4%	2980/2930	50% NB
Exit 63 to 64	4,180	5.3%	2200/1980	53% NB	5,820	7.4%	2810/3010	52% SB
Exit 64 to 65	4,080	5.2%	2250/1830	55% NB	5,890	7.6%	2770/3120	53% SB
Exit 65 to 66	3,820	5.1%	2050/1770	54% NB	5,600	7.5%	2720/2880	51% SB
Exit 66 to 67 (Elm St)	3,800	5.2%	2000/1800	53% NB	5,490	7.5%	2710/2780	51% SB
Exit 67 (Elm St) to 67 (Rte 154)	4,200	5.3%	2160/2040	51% NB	6,100	7.7%	3030/3070	50% SB
Exit 67 (Rte 154) to 68	3,650	5.1%	1810/1840	50% SB	5,360	7.5%	2660/2700	50% SB
Exit 68 to 69	4,280	5.3%	2060/2220	52% SB	6,190	7.7%	3140/3050	51% NB
Exit 69 to 70	5,670	5.9%	2640/3030	53% SB	7,490	7.8%	3860/3630	52% NB
Exit 70 to 71	4,890	5.8%	2350/2540	52% SB	6,280	7.4%	3130/3150	50% SB
Exit 71 to 72	5,080	5.8%	2480/2600	51% SB	6,540	7.5%	3230/3310	51% SB
Exit 72 to 73	4,920	5.8%	2510/2410	51% NB	6,260	7.3%	3150/3110	50% NB
Exit 73 to 74	4,930	5.8%	2570/2360	52% NB	6,270	7.3%	3150/3120	50% NB
Exit 74 to 75	5,280	5.8%	2890/2390	55% NB	6,780	7.5%	3450/3330	51% NB
Exit 75 to 76	5,750	5.8%	3160/2590	55% NB	7,560	7.7%	3650/3910	52% SB
Exit 76 to 80	3,870	5.9%	2100/1770	54% NB	4,970	7.6%	2210/2760	56% SB
Exit 80 to 81	3,920	5.9%	2130/1790	54% NB	5,050	7.6%	2230/2820	56% SB
Exit 81 to 82	4,170	5.8%	2200/1970	53% NB	5,600	7.8%	2530/3070	55% SB
Exit 82 to 82A	4,800	5.8%	2530/2270	53% NB	6,700	8.1%	2910/3790	57% SB
Exit 82A to 83	4,270	6.0%	2400/1870	56% NB	5,600	7.8%	2700/2900	52% SB
Exit 83 to 84	5,400	5.9%	3000/2400	56% NB	7,340	8.0%	3590/3750	51% SB
Exit 84 to 85	7,520	6.2%	3580/3940	52% SB	10,170	8.4%	4940/5230	51% SB
Exit 85 to 86	6,340	6.1%	2650/3690	58% SB	8,930	8.6%	4040/4890	55% SB

Section	Existing 2016 AM Peak hour				Existing 2016 PM Peak hour			
	Volume (vph)	% of Daily Traffic	Directional Split (vph) NB/SB	Directional Distribution	Volume (vph)	% of Daily Traffic	Directional Split (vph) NB/SB	Directional Distribution
Exit 86 to 87 (Rte 1)	5,030	6.4%	2100/2930	58% SB	6,590	8.4%	3000/3590	54% SB
Exit 87 (Rte 1) to 87 (Rte 349)	4,480	6.2%	1540/2940	66% SB	5,820	8.0%	2790/3030	52% SB
Exit 87 (Rte 349) to 88	5,430	6.3%	1890/3540	65% SB	7,240	8.4%	3990/3250	55% NB
Exit 88 to 89	4,970	6.2%	1720/3250	65% SB	6,770	8.5%	3790/2980	56% NB
Exit 89 to 90	4,500	6.0%	1690/2810	62% SB	6,330	8.4%	3460/2870	55% NB
Exit 90 to 91	3,740	5.8%	1210/2530	68% SB	5,360	8.3%	2950/2410	55% NB
Exit 91 to 92	3,020	5.4%	980/2040	68% SB	4,560	8.1%	2450/2110	54% NB
Exit 92 to 93	2,530	5.0%	880/1650	65% SB	4,060	8.1%	2130/1930	52% NB

As shown in Table 2-2A, the PM Peak hour carries more traffic as percentage of Daily Traffic compared to the AM Peak hour. During the AM Peak hour, southbound (SB) is the predominant direction of flow from Exits 54 to 63, Exits 67 to 73 and from Exits 84 to 93. The northbound (NB) direction is the predominant flow direction for the remainder of the mainline sections. During the PM Peak hour, NB is the predominant direction of flow Exits 54 to 63 and from Exits 87 to 93. SB direction is the predominant flow direction for the remainder of the mainline sections.

CDM Smith compared 2016 Average Summer Weekday AM and PM Peak hour volumes to 2001 Average Summer Weekday AM and 2002 Average Summer Weekday PM Peak hour volumes (Figures A-10 and A-11 in Appendix A). Although Summer Daily Traffic Volumes in 2016 are higher than year 2000 Daily Volumes, the AM and PM Peak hour 2016 Summer Average Volumes are significantly lower than the volumes presented in the 2004 report. One possible explanation of lower 2016 Peak hour volumes compared to 2001/2002 is the occurrence of peak spreading during the peak periods.

2.1.4 Trucks

CDM Smith utilized truck percentages already estimated as part of the previous study to conduct Capacity Analysis. No new Vehicle Classification Counts were conducted as part of this study.

2.1.5 Mainline Speeds

CDM Smith did not measure corridor Travel Times and Speeds using the floating car method along I-95 as part of this update. Instead, CDM Smith utilized INRIX data to develop a Speed Profile representing Average 2016 Summer Weekday (Tuesday to Thursday), Friday and Weekend Conditions.

Figures A-12 to A-15 in Appendix A display the Average Hourly 2016 Summer Weekday (Tuesday through Thursday), Friday, Saturday, and Sunday INRIX Speeds and Bottlenecks measured over 24 Hours along the study corridor.

As shown in Figure A-12, during an Average Summer Weekday, the corridor experiences minor congestion in both the northbound and southbound directions. In the northbound direction, during the AM Commuter Peak Period, congestion is observed Exit 81 and 83 in the New London area. In the PM Commuter Peak Period, congestion is typically experienced in Branford near Exit 54 and from Exit 69 (Route 9) to Exit 76 (I-395). In the southbound direction, during the AM and PM Peak Commuter periods, congestion typically occurs Exit 76 (I-395) and Exit 69 (Route 9).

During an Average Summer Friday period (Figure A-13), the corridor experiences congestion in the northbound direction mainly during the PM Commuter Peak Period. Heavy PM Commuter Peak hour northbound congestion is experienced in Branford near Exit 54 and from Exit 69 (Route 9) to Exit 76 (I-395). In the southbound direction, during the AM and PM Commuter Peak periods, the corridor typically operates under free-flow conditions. Minor congestion is observed in the New London and Branford areas.

During an Average Summer Saturday conditions (Figure A-14), the corridor experiences severe congestion mainly during the Noon Peak period in the northbound direction. Congestion was experienced between Exit 54 and Exit 61 and between Exit 69 and Exit 81. In the southbound direction, the corridor typically operates under free-flow conditions, except in August when severe congestion was observed between Exit 82 and Exit 71.

On an Average Summer Sunday (Figure A-15), the corridor experiences severe congestion mainly during the Noon and PM Peak periods in the southbound direction. Congestion was experienced between Exit 83 and Exit 72 and between Exit 69 and Exit 54. In the northbound direction, the corridor experiences minor congestion, except in August when severe congestion was observed between Exit 69 and Exit 76.

Overall, Congestion is significantly worse in August compared to early summer months of June/July. This pattern is common to Average Weekday, Friday, and Weekend periods.

2.2 Geometrics

No updates are provided to this section. The existing geometrics of the I-95 study corridor have not changed due to major reconstruction since the acceptance of the 2004 Feasibility Study.

2.2.1 Methodology/Review of Geometrics

No updates are provided to this section. Mainline I-95 was reviewed, and all improvements made to the corridor within the study area summarized. The minimum design geometrics summarized under the 2004 Feasibility Study still apply, based on A Policy on Geometric Design of Highways and Streets, 6th Edition, dated 2011, and The Connecticut Department of Transportation Highway Design Manual, 2003 Edition (Including Revisions to February 2013). Since no major construction projects have been performed along I-95 that have improved the existing horizontal and vertical geometry since 2004, the existing highway geometrics (grades, lane/shoulder widths, etc.) remain unchanged, and the existing highway deficiencies continue to exist. While there have been several corridor projects aimed at pavement restoration and safety improvements (guiderail replacement & median barrier installation), the geometric conditions of I-95 remain the same as when analyzed under the 2004 Feasibility Study. Any section of the corridor that has been reconstructed is summarized below.

2.2.2 Mainline Review

Since the inception of the 2004 Feasibility Study Report, several improvement projects have been completed to the I-95 mainline corridor. The following is a list of all improvement projects either completed, or scheduled to be completed along mainline I-95 within the study area since the inception of the 2004 Feasibility Study Report:

- Exit 65 to Exit 68 – Pavement preservation along both northbound and southbound I-95 between the towns of Westbrook and Old Saybrook (Project No. 154-122). This project included pavement rehabilitation on mainline I-95 and was completed in 2014.
- Exit 69 to Exit 73 – Resurfacing and safety improvements along both northbound and southbound I-95 between the towns of Old Saybrook, Old Lyme, and East Lyme (Project No. 104-164). This project included pavement rehabilitation and concrete median barrier replacement on mainline I-95 and was completed in 2017.
- Exit 73 to Exit 83 – Resurfacing and safety improvements along both northbound and southbound I-95 between the towns of East Lyme and Waterford (Project No. 44-151). This project included pavement rehabilitation and concrete median barrier replacement on mainline I-95 and was completed in 2014. A VIP Overlay project (Project No. 172-442) was completed between exits 75 and 82A in 2016.
- Gold Star Memorial Bridge – Rehabilitation of both northbound and southbound sections of the bridge (northbound: Project No. 94-235, southbound: Project No. 94-252). The southbound section has an anticipated completion date of 8/1/2018. The northbound section has an anticipated advertise date of 8/30/2017.
- Exit 90 to Exit 91 – The slow vehicle lane on southbound I-95 has been removed under a pavement rehabilitation project.
- Exit 91 to Exit 92 – The slow vehicle lane on southbound I-95 has been removed under a pavement rehabilitation project.
- Exit 92 to Exit 93 – Two separate slow vehicle lanes on northbound I-95, as well as a slow vehicle lane on southbound I-95, have been removed under a pavement rehabilitation project.

2.2.3 Interchange Review

Since the inception of the 2004 Feasibility Study Report, several improvement projects have been completed to the interchanges of I-95. The following is a list of all improvement projects either completed or scheduled to be completed at each of the interchanges within the study area.

Exit 54 – SR 740 (Cedar Street):

- Widening of the northbound Exit 54 Off ramp approach to Cedar Street from two lanes to three lanes, providing dual left turn lanes at the intersection with Cedar Street.

- Widening of the southbound Exit 54 Off ramp approach to Cedar Street from two lanes to three lanes, providing dual left turn lanes at the ramp intersection with Cedar Street.

- Updated pavement markings along Cedar Street between the northbound Off ramp intersection and the southbound Off ramp intersection. Updated pavement markings allow for two thru lanes, and an auxiliary left turn lane on both northbound and southbound Cedar Street between the intersections with the I-95 ramps.

- In addition to the improvements at this interchange, there is a current study underway to determine the feasibility of converting the existing partial interchange at Exit 53 to a full interchange, which would provide access from I-95 southbound and to I-95 northbound. As part of this study, improvements to Exit 54 are also anticipated. Refer to Section 8.1 for additional information about this interchange.

<u>Exit 55 – US Route 1 (East Main Street):</u>

- Updated pavement markings along US Route 1 (East Main Street) at the intersection with the I-95 northbound Off ramp/I-95 northbound On ramp and the park and ride lot. The updated pavement markings provide an auxiliary left turn lane on northbound US Route 1 for vehicles turning into the park and ride lot.

- Updated pavement markings along US Route 1 (East Main Street) at the driveway entrance of Branford Square. The updated pavement markings provide an auxiliary left turn lane into the developed property across from the Branford Square driveway entrance.

- Updated pavement markings on the Exit 55 northbound Off ramp approach to US Route 1 to provide for a longer auxiliary right turn lane at the ramp intersection with US Route 1.

- Bridge No. 00196, I-95 over US Route 1, will be replaced under Project No. 14-185. This project has a current advertise date of 9/5/18.

<u>Exit 57 – US Route 1 (Boston Post Road):</u>

- Widening of the northbound Exit 57 Off ramp approach to US Route 1 from one lane to two lanes, providing a dual thru/left turn lane and a right turn lane at the intersection with US Route 1.

- Addition of a traffic signal to the intersection of US Route 1 and the I-95 southbound Off ramp and southbound On ramp.

- The bridge joints on the bridge carrying I-95 over US Route 1 will be rehabbed under Project No. 173-466. This project has a current advertise date of 1/11/17.

<u>Exit 58 – Route 77 (Church Street):</u>

- Widening of Route 77 between the southbound off/On ramp intersection and the northbound off/On ramp intersection. Widening of this section of Route 77 provided auxiliary left turn lanes to be added to improve access to the northbound and southbound I-95 ramps.

Exit 59 – SR 718 (Goose Lane):

- Updated pavement markings along Goose Lane at the intersection with the I-95 northbound Off ramp and northbound On ramp. The updated pavement markings provide an auxiliary left turn lane onto the northbound On ramp.

Exit 62 – SR 450 (Hammonassett Connector)/Hammonasset State Park:

- Bridge No. 00218, SR 450 (Hammonasset Connector) over I-95 was repaired under Project No. 75-131. This project was completed on 11/30/10.

Exit 63 – Route 81 (Killingworth Turnpike):

- Project No. 172-443 will address safety improvements at this interchange with the replacement of traffic signals at the I-95 northbound Exit 63 Off ramp, North High Street, and Route 81 intersections. This project has a current advertise date of 5/9/18.

- The Clinton Station Sports Complex, which will be located along Route 81, south of the I-95 interchange, is currently under review by the Office of the State Traffic Administration (MTG OSTA No. 027-1507-01).

Exit 64 – Route 145 (Horse Hill Road):

- Widening of the northbound Exit 64 Off ramp approach to Route 145 from one lane to two lanes, providing a dual thru/left turn lane and a right turn lane at the intersection with Route 145.

- Widening of the southbound Exit 64 Off ramp approach to Route 145 from one lane to two lanes, providing a dual thru/left turn lane and a right turn lane at the intersection with Route 145.

Exit 66 – Route 166 (Spencer Plain Road):

- Widening of the northbound Exit 66 Off ramp approach to Route 166 from one lane to two lanes, providing a left turn and a right turn lane at the intersection with Route 166.

- Updated pavement markings along Route 166 at the intersection with the I-95 northbound Off ramp and northbound On ramp. The updated pavement markings provide an auxiliary left turn lane onto the northbound On ramp.

- Widening of Route 166 south of the intersection with the northbound Exit 66 off/On ramps. Route 166 has been widened to provide two southbound thru lanes, and an auxiliary left turn lane into the developed property on the east side of Route 166. A new traffic signal has also been constructed at the entrance to the developed property.

Exit 73 – Society Road:

- The Society Road over I-95 Bridge was replaced in 2014 under Project No. 44-152, Replacement of Bridge No. 00249.

- The Gateway Commons, located along Society Road, east of Exit 73, is in the planning stages of expansion. This project is currently under review by the Office of the State Traffic Administration (MTG OSTA No. 044-1505-01).

Exit 74 – Route 161 (Flanders Road):

- Project No. 44-156, with a scheduled advertise date of 11/18/2020, will address traffic operations and improve vehicular safety concerns at this interchange. As part of this project, the northbound Off ramp to Exit 74 will be relocated to tie into Route 161 with a new signalized intersection south of the current Off ramp location. A new northbound On ramp will also be constructed at this new signalized intersection. The existing northbound On ramp along Route 161 will remain but be re-aligned to only allow access for vehicles traveling northbound on Route 161. The I-95 southbound on and Off ramps will be relocated and lengthened and terminate at a new signalized intersection along a proposed frontage road. The proposed frontage road, which will provide access to a future Costco development, will tie into at new signalized intersection with Route 161, north of the existing intersection of the southbound I-95 on and Off ramps. In addition to the I-95 on/Off ramp configurations at Exit 74, the I-95 Bridge over Route 161 (Bridge No. 250) will be replaced with a new structure that is capable of carrying three (3) I-95 northbound and southbound lanes in each direction, accounting for future widening of mainline I-95, as well as providing improved vertical and horizontal under-clearances. Route 161 will also be widened within the project limits to provide left and right turn lanes, 5' shoulders and 5' concrete sidewalks. Additionally, it is proposed to relocate the existing commuter parking lots to the west side of Route 161, across from King Arthur Drive.

- Project No. 172-471, with a scheduled advertise date of 5/6/2020, will address replacement of the existing traffic signal equipment at the intersection of Route 1 and Route 161.

Exit 81 – Cross Road:

- The planned updates to the Exit 81 interchange, outlined in the 2004 Feasibility Study Report, were completed in 2005.

Exit 90 – Route 27 (Greenmanville Road/White Hall Avenue):

- Addition of a traffic signal to the intersection of White Hall Avenue and Hendel Drive, between the I-95 southbound On ramp and the southbound Off ramp. An auxiliary left turn lane on northbound White Hall Avenue has been added at this new signalized intersection.
- Overhead destination signing has been added to the northbound Off ramp to reduce driver confusion leading to the intersection with Route 27.

Exit 92 – Route 2/Route 49:

- Updated pavement markings along northbound Route 2 at the intersection with Route 2, Route 617, and the southbound On ramp. Updated pavement markings allow for two thru lanes on northbound Route 2.

Additional Projects Currently Under Design as of 2018:

CTDOT Project 44-156, I-95 Interchange 74 at Route 161, and Bridge No. 250:

- Purpose of the project is to address vehicular safety on I-95 at Interchange 74 and improve operations between Interchange 74 and Interchange 75 in East Lyme.

- I-95 will be widened to accommodate three travel lanes in each direction between Interchange 74 and 75. The third I-95 travel lane will not be constructed but rather allow for future construction. Bridges of Pattagansett River and Latimar Brooke will be replaced or widened contingent on the hydraulic analysis of the existing bridges.

- Various improvements to Exit 74 and 75 will be constructed, including a new frontage road which will tie into Route 161 at a new intersection.

CTDOT Project 58-307, Proposed Safety Improvements including acceleration/deceleration lane improvements at Interchange Nos. 88, 89, 90, 91, 92, and 93 in the Towns of Groton, Stonington, and North Stonington:

- Exit 88 Interchange Improvements: Extend the I-95 southbound Off ramp deceleration lane and extend the I-95 northbound On ramp acceleration lane.

- Exit 89 Interchange Improvements: Add a new signalized intersection at the I-95 northbound on/Off ramp intersection with Allyn Street and a new signalized intersection of the I-95 southbound off/On ramp intersection with Allyn Street. Allyn Street will also be widened to accommodate the left turning movements.

- Exit 90 Interchange Improvements: Extend the I-95 northbound Off ramp deceleration lane, extend the I-95 southbound Off ramp deceleration lane, and extend the I-95 southbound On ramp acceleration lane.

- Exit 91 Interchange Improvements: Extend the I-95 northbound Off ramp deceleration lane, extend the I-95 northbound On ramp acceleration lane, extend the I-95 southbound Off ramp deceleration lane, and extend the I-95 southbound On ramp acceleration lane.

- Exit 92 Interchange Improvements: Extend the I-95 northbound Off ramp deceleration lane, extend the I-95 northbound On ramp acceleration lane, extend the I-95 southbound Off ramp deceleration lane, and extend the I-95 southbound On ramp acceleration lane.

- Exit 93 Interchange Improvements: Extend the I-95 northbound Off ramp deceleration lane, extend the I-95 southbound Off ramp deceleration lane, and extend the I-95 southbound On ramp acceleration lane.

Branford Connector Study, performed for the Town of Branford by BL Companies:

- This study summarized the existing and future No-Build traffic operations along the Branford Connector corridor, which includes:

  - US Route 1 between CT Route 142 (Short Beach Road) to Cedar Street (SR 740)

  - I-95 between Exit 53 (Branford Connector) and Exit 54

  - Cedar Street between US Route 1 and the I-95 Exit 54 ramps.

- This study presents several conceptual alternatives for the reconstruction of Exit 53 to include the missing I-95 southbound Off ramp and the I-95 northbound On ramp. The conceptual alternatives also present several improvements that can be made to US Route 1 to improve traffic operations and promote economic development.

Refer to Figures A-16 to A-23 in Appendix A for the Corridor Improvements Since 2004 Plans.

2.3 Existing Traffic Operations

The following sections provides a summary of the operational analysis of Freeway Mainline and Weaving sections using updated 2010 Highway Capacity Manual (HCM) procedures. Using Peak hour volumes (see Table 2-2A) described in Section 2.1.2, CDM Smith conducted Mainline and Weaving Capacity Analysis for the AM and PM Peak hour periods to assign Level of Service (LOS) rating for each specific section. LOS is a quality measure of both the operating conditions within traffic system and how drivers and passenger perceive these conditions. It is related to the physical characteristics of the highway and the different operating characteristics that can occur when the highway carries different traffic volumes.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing free-flow traffic and LOS F representing forced or breakdown flow. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

2.3.1 Methodology/Criteria

The criteria used to evaluate the I-95 Mainline and Weaving segment capacities is based on the methodology presented in the 2010 HCM. CDM Smith did not perform Ramp and Intersection Capacity analysis as part of this study update. However, CDM Smith conducted Ramp analysis at 3 specific deeper dive locations based on consultations with the CTDOT. The results of those analysis are discussed in detail in Section 8. For purposes of this study, sections with LOS D and better are considered acceptable, while sections with LOS E and F are considered deficient.

2.3.2 Mainline Operations

The procedures for analyzing operational conditions along Mainlines are based on updated procedures presented in Chapter 11 (Basic Freeway Segments) of the HCM. The HCM procedures for analyzing freeway sections use a number of factors including traffic volumes, number of lanes width, percentage of heavy vehicles, lateral clearance to obstructions along the side of the road, base free flow speeds, terrain and mix of driver population (commuters, recreational/commuter) etc. in the analysis sections.

LOS for Freeway sections (see Table 2-9A) are defined in terms of density and are measured in passenger cars per mile per lane(pcpml). Table below summarizes LOS criteria for Freeway Mainline sections.

Table 2-9A Freeway Mainline LOS Criteria

Density (pcpml)	LOS
<=11	A
>11-18	B
>18-26	C
>26-35	D
>35-45	E
>45 or any component v/c>1.0	F

The results of the freeway mainline segment analysis for Existing (2016) Traffic conditions during the AM and PM Peak hours are summarized in Tables 2-9B and 2-9C respectively and are illustrated in Figures A-24 through A-31.

Table 2-9B Freeway Section Analysis – Summary of Existing 2016 AM Peak hour conditions

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	AM	C (25.2)	2970
Exit 55	Exit 56	Level	2	AM	C (23.6)	2820
Exit 56	Exit 57	Level	2	AM	C (21.6)	2600
Exit 57	Exit 58	Level	2	AM	C (21.2)	2560
Exit 58	Exit 59	Level	2	AM	C (20.6)	2500
Exit 59	Exit 60	Rolling	2	AM	C (18.5)	2140
Exit 60	Exit 61	Rolling	2	AM	C (20.0)	2300
Exit 61	Exit 62	Rolling	2	AM	C (18.2)	2100
Exit 62	Exit 63	Rolling	2	AM	C (18.6)	2150
Exit 63	Exit 64	Rolling	2	AM	C (19.1)	2200
Exit 64	Exit 65	Rolling	2	AM	C (19.6)	2250
Exit 65	Exit 66	Rolling	2	AM	B (17.7)	2050
Exit 66	Exit 67	Rolling	2	AM	B (17.3)	2000
Exit 67	Exit 68	Rolling	2	AM	C (18.7)	2160
Exit 68	Exit 69	Rolling	3	AM	B (11.9)	2060
Exit 69	Exit 70	Rolling	4	AM	A (10.7)	2640
Exit 70	Exit 71	Rolling	2	AM	C (20.2)	2350
Exit 71	Exit 72	Rolling	2	AM	C (21.4)	2480
Exit 72	Exit 73	Rolling	2	AM	C (21.7)	2510
Exit 73	Exit 74	Rolling	2	AM	C (22.3)	2570
Exit 74	Exit 75	Rolling	2	AM	C (25.8)	2890
Exit 75	Exit 76	Rolling	2	AM	D (29.2)	3160
Exit 76	Exit 80	Rolling	2	AM	B (17.9)	2100
Exit 80	Exit 81	Rolling	2	AM	B (17.9)	2130
Exit 81	Exit 82	Rolling	2	AM	C (18.5)	2200
Exit 82	Exit 82A	Rolling	2	AM	C (21.6)	2530
Exit 82A	Exit 83	Rolling	3	AM	B (13.5)	2400
Exit 83	Exit 84	Rolling	4	AM	B (11.8)	3000
Exit 84	Exit 85	Rolling	5	AM	B (11.2)	3580
Exit 85	Exit 86	Rolling	3	AM	B (14.9)	2640
Exit 86	Exit 87	Rolling	3	AM	B (11.9)	2100
Exit 87	Exit 88	Rolling	3	AM	A (10.9)	1890
Exit 88	Exit 89	Rolling	3	AM	A (9.9)	1720

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Exit 89	Exit 90	Rolling	2	AM	B (14.8)	1690
Exit 90	Exit 91	Rolling	2	AM	A (10.6)	1210
Exit 91	Exit 92	Rolling	2	AM	A (8.6)	980
Exit 92	Exit 93	Rolling	2	AM	A (7.8)	880
Exit 93	State Line	Rolling	2	AM	A (8.2)	920
Southbound						
Exit 55	Exit 54	Level	2	AM	**E (36.6)**	3750
Exit 56	Exit 55	Level	2	AM	D (31.1)	3400
Exit 57	Exit 56	Level	2	AM	D (27.7)	3130
Exit 58	Exit 57	Level	2	AM	D (26.6)	3040
Exit 59	Exit 58	Level	2	AM	C (24.7)	2870
Exit 60	Exit 59	Rolling	2	AM	C (24.4)	2580
Exit 61	Exit 60	Rolling	2	AM	D (26.1)	2720
Exit 62	Exit 61	Rolling	2	AM	C (22.4)	2410
Exit 63	Exit 62	Rolling	2	AM	C (20.8)	2260
Exit 64	Exit 63	Rolling	2	AM	C (18.1)	1980
Exit 65	Exit 64	Rolling	2	AM	B (16.7)	1830
Exit 66	Exit 65	Rolling	2	AM	B (16.2)	1770
Exit 67	Exit 66	Rolling	2	AM	B (16.4)	1800
Exit 67	Exit 67	Rolling	2	AM	C (18.6)	2040
Exit 68	Exit 67 (Saybrook)	Rolling	2	AM	B (16.8)	1840
Exit 69	Exit 68	Rolling	3	AM	B (13.5)	2220
Exit 70	Exit 69	Rolling	4	AM	B (12.9)	3030
Exit 71	Exit 70	Rolling	2	AM	C (23.9)	2540
Exit 72	Exit 71	Rolling	2	AM	C (24.2)	2600
Exit 73	Exit 72	Rolling	2	AM	C (22.1)	2410
Exit 74	Exit 73	Rolling	2	AM	C (21.2)	2360
Exit 75	Exit 74	Rolling	2	AM	C (21.9)	2390
Exit 76	Exit 75	Rolling	3	AM	B (15.3)	2590
Exit 80	Exit 76	Rolling	2	AM	B (15.5)	1770
Exit 81	Exit 80	Rolling	2	AM	B (15.7)	1790
Exit 82	Exit 81	Rolling	2	AM	B (17.0)	1970
Exit 82A	Exit 82	Rolling	2	AM	C (19.7)	2270
Exit 83	Exit 82A	Rolling	2	AM	B (16.0)	1870
Exit 84	Exit 83	Rolling	4	AM	A (9.6)	2400
Exit 85	Exit 84	Rolling	5	AM	B (12.4)	3940
Exit 86	Exit 85	Rolling	4	AM	C (19.8)	3690

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Exit 87	Exit 86	Rolling	3	AM	B (16.7)	2930
Exit 87A	Exit 87	Rolling	3	AM	B (17.2)	2940
Exit 88	Exit 87A	Rolling	3	AM	C (21.2)	3540
Exit 89	Exit 88	Rolling	3	AM	C (19.3)	3250
Exit 90	Exit 89	Rolling	2	AM	D (26.8)	2810
Exit 91	Exit 90	Rolling	2	AM	C (23.8)	2530
Exit 92	Exit 91	Rolling	2	AM	C (18.9)	2040
Exit 93	Exit 92	Rolling	2	AM	B (15.5)	1650
State Line	Exit 93	Rolling	2	AM	B (16.1)	1680

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

Table 2-9C Freeway Section Analysis – Summary of Existing 2016 PM Peak hour conditions

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	PM	**E (36.9)**	3820
Exit 55	Exit 56	Level	2	PM	D (33.7)	3630
Exit 56	Exit 57	Level	2	PM	D (32.3)	3520
Exit 57	Exit 58	Level	2	PM	D (30.6)	3400
Exit 58	Exit 59	Level	2	PM	D (28.4)	3230
Exit 59	Exit 60	Rolling	2	PM	D (28.6)	3070
Exit 60	Exit 61	Rolling	2	PM	D (30.9)	3230
Exit 61	Exit 62	Rolling	2	PM	D (27.7)	3000
Exit 62	Exit 63	Rolling	2	PM	D (27.5)	2980
Exit 63	Exit 64	Rolling	2	PM	C (25.4)	2810
Exit 64	Exit 65	Rolling	2	PM	C (24.9)	2770
Exit 65	Exit 66	Rolling	2	PM	C (24.3)	2720
Exit 66	Exit 67	Rolling	2	PM	C (24.2)	2710
Exit 67	Exit 68	Rolling	2	PM	D (28.1)	3030
Exit 68	Exit 69	Rolling	3	PM	C (18.1)	3140
Exit 69	Exit 70	Rolling	4	PM	B (15.7)	3860
Exit 70	Exit 71	Rolling	2	PM	D (28.8)	3130
Exit 71	Exit 72	Rolling	2	PM	D (30.2)	3230
Exit 72	Exit 73	Rolling	2	PM	D (29.1)	3150
Exit 73	Exit 74	Rolling	2	PM	D (29.1)	3150
Exit 74	Exit 75	Rolling	2	PM	D (33.5)	3450

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Exit 75	Exit 76	Rolling	2	PM	**E (37.0)**	3650
Exit 76	Exit 80	Rolling	2	PM	C (18.9)	2210
Exit 80	Exit 81	Rolling	2	PM	C (18.8)	2230
Exit 81	Exit 82	Rolling	2	PM	C (21.6)	2530
Exit 82	Exit 82A	Rolling	2	PM	C (25.6)	2910
Exit 82A	Exit 83	Rolling	3	PM	B (15.1)	2700
Exit 83	Exit 84	Rolling	4	PM	B (14.1)	3590
Exit 84	Exit 85	Rolling	5	PM	B (15.6)	4940
Exit 85	Exit 86	Rolling	3	PM	C (23.2)	4040
Exit 86	Exit 87	Rolling	3	PM	B (17.1)	3000
Exit 87	Exit 88	Rolling	3	PM	C (23.7)	3990
Exit 88	Exit 89	Rolling	3	PM	C (22.3)	3790
Exit 89	Exit 90	Rolling	2	PM	**E (35.3)**	3460
Exit 90	Exit 91	Rolling	2	PM	D (27.6)	2950
Exit 91	Exit 92	Rolling	2	PM	C (21.8)	2450
Exit 92	Exit 93	Rolling	2	PM	C (19.0)	2130
Exit 93	State Line	Rolling	2	PM	C (19.6)	2190
Southbound						
Exit 55	Exit 54	Level	2	PM	**E (37.9)**	3750
Exit 56	Exit 55	Level	2	PM	D (33.6)	3400
Exit 57	Exit 56	Level	2	PM	D (31.2)	3130
Exit 58	Exit 57	Level	2	PM	D (30.9)	3040
Exit 59	Exit 58	Level	2	PM	D (30.6)	2870
Exit 60	Exit 59	Rolling	2	PM	D (29.8)	2580
Exit 61	Exit 60	Rolling	2	PM	D (31.6)	2720
Exit 62	Exit 61	Rolling	2	PM	D (28.2)	2410
Exit 63	Exit 62	Rolling	2	PM	D (28.9)	2260
Exit 64	Exit 63	Rolling	2	PM	D (30.1)	1980
Exit 65	Exit 64	Rolling	2	PM	D (31.8)	1830
Exit 66	Exit 65	Rolling	2	PM	D (28.2)	1770
Exit 67	Exit 66	Rolling	2	PM	D (26.8)	1800
Exit 67	Exit 67	Rolling	2	PM	D (31.0)	2040
Exit 68	Exit 67 (Saybrook)	Rolling	2	PM	C (25.8)	1840
Exit 69	Exit 68	Rolling	3	PM	C (18.6)	2220
Exit 70	Exit 69	Rolling	4	PM	B (15.5)	3030
Exit 71	Exit 70	Rolling	2	PM	D (32.3)	2540
Exit 72	Exit 71	Rolling	2	PM	D (34.3)	2600

Section		Terrain	Number of Lanes	Peak hour	Level of Service	Existing 2016 Volumes (vph) [1]
From	To					
Exit 73	Exit 72	Rolling	2	PM	D (31.0)	2410
Exit 74	Exit 73	Rolling	2	PM	D (30.5)	2360
Exit 75	Exit 74	Rolling	2	PM	D (34.7)	2390
Exit 76	Exit 75	Rolling	3	PM	C (23.9)	2590
Exit 80	Exit 76	Rolling	2	PM	C (25.2)	1770
Exit 81	Exit 80	Rolling	2	PM	C (25.9)	1790
Exit 82	Exit 81	Rolling	2	PM	D (28.6)	1970
Exit 82A	Exit 82	Rolling	2	PM	**E (40.9)**	2270
Exit 83	Exit 82A	Rolling	2	PM	C (26.0)	1870
Exit 84	Exit 83	Rolling	4	PM	B (15.0)	2400
Exit 85	Exit 84	Rolling	5	PM	B (16.6)	3940
Exit 86	Exit 85	Rolling	4	PM	D (26.2)	3690
Exit 87	Exit 86	Rolling	3	PM	C (20.6)	2930
Exit 87A	Exit 87	Rolling	3	PM	B (17.7)	2940
Exit 88	Exit 87A	Rolling	3	PM	C (19.3)	3540
Exit 89	Exit 88	Rolling	3	PM	B (17.7)	3250
Exit 90	Exit 89	Rolling	2	PM	D (27.6)	2810
Exit 91	Exit 90	Rolling	2	PM	C (22.4)	2530
Exit 92	Exit 91	Rolling	2	PM	C (19.6)	2040
Exit 93	Exit 92	Rolling	2	PM	C (18.1)	1650
State Line	Exit 93	Rolling	2	PM	C (19.8)	2050

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

Northbound Freeway Sections

As shown in Table 2-9B, during the AM Peak hour, all segments in the northbound direction operate at LOS D or better. During the PM Peak hour (see Table 2-9C), all segments operate at LOS D or better, except the following segments:

- Exit 54 to 55 in Branford;
- Exit 75 to 76 in East Lyme; and
- Exits 89 to 90 in Mystic.

Southbound Freeway Sections

As shown in Table 2-9B, during the AM Peak hour, all segments in the southbound direction operate at LOS D or better, except the section between Exits 54 and 55 in Branford. During the PM Peak hour (see Table 2-9C), all segments operate at LOS D or better, except the following segments:

- Exit 54 to 55 in Branford; and
- Exit 82 to 82A in New London.

2.3.3 Ramp Operations

No updates are provided to this section. Interchange ramps were not analyzed as part of the feasibility study update.

2.3.4 Weaves

The procedures for analyzing operational conditions along Weaving areas are based on updated procedures presented in Chapter 12 (Freeway Weaving Segments) of the HCM. The HCM procedures for analyzing weavings sections use a number of factors including weaving and non-weaving traffic volumes, geometry, percentage of heavy vehicles, free flow speeds, terrain and mix of driver population (commuters, recreational/commuter) etc. in the analysis sections.

LOS for Weaving sections (see Table 2-11A) are defined in terms of density and are measured in passenger cars per mile per lane. Table below summarizes LOS criteria for Freeway Weaving sections.

Table 2-11A Freeway Weaving LOS Criteria

Density (pcpml)	LOS
0-10	A
>10-20	B
>20-28	C
>28-35	D
>35	E
Demand exceeds capacity	F

Table 2-11 of the 2004 Feasibility Study Report, which summarizes the Weaving sections analysis of the existing conditions, has been updated to show the Existing 2016 Weaving section analysis.

The results of the freeway weaving segment analysis for Existing 2016 Traffic conditions during the AM and PM Peak hours are summarized in Tables 2-11B and 2-11C respectively.

Table 2-11B Weaving Sections Analysis – Summary of Existing 2016 AM Peak hour conditions

Section Description	Weave Length (ft.)	Peak hour	Level of Service	Density (pc/mi/ln)
Northbound				
Exit 68 to Exit 69	1,040	AM	B	13.9
Exit 71 to Exit 72	800	AM	B	17.1
Exit 75 to Exit 76	1,250	AM	C	22.2
Exit 82A to Exit 83	2,300	AM	B	12.3
Southbound				
Exit 69 to Exit 68	900	AM	B	15.6
Exit 72 to Exit 71	500	AM	B	19.1
Exit 76 to Exit 75	1,000	AM	B	18.0
Exit 82A (Frontage Road) to Exit 82	1,000	AM	B	15.2

Table 2-11C Weaving Sections Analysis – Summary of Existing 2016 PM Peak hour conditions

Section Description	Weave Length (ft.)	Peak hour	Level of Service	Density (pc/mi/ln)
Northbound				
Exit 68 to Exit 69	1,040	PM	C	22.0
Exit 71 to Exit 72	800	PM	C	23.1
Exit 75 to Exit 76	1,250	PM	C	25.2
Exit 82A to Exit 83	2,300	PM	B	13.8
Southbound				
Exit 69 to Exit 68	900	PM	C	22.4
Exit 72 to Exit 71	500	PM	B	19.2
Exit 76 to Exit 75	1,000	PM	D	29.7
Exit 82A (Frontage Road) to Exit 82	1,000	PM	D	32.5

Northbound Freeway Sections

As shown in Tables 2-11B and 2-11C, all segments in the northbound direction during the AM and PM peak hours operate at LOS D or better.

Southbound Freeway Sections

As shown in Tables 2-11B and 2-11C**,** all segments in the southbound direction during the AM and PM peak hours operate at LOS D or better.

2.3.5 Intersections

No updates are provided to this section.

2.3.6 Other Geometric Issues

No updates are provided to this section. The slow vehicle lanes recommended for removal in the 2004 Feasibility Study have been removed with the addition of a new pavement marking striping pattern.

2.4 Safety Analysis

Safety analysis was updated for the I-95 freeway system based on updated 2016 Traffic volumes to determine the impact of Traffic volumes and geometry on operating conditions.

Crash analysis was conducted along I-95 between Branford and Rhode Island based on updated Average Summer Weekday Traffic Volumes discussed earlier in Section 2.1. The purpose of a Crash analysis is to determine the impact of Daily Traffic volumes and Geometry on operating conditions. Crash records for I-95 from the most recent three-year period, 2014-2016, were assembled and analyzed from CTDOT/University of Connecticut (UConn) "Connecticut Crash Data Repository" website. Crashes are listed by date and include among other things data on Location, Crash severity, Crash Type, Road Surface condition and Work Zone related crashes. This report also summarizes actual accident rates for every roadway link along the corridor.

To better under crash patterns, vehicular crashes were analyzed by Crash severity and type. A detailed summary of the findings by segment are presented in Figure A-32 to A-39 in Appendix A.

2.4.1 High Crash Locations based on Crash Rate

Actual crash rates for each location based on the traffic volumes and vehicle miles of were calculated to identify the high crash locations within the study corridor. Any location with a crash rate greater than 2.5 was classified as a high crash location. Crash rate for roadway departure crashes was calculated based on the following formula:

$$R = \frac{C \times 100{,}000{,}000}{V \times 365 \times N \times L}$$

where:
R = Roadway Departure crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel (MVMT),
C = Total number of roadway departure crashes in the study period
V = Traffic volumes using Average Summer Daily Traffic volumes
N = Number of years of data (2014-2016- 3 years)
L = Length of the roadway segment in miles

In the northbound direction, high crash rates were observed at the following locations:

- Branford at Exit 54;
- Madison at Exit 61; and
- East Lyme between Exits 74 and 76.

Crash rates were highest at three locations along the corridor in the northbound direction- East Lyme, between Exit 74 Off ramp and On ramp (3.3 crashes/MVMT); Madison, between Exit 61 Off ramp and On ramp (2.9 crashes/MVMT) and Branford, between Exit 54 Off ramp and On ramp (2.7 crashes/MVMT).

In the southbound direction, high crash rates were observed at the following locations:

- North Stonington Service Area;
- Groton between Exits 88 and 86;
- New London at Exit 82;
- Niantic at Exit 74;
- Old Lyme at Exit 71;
- Clinton at Exit 63; and
- Branford at Exit 56.

In the southbound direction, the crash rate was highest in Niantic between the Exit 74 Off ramp and On ramp (Rt. 161). High crash rates could be attributed to inadequate geometry i.e. closely-spaced ramps, short acceleration and deceleration lanes, short weave sections between ramps and tight ramp radii; congestion and speeding.

2.4.2 Crashes by Severity

Crashes by severity i.e. involving Fatalities, Injuries or Property Damage are an important criterion in identifying unsafe locations along the corridor. Table 2-14A summarizes the crashes by severity along the corridor by direction.

Table 2-14A – Crashes by Severity and Highway Direction

Segment/ Crash Severity	Fatal		Injury of any type (Serious, Minor, Possible)		Property Damage Only		Total
	No.	%	No.	%	No.	%	
I-95 northbound	10	1%	346	20%	1335	79%	1691
I-95 southbound	8	0%	343	20%	1342	79%	1693
Total	18	1%	689	20%	2677	79%	3384

As shown in Table 2-14A, approximately a quarter (20%) of all crashes involved Serious, Minor or Possible Injury. Majority of the crashes (approx. 79%) were property damage related.

There were a total of 18 fatal crashes (both directions combined) along the corridor between 2014 and 2016- 10 in the northbound direction and 8 in the southbound direction. In the northbound direction, Fatal crashes occurred at the following locations:

- Branford (1 near Exit 54);
- Guilford (2 near Exit 57 and Exit 59);
- Clinton (1 near Exit 63);
- Old Saybrook (2 near Exits 69 and 70);
- Niantic (1 near Exit 72);
- New London (1 near Exit 85); and
- Mystic (2 between Exits 90 and 91).

In the southbound direction, Fatal crashes occurred at the following locations

- North Stonington (2 near Service Area);
- Mystic (1 near Exit 89);
- Waterford (2 near Exit 82 and Weigh Station);
- Niantic (1 near Exit 72); and
- Old Saybrook (2 near Exits 69 and 70).

2.4.3 Crashes by Collision Type

Crashes by collision type i.e. Angled, Head On, Rear End etc. are an important criterion in understanding the causes of crash and to determine improvements at high crash locations**.** Table 2-14B summarizes the crashes by severity along the corridor by direction.

Table 2-14B – Crashes by Collision Type

Segment/ Crash Type	Angled		Head On		Rear End		Sideswipe		Other		Total
	No.	%	No.	%	No.	%	No.	%	No.	%	
I-95 northbound	42	2%	4	0%	736	44%	269	16%	640	38%	1691
I-95 southbound	39	2%	3	0%	697	41%	258	15%	696	41%	1693
Total	81	2%	7	0%	1433	42%	527	16%	1336	39%	3384

As shown in Table 2-14B, more than 40% of all crashes in both directions were Rear end collisions, approximately 16% of all crashes were Sideswipe collisions, 2% were Angled or Head On crashes and the remaining 39% were classified as Other (Unknown, Other).

Several locations had a high number of crashes of a particular type. These locations also exhibit high number of total crashes. In the northbound direction, the locations with the highest number of Rear end and Sideswipe collisions are as follows:

- Branford between Exits 54 and 55 (82 out of 103 crashes);
- Old Saybrook between Exits 69 and 71 (144 out of 213 crashes);
- East Lyme between Exits 72 and 74 (126 out of 169 crashes);
- New London between Exits 85 and 87 (59 out of 116 crashes); and
- Mystic between Exits 89 and 90 (85 out of 142 crashes).

In the southbound direction, the highest number of Rear end and Sideswipe crashes occurred at the following locations:

- New London between Exits 84 and 82 (107 out of 181 crashes);
- East Lyme between Exits I-395 and 72 (158 out of 221 crashes);
- Old Saybrook near Exit 71 (59 out of 91 crashes);
- Clinton between Exits 65 and 62 (102 out of 168 crashes); and
- Branford between Exits 57 and 55 (89 out of 142 crashes).

2.5 Deficiencies Summary

The following is a summary of the specific locations where existing traffic operations do not meet current operational guidelines based on analysis of I-95 Freeway mainline analysis.

Traffic Demand:

- 2016 Average Summer Weekday Daily Traffic volumes for Mainline sections along I-95 range from approximately 105,000 vehicles per day (vpd) between Exit 54 and 55 in Branford to approximately 50,000 vpd between Exit 92 and 93 near the Rhode Island State line. The highest mainline volume of approximately 121,000 vpd occurs between Exit 84 and 85 in Groton on the Goldstar Memorial Bridge.

- Overall, the PM Peak hour carries more traffic as percentage of Daily Traffic compared to the AM Peak hour. During the AM Peak hour, southbound (SB) is the predominant direction of flow from Exits 54 to 63, Exits 67 to 73 and from Exits 84 to 93. The northbound (NB) direction is the predominant flow direction for the remainder of the mainline sections. During the PM Peak hour, NB is the predominant direction of flow Exits 54 to 63 and from Exits 87 to 93. SB direction is the predominant flow direction for the remainder of the mainline sections.

Geometry:

No major improvements, except pavement marking and rehabilitation projects have been implemented since the 2004 Feasibility Study Report was published.

Traffic Operations:

This study analyzed traffic operations on I-95 mainline sections in the study area. Level of service (LOS) is used as the qualitative measurement denoting the different operating conditions that occur under various traffic volume loadings. LOS designations are letter based, ranging from A to F, with LOS A representing the best operating condition under relatively free flowing traffic conflations and LOS F- representing the worst operating condition i.e. at or exceeding capacity. LOS E or F on a mainline section is an indication of volumes approaching or exceeding the roadway capacity. LOS E or F in a weaving area is an indication of the high volume of vehicles creating turbulence within a limited maneuver area.

- Mainline Segments- There are 38 northbound sections and 40 southbound sections between Exit 54 and the Rhode Island state line. The analysis indicates that during the AM Peak hour period, only one (1) southbound section operates at LOS E or worse. During the PM Peak hour period, three (3) northbound and two (2) southbound sections operate at LOS E or worse.

- Weaving Segments- Eight weaving segments were analyzed including four (4) in the northbound and four (4) in the southbound direction. During the AM and PM Peak hour periods, only one (1) section in the northbound direction i.e. between Exit 75 and Exit 76 operates at LOS E or worse.

Crash Analysis:

An analysis of Crash records for I-95 from the most recent three-year period, 2014-2016, indicates that there were ten (10) mainline segments along I-95- three (3) northbound and seven (7) southbound- that exhibit “higher than expected” accident rates (> 2.5 crashes/<VMT).

- Northbound

  - Branford at Exit 54;
  - Madison at Exit 61; and
  - East Lyme between Exits 74 and 76.

- Southbound

  - North Stonington Service Area;
  - Groton between Exits 88 and 86;
  - New London at Exit 82;

- Niantic at Exit 74;
- Old Lyme at Exit 71;
- Clinton at Exit 63; and
- Branford at Exit 56.

Overall, high crash rates could be attributed to inadequate geometry i.e. closely-spaced ramps, short acceleration and deceleration lanes, short weave sections between ramps and tight ramp radii; congestion and speeding.

2.6 Multi-Modal Transportation Services

No updates are provided to this section. Rail and other transit services were not analyzed under this report update.

2.7 Existing Bridge Structures and Culverts

As part of the 2004 I-95 Feasibility Study Report update, an inventory and assessment of all bridges and culverts along I-95 from Exit 54 in Branford to the Rhode Island State Line was developed. A Bridge Inventory Database was constructed to summarize the important bridge information on each structure carrying I-95 and crossing over I-95 through the eastern I-95 corridor. The database was updated to present the following information: structure number, town, year of major rehabilitation or re-construction of the structure, number of travel lanes carrying I-95 or passing beneath the structure, span count, roadway & structure dimensions, latest condition ratings, load rating type, and bridge category. This information was obtained from the Department's bridge database from the latest Bridge Inspection Report of each structure. Active design and construction projects were also identified in this database for structures involved in a present or future design or construction phase. This information was obtained from the Department's Bridge Management Group. Refer to Appendix B for the Bridge Inventory Database.

Summary of Existing Structures:

There is a total of 159 structures between Branford mile point (MP) 50.81 and Stonington (Rhode Island State Line) MP 111.14, which were evaluated under this study. Among the 159 structures, four (4) are identified as major structures carrying I-95:

- Baldwin Bridge – Bridge No. 06200A/B
- Gold Star Memorial Bridge – Bridge No. 03819 (NB) & 02514A (SB)

Among the remaining structures between Branford and the Rhode Island State Line, thirty-four (34) are culverts carrying I-95, seventy-six (76) are bridges carrying I-95 and forty-five (45) are bridges over I-95.

Culverts:

The thirty-four (34) culverts carrying I-95, between Branford and the Rhode Island State Line, were originally constructed between 1958 and 1964, and consist of either asphalt coated corrugated metal pipe or cast-in-place concrete box culverts. The condition rating of each of these culverts was available from the Department. There were thirty-two (32) culverts with a condition rating ranging from 5 to 7, with "5" signifying "Fair" condition and "6 or higher" signifying "Good" condition of the structure. Culverts without a Bridge Identification Number typically have a span / opening less than 6'-0" and are not considered in this updated study report.

All the culverts were originally designed for HS-20 or H-20 Truck Live Loads. The LRFR Load Rating reports are available for only twenty-six (26) of the thirty-four (34) culverts, and those culverts were found to have a Rating Factor >1 for HL-93 Live Loads.

Bridges Carrying I-95:
There is a total of seventy-six (76) bridges carrying I-95 along the eastern corridor (excluding the two major structures). These bridges are comprised of thirty-six (36) single span and forty (40) multi-span bridges. These bridges were predominantly constructed between 1957 and 1964. Many of these bridges have undergone rehabilitations such as parapet, median replacement/modifications, repair/widening, substructure repair/modifications etc., over the years. Major rehabilitations/ replacements and the year performed are identified in the Bridge Inventory Database. Of the seventy-six (76) bridges, only Bridge Nos. 00352A & B have had their superstructure replaced, which was completed in 2016 under Project No. 152-157.

The condition ratings of all the structures for the deck, superstructure and substructure were obtained from the latest bridge inspection reports. The condition ratings are found to be in the range of "4 to 8"; with 4 or lower signifying "Poor" condition, 5 signifying "Fair" condition, and "6 or higher" signifying "Good" condition. These ratings are presented in the Bridge Inventory Database. A total of five (5) bridges have a condition rating below 5 and are summarized in Table 2-16A.

Table 2-16A Summary of Bridges with a Condition Rating Below 5

Bridge Number	Facility Intersected	Lowest Condition Rating	Feature Rated	Remarks
00196	US Route 1	4	Deck	New Overlay Planned SPN 14-183
00250	Route 161	4	Deck	Planned SPN 44-153
03819	Thames River	4	Superstructure	Gold Star NB, Planned SPN 94-235
01791	Route 27	4	Superstructure	No Planned Project
01792	Route 27	4	Superstructure	No Planned Project

All the original bridges along this corridor were designed for HS-20 or H-20 Truck Live loads. All bridges that had superstructure and deck replacements or modifications, as well as structures built after 2003, were most likely to be designed for HL-93 Live Loads. The LRFR Load Rating reports are available only for four (4) of seventy-six (76) bridges, of which these bridges are found to have a Rating Factor >1 for HL-93 Live loads.

Bridges Over I-95:
There are a total of forty-five (45) bridges carrying local roads and exit or entrance ramps over I-95. Most of those bridges were originally constructed between 1957 and 1964. Many of these bridges have undergone rehabilitation such as parapet, median replacement/modifications, substructure repair/modifications etc., over the years. Major rehabilitations/ replacements and the year performed have been summarized in the Bridge Inventory Database. Out of forty-five (45)

bridges, two (2) have been completely replaced, bridge Nos. 00245 & 00249 were completely replaced in 2015 and 2016 respectively.

Structure Categorization:

The structures carrying I-95 have been separated into nine (9) different categories based on the type of structure & substructure, number of spans, and the location of ramp approaches on the bridge. The categories are as follows:

- Category 1 - Single Span Bridges Carrying I-95 with Full Height Abutments
- Category 2 - Single Span Bridges Carrying I-95 with Stub Abutments
- Category 3 - Multi Span Bridges carrying I-95
- Category 4 - Bridges with Ramp Approaches
- Category 5 - Culverts
- Category 6 - Bridges Over I-95 with Full Height Abutments & No Setbacks
- Category 7 - Bridges over I-95 with Full Height Abutments & Setbacks (Semi-Stub)
- Category 8 - Bridges Over I-95 with Stub Abutments
- Category 9 - Bridges Over I-95 with Shoulder Piers

Summary of Findings

Table 2-17A presents a summary of the number of structures studied as part of the 2004 I-95 Feasibility Study Report update.

Table 2-17A Summary of Structures

Description	Quantity
Total Number of Structures	159
Total Number of Bridges	125
Total Number of Culverts	34
Total Number of Bridges with a Condition Rating <5 (Considered Poor)	5
Total Number of Culverts with a Condition Rating <5 (Considered Poor)	0
Total Number of Structures with a LRFR Load Rating	30

Section 3

Future No-Build 2045 Transportation Conditions

This chapter presents updated results of anticipated future traffic demands along the study corridor and evaluates the resultant impacts of these future traffic demands on the operations along the existing roadway infrastructure. The resultant impacts were determined assuming no future geometric improvements will be made. This is generally referred to as the future No-Build condition. Unlike the previous study, the update doesn't assume the Route 11 extension and I-95/I-395/Route 1 interchange reconfiguration projects. No-Build traffic growth projections were based on historical growth data estimated from the CTDOT's Statewide Travel Demand Model developed as part of the I-95 Value Pricing Pilot (VPPP) and CT LetsGOCT Statewide Long-range Transportation Planning studies. Using Peak hour volumes (see Tables 3-4A and 3-4B) described in Section 3.3.1, CDM Smith conducted Mainline and Weaving Capacity Analysis for the AM and PM Peak hour periods to assign Level of Service (LOS) rating for each specific section. For the purposes of this study, a design year of 2045 was selected as the basis for the future conditions analysis.

3.1 Forecasting Future Traffic Conditions – 2016 to 2045

As stated above, traffic growth projections were based on historical growth data- between 2016 and 2040- estimated from the updated CTDOT's Statewide Travel Demand Model developed as part of the I-95 Value Pricing Pilot (VPPP) and CT LetsGOCT Statewide Long-range Transportation Planning studies. The growth estimates using the Model population and employment forecasts for the Future 2040 were applied to the Existing 2016 volumes discussed in Section 2 earlier to estimate (by extrapolation) Future No-Build traffic demand volumes.

3.1.1 Study Area Land Use Update

No major changes to Land Use are assumed as part of this updated study. However, unlike the previous study, this study does not assume inclusion of the Route 11 extension and I-95/I-395/Route 1 interchange reconfiguration projects under the Future No-Build 2045 scenario.

3.2 Future Traffic Demand – Year 2045

Estimates of Future No-Build 2045 Average Summer Weekday daily and peak hour traffic volumes were calculated using the growth projections estimated from the updated CTDOT's Statewide Travel Demand Model for the mainline, interchange ramps and mainline weaving sections within the study area.

3.2.1 2045 Daily Volumes

Table 3-1 of the 2004 Feasibility Study Report, which summarizes the I-95 mainline ADT volumes from the year 2000 and 2025, has been updated to show Existing 2016 and Future No-Build 2045 volumes (see Table 3-1A).

Table 3-1A I-95 Mainline Average Summer Weekday Daily Traffic Volumes (ASWDT) Comparison– Existing 2016 vs. Future No-Build 2045(Two-Way)

Section	Existing 2016 ASWDT	Future No-Build 2045 ASWDDT	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	104360	134453	29%	1.0%
Exit 55 to 56	98570	127440	29%	1.0%
Exit 56 to 57	94090	121687	29%	1.0%
Exit 57 to 58	92330	119665	30%	1.0%
Exit 58 to 59	89640	115888	29%	1.0%
9Exit 59 to 60	83610	108250	29%	1.0%
Exit 60 to 61	86990	112508	29%	1.0%
Exit 61 to 62	81080	104973	29%	1.0%
Exit 62 to 63	80290	104059	30%	1.0%
Exit 63 to 64	78150	101393	30%	1.0%
Exit 64 to 65	77970	101114	30%	1.0%
Exit 65 to 66	74690	96824	30%	1.0%
Exit 66 to 67 (Elm St)	73330	95168	30%	1.0%
Exit 67 (Elm St) to 67 (Rte 154)	79570	102805	29%	1.0%
Exit 67 (Rte 154) to 68	71310	92766	30%	1.0%
Exit 68 to 69	80810	104241	29%	1.0%
Exit 69 to 70	96610	125976	30%	1.0%
Exit 70 to 71	84350	109543	30%	1.0%
Exit 71 to 72	87050	113044	30%	1.0%
Exit 72 to 73	85270	110668	30%	1.0%
Exit 73 to 74	85710	111159	30%	1.0%
Exit 74 to 75	90650	117158	29%	1.0%
Exit 75 to 76	98660	127188	29%	1.0%
Exit 76 to 80	65250	85546	31%	1.0%
Exit 80 to 81	66100	86664	31%	1.0%
Exit 81 to 82	71550	93948	31%	1.0%
Exit 82 to 82A	82750	107957	30%	1.0%
Exit 82A to 83	71550	93559	31%	1.0%
Exit 83 to 84	91850	120315	31%	1.0%
Exit 84 to 85	121360	157439	30%	1.0%
Exit 85 to 86	103860	135837	31%	1.0%
Exit 86 to 87 (Rte 1)	78790	104560	33%	1.1%
Exit 87 (Rte 1) to 87 (Rte 349)	72630	96915	33%	1.1%
Exit 87 (Rte 349) to 88	85890	112889	31%	1.0%
Exit 88 to 89	80090	105640	32%	1.1%
Exit 89 to 90	75420	100444	33%	1.1%
Exit 90 to 91	64580	87591	36%	1.2%

Section	Existing 2016 ASWDT	Future No-Build 2045 ASWDDT	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 91 to 92	55970	77816	39%	1.3%
Exit 92 to 93	50100	71171	42%	1.4%

Table 3- 1A presents a comparison of the Average Summer Weekday Daily Traffic volumes (ASWDT) in the Existing 2016 condition and Future No-Build 2045 condition for each main line section in the study area. All sections are projected to experience increased traffic demand. ASWDT volumes are projected to increase between 29 and 42 percent over the study period. The average change for this period is 31 per cent. This corresponds to an average yearly change of 1.0 percent assuming uniform annual increases.

3.2.2 Future No-Build 2045 Peak hour volumes

Table 3-2 of the 2004 Feasibility Study Report, which summarizes the I-95 mainline evening peak hour volumes from the year 2002 and 2025, has been updated to show the year 2016 and 2045 AM and PM peak hour volumes (see Tables 3-2A and 3-2B).

Table 3-2A I-95 Mainline AM Peak hour Volume Comparison – Existing 2016 to Future No-Build 2045 (Two-Way)

Section	Existing 2016 Volume (vph)[1]	Future No-Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	6,720	8,640	29%	1.0%
Exit 55 to 56	6,220	8,040	29%	1.0%
Exit 56 to 57	5,730	7,410	29%	1.0%
Exit 57 to 58	5,600	7,250	29%	1.0%
Exit 58 to 59	5,370	6,920	29%	1.0%
Exit 59 to 60	4,720	6,100	29%	1.0%
Exit 60 to 61	5,020	6,490	29%	1.0%
Exit 61 to 62	4,510	5,830	29%	1.0%
Exit 62 to 63	4,410	5,710	29%	1.0%
Exit 63 to 64	4,180	5,400	29%	1.0%
Exit 64 to 65	4,080	5,280	29%	1.0%
Exit 65 to 66	3,820	4,940	29%	1.0%
Exit 66 to 67 (Elm St)	3,800	4,910	29%	1.0%
Exit 67 (Elm St) to 67 (Rte 154)	4,200	5,420	29%	1.0%
Exit 67 (Rte 154) to 68	3,650	4,740	30%	1.0%
Exit 68 to 69	4,280	5,510	29%	1.0%
Exit 69 to 70	5,670	7,400	31%	1.0%
Exit 70 to 71	4,890	6,350	30%	1.0%
Exit 71 to 72	5,080	6,590	30%	1.0%
Exit 72 to 73	4,920	6,400	30%	1.0%

Section	Existing 2016 Volume (vph)[1]	Future No-Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 73 to 74	4,930	6,390	30%	1.0%
Exit 74 to 75	5,280	6,790	29%	1.0%
Exit 75 to 76	5,750	7,390	29%	1.0%
Exit 76 to 80	3,870	5,040	30%	1.0%
Exit 80 to 81	3,920	5,110	30%	1.0%
Exit 81 to 82	4,170	5,450	31%	1.0%
Exit 82 to 82A	4,800	6,240	30%	1.0%
Exit 82A to 83	4,270	5,560	30%	1.0%
Exit 83 to 84	5,400	7,060	31%	1.0%
Exit 84 to 85	7,520	9,710	29%	1.0%
Exit 85 to 86	6,340	8,250	30%	1.0%
Exit 86 to 87 (Rte 1)	5,030	6,620	32%	1.1%
Exit 87 (Rte 1) to 87 (Rte 349)	4,480	5,920	32%	1.1%
Exit 87 (Rte 349) to 88	5,430	7,050	30%	1.0%
Exit 88 to 89	4,970	6,480	30%	1.0%
Exit 89 to 90	4,500	5,960	32%	1.1%
Exit 90 to 91	3,740	5,060	35%	1.2%
Exit 91 to 92	3,020	4,250	41%	1.4%
Exit 92 to 93	2,530	3,680	45%	1.5%

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 3-2B I-95 Mainline PM Peak hour Volume Comparison – Existing 2016 to Future No-Build 2045 (Two-Way)

Section	Existing 2016 Volume (vph)[1]	Future No-Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	7,640	9,860	29%	1.0%
Exit 55 to 56	7,200	9,330	30%	1.0%
Exit 56 to 57	6,910	8,950	30%	1.0%
Exit 57 to 58	6,770	8,800	30%	1.0%
Exit 58 to 59	6,580	8,520	29%	1.0%
Exit 59 to 60	6,060	7,860	30%	1.0%
Exit 60 to 61	6,340	8,220	30%	1.0%
Exit 61 to 62	5,880	7,630	30%	1.0%
Exit 62 to 63	5,910	7,670	30%	1.0%
Exit 63 to 64	5,820	7,570	30%	1.0%
Exit 64 to 65	5,890	7,660	30%	1.0%
Exit 65 to 66	5,600	7,270	30%	1.0%

Section	Existing 2016 Volume (vph)[1]	Future No-Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 66 to 67 (Elm St)	5,490	7,120	30%	1.0%
Exit 67 (Elm St) to 67 (Rte 154)	6,100	7,880	29%	1.0%
Exit 67 (Rte 154) to 68	5,360	6,970	30%	1.0%
Exit 68 to 69	6,190	7,980	29%	1.0%
Exit 69 to 70	7,490	9,760	30%	1.0%
Exit 70 to 71	6,280	8,150	30%	1.0%
Exit 71 to 72	6,540	8,490	30%	1.0%
Exit 72 to 73	6,260	8,130	30%	1.0%
Exit 73 to 74	6,270	8,130	30%	1.0%
Exit 74 to 75	6,780	8,770	29%	1.0%
Exit 75 to 76	7,560	9,740	29%	1.0%
Exit 76 to 80	4,970	6,520	31%	1.0%
Exit 80 to 81	5,050	6,620	31%	1.0%
Exit 81 to 82	5,600	7,360	31%	1.0%
Exit 82 to 82A	6,700	8,740	30%	1.0%
Exit 82A to 83	5,600	7,330	31%	1.0%
Exit 83 to 84	7,340	9,620	31%	1.0%
Exit 84 to 85	10,170	13,190	30%	1.0%
Exit 85 to 86	8,930	11,660	31%	1.0%
Exit 86 to 87 (Rte 1)	6,590	8,740	33%	1.1%
Exit 87 (Rte 1) to 87 (Rte 349)	5,820	7,820	34%	1.1%
Exit 87 (Rte 349) to 88	7,240	9,540	32%	1.1%
Exit 88 to 89	6,770	8,950	32%	1.1%
Exit 89 to 90	6,330	8,450	33%	1.1%
Exit 90 to 91	5,360	7,310	36%	1.2%
Exit 91 to 92	4,560	6,400	40%	1.3%
Exit 92 to 93	4,060	5,830	44%	1.5%

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 3-3 of the 2004 Feasibility Study Report, which summarizes the I-95 mainline evening peak hour volumes for the year 2025, has been updated to show the year Future No-Build 2045 mainline AM and PM peak hour volumes (see Tables 3-3A and 3-3B).

Table 3-3A I-95 Mainline AM Peak hour volumes – Future No-Build 2045 conditions (Two-Way)

Section	Future No-Build 2045 AM Peak hour					
	Future No-Build 2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 54 to 55	8,640	6.4%	3690	4950	43	57
Exit 55 to 56	8,040	6.3%	3520	4520	44	56
Exit 56 to 57	7,410	6.1%	3240	4170	44	56
Exit 57 to 58	7,250	6.1%	3190	4060	44	56
Exit 58 to 59	6,920	6.0%	3100	3820	45	55
Exit 59 to 60	6,100	5.6%	2660	3440	44	56
Exit 60 to 61	6,490	5.8%	2860	3630	44	56
Exit 61 to 62	5,830	5.6%	2600	3230	45	55
Exit 62 to 63	5,710	5.5%	2680	3030	47	53
Exit 63 to 64	5,400	5.3%	2730	2670	51	49
Exit 64 to 65	5,280	5.2%	2800	2480	53	47
Exit 65 to 66	4,940	5.1%	2540	2400	51	49
Exit 66 to 67 (Elm St)	4,910	5.2%	2480	2430	51	49
Exit 67 (Elm St) to 67 (Rte 154)	5,420	5.3%	2680	2740	49	51
Exit 67 (Rte 154) to 68	4,740	5.1%	2260	2480	48	52
Exit 68 to 69	5,510	5.3%	2560	2950	46	54
Exit 69 to 70	7,400	5.9%	3330	4070	45	55
Exit 70 to 71	6,350	5.8%	2950	3400	46	54
Exit 71 to 72	6,590	5.8%	3110	3480	47	53
Exit 72 to 73	6,400	5.8%	3160	3240	49	51
Exit 73 to 74	6,390	5.7%	3220	3170	50	50
Exit 74 to 75	6,790	5.8%	3610	3180	53	47
Exit 75 to 76	7,390	5.8%	3950	3440	53	47
Exit 76 to 80	5,040	5.9%	2650	2390	53	47
Exit 80 to 81	5,110	5.9%	2690	2420	53	47
Exit 81 to 82	5,450	5.8%	2780	2670	51	49
Exit 82 to 82A	6,240	5.8%	3180	3060	51	49
Exit 82A to 83	5,560	5.9%	3020	2540	54	46
Exit 83 to 84	7,060	5.9%	3830	3230	54	46
Exit 84 to 85	9,710	6.2%	4580	5130	47	53
Exit 85 to 86	8,250	6.1%	3430	4820	42	58
Exit 86 to 87 (Rte 1)	6,620	6.3%	2740	3880	41	59
Exit 87 (Rte 1) to 87 (Rte 349)	5,920	6.1%	2040	3880	34	66
Exit 87 (Rte 349) to 88	7,050	6.2%	2460	4590	35	65
Exit 88 to 89	6,480	6.1%	2240	4240	35	65
Exit 89 to 90	5,960	5.9%	2210	3750	37	63

Section	Future No-Build 2045 AM Peak hour					
	Future No-Build 2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 90 to 91	5,060	5.8%	1650	3410	33	67
Exit 91 to 92	4,250	5.5%	1380	2870	32	68
Exit 92 to 93	3,680	5.2%	1260	2420	34	66

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 3-3B I-95 Mainline PM Peak hour volumes – Future No-Build 2045 conditions (Two-Way)

Section	Future No-Build 2045 PM Peak hour					
	Future No-Build 2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 54 to 55	9,860	7.3%	4800	5060	49	51
Exit 55 to 56	9,330	7.3%	4570	4760	49	51
Exit 56 to 57	8,950	7.4%	4420	4530	49	51
Exit 57 to 58	8,800	7.4%	4280	4520	49	51
Exit 58 to 59	8,520	7.4%	4050	4470	48	52
Exit 59 to 60	7,860	7.3%	3850	4010	49	51
Exit 60 to 61	8,220	7.3%	4060	4160	49	51
Exit 61 to 62	7,630	7.3%	3770	3860	49	51
Exit 62 to 63	7,670	7.4%	3750	3920	49	51
Exit 63 to 64	7,570	7.5%	3550	4020	47	53
Exit 64 to 65	7,660	7.6%	3490	4170	46	54
Exit 65 to 66	7,270	7.5%	3420	3850	47	53
Exit 66 to 67 (Elm St)	7,120	7.5%	3400	3720	48	52
Exit 67 (Elm St) to 67 (Rte 154)	7,880	7.7%	3790	4090	48	52
Exit 67 (Rte 154) to 68	6,970	7.5%	3350	3620	48	52
Exit 68 to 69	7,980	7.7%	3930	4050	49	51
Exit 69 to 70	9,760	7.7%	4880	4880	50	50
Exit 70 to 71	8,150	7.4%	3930	4220	48	52
Exit 71 to 72	8,490	7.5%	4060	4430	48	52
Exit 72 to 73	8,130	7.3%	3960	4170	49	51
Exit 73 to 74	8,130	7.3%	3950	4180	49	51
Exit 74 to 75	8,770	7.5%	4330	4440	49	51
Exit 75 to 76	9,740	7.7%	4570	5170	47	53
Exit 76 to 80	6,520	7.6%	2810	3710	43	57
Exit 80 to 81	6,620	7.6%	2840	3780	43	57
Exit 81 to 82	7,360	7.8%	3230	4130	44	56
Exit 82 to 82A	8,740	8.1%	3680	5060	42	58

Section	Future No-Build 2045 PM Peak hour					
	Future No-Build 2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 82A to 83	7,330	7.8%	3430	3900	47	53
Exit 83 to 84	9,620	8.0%	4600	5020	48	52
Exit 84 to 85	13,190	8.4%	6350	6840	48	52
Exit 85 to 86	11,660	8.6%	5240	6420	45	55
Exit 86 to 87 (Rte 1)	8,740	8.4%	3940	4800	45	55
Exit 87 (Rte 1) to 87 (Rte 349)	7,820	8.1%	3670	4150	47	53
Exit 87 (Rte 349) to 88	9,540	8.5%	5140	4400	54	46
Exit 88 to 89	8,950	8.5%	4870	4080	54	46
Exit 89 to 90	8,450	8.4%	4490	3960	53	47
Exit 90 to 91	7,310	8.3%	3890	3420	53	47
Exit 91 to 92	6,400	8.2%	3320	3080	52	48
Exit 92 to 93	5,830	8.2%	2950	2880	51	49

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

3.3 Future No-Build Traffic Operations – year 2045

The following sections provides a summary of the operational analysis of Freeway Mainline and Weaving sections using updated 2010 Highway Capacity Manual (HCM) procedures. Using Peak hour volumes (see Tables 3-2A and 3-2B) described in Section 3.2.2, CDM Smith conducted Mainline and Weaving Capacity Analysis for the AM and PM Peak hour periods to assign Level of Service (LOS) rating for each specific section. LOS is a quality measure of both the operating conditions within traffic system and how drivers and passenger perceive these conditions. It is related to the physical characteristics of the highway and the different operating characteristics that can occur when the highway carries different traffic volumes.

3.3.1 Mainline Operations

Table 3-4 of the 2004 Feasibility Study Report, which summarizes the results of the HCM analysis for year 2025 future traffic conditions, has been updated to show the year 2045 future traffic conditions (see Tables 3-4A and 3-4B).

Table 3-4A Freeway Section Analysis – Summary of Future No-Build 2045 conditions

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph)[1]	Level of Service[2]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	AM	3690	D (34.7)
Exit 55	Exit 56	Level	2	AM	3520	D (32.1)
Exit 56	Exit 57	Level	2	AM	3240	D (28.5)

CDM Smith

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Exit 57	Exit 58	Level	2	AM	3190	D (27.9)
Exit 58	Exit 59	Level	2	AM	3100	D (26.8)
Exit 59	Exit 60	Rolling	2	AM	2660	C (23.7)
Exit 60	Exit 61	Rolling	2	AM	2860	C (26.0)
Exit 61	Exit 62	Rolling	2	AM	2600	C (23.0)
Exit 62	Exit 63	Rolling	2	AM	2680	C (23.9)
Exit 63	Exit 64	Rolling	2	AM	2730	C (24.4)
Exit 64	Exit 65	Rolling	2	AM	2800	C (25.3)
Exit 65	Exit 66	Rolling	2	AM	2540	C (22.4)
Exit 66	Exit 67	Rolling	2	AM	2480	C (21.8)
Exit 67	Exit 68	Rolling	2	AM	2680	C (23.9)
Exit 68	Exit 69	Rolling	3	AM	2560	B (14.8)
Exit 69	Exit 70	Rolling	4	AM	3330	B (13.4)
Exit 70	Exit 71	Rolling	2	AM	2950	D (26.6)
Exit 71	Exit 72	Rolling	2	AM	3110	D (28.6)
Exit 72	Exit 73	Rolling	2	AM	3160	D (29.2)
Exit 73	Exit 74	Rolling	2	AM	3220	D (30.1)
Exit 74	Exit 75	Rolling	2	AM	3610	**E (36.3)**
Exit 75	Exit 76	Rolling	2	AM	3950	**E (43.3)**
Exit 76	Exit 80	Rolling	2	AM	2650	C (23.2)
Exit 80	Exit 81	Rolling	2	AM	2690	C (23.2)
Exit 81	Exit 82	Rolling	2	AM	2780	C (24.1)
Exit 82	Exit 82A	Rolling	2	AM	3180	D (28.9)
Exit 82A	Exit 83	Rolling	3	AM	3020	B (16.9)
Exit 83	Exit 84	Rolling	4	AM	3830	B (15.1)
Exit 84	Exit 85	Rolling	5	AM	4580	B (14.4)
Exit 85	Exit 86	Rolling	3	AM	3430	C (19.3)
Exit 86	Exit 87	Rolling	3	AM	2740	B (15.6)
Exit 87	Exit 88	Rolling	3	AM	2460	B (14.2)
Exit 88	Exit 89	Rolling	3	AM	2240	B (12.9)
Exit 89	Exit 90	Rolling	2	AM	2210	C (19.5)
Exit 90	Exit 91	Rolling	2	AM	1650	B (14.5)
Exit 91	Exit 92	Rolling	2	AM	1380	B (12.1)
Exit 92	Exit 93	Rolling	2	AM	1260	B (11.2)
Exit 93	State Line	Rolling	2	AM	1310	B (11.6)
Southbound						
Exit 55	Exit 54	Level	2	AM	4950	**F (75.2)**

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Exit 56	Exit 55	Level	2	AM	4520	**F (55.7)**
Exit 57	Exit 56	Level	2	AM	4170	**F (45.9)**
Exit 58	Exit 57	Level	2	AM	4060	**E (43.3)**
Exit 59	Exit 58	Level	2	AM	3820	**E (38.3)**
Exit 60	Exit 59	Rolling	2	AM	3440	**E (37.6)**
Exit 61	Exit 60	Rolling	2	AM	3630	**E (41.8)**
Exit 62	Exit 61	Rolling	2	AM	3230	D (33.6)
Exit 63	Exit 62	Rolling	2	AM	3030	D (30.4)
Exit 64	Exit 63	Rolling	2	AM	2670	C (25.5)
Exit 65	Exit 64	Rolling	2	AM	2480	C (23.2)
Exit 66	Exit 65	Rolling	2	AM	2400	C (22.3)
Exit 67	Exit 66	Rolling	2	AM	2430	C (22.6)
Exit 67	Exit 67	Rolling	2	AM	2740	D (26.3)
Exit 68	Exit 67 (Saybrook)	Rolling	2	AM	2480	C (23.2)
Exit 69	Exit 68	Rolling	3	AM	2950	B (18.0)
Exit 70	Exit 69	Rolling	4	AM	4070	B (17.6)
Exit 71	Exit 70	Rolling	2	AM	3400	**E (36.8)**
Exit 72	Exit 71	Rolling	2	AM	3480	**E (37.5)**
Exit 73	Exit 72	Rolling	2	AM	3240	D (33.1)
Exit 74	Exit 73	Rolling	2	AM	3170	D (31.3)
Exit 75	Exit 74	Rolling	2	AM	3180	D (32.1)
Exit 76	Exit 75	Rolling	3	AM	3440	C (20.6)
Exit 80	Exit 76	Rolling	2	AM	2390	C (21.2)
Exit 81	Exit 80	Rolling	2	AM	2420	C (21.5)
Exit 82	Exit 81	Rolling	2	AM	2670	C (23.8)
Exit 82A	Exit 82	Rolling	2	AM	3060	D (28.5)
Exit 83	Exit 82A	Rolling	2	AM	2540	C (22.0)
Exit 84	Exit 83	Rolling	4	AM	3230	B (12.9)
Exit 85	Exit 84	Rolling	5	AM	5130	B (16.2)
Exit 86	Exit 85	Rolling	4	AM	4820	C (25.8)
Exit 87	Exit 86	Rolling	3	AM	3880	C (22.5)
Exit 87A	Exit 87	Rolling	3	AM	3880	C (23.3)
Exit 88	Exit 87A	Rolling	3	AM	4590	D (29.6)
Exit 89	Exit 88	Rolling	3	AM	4240	D (26.5)
Exit 90	Exit 89	Rolling	2	AM	3750	**E (43.6)**
Exit 91	Exit 90	Rolling	2	AM	3410	**E (37.0)**

CDM Smith

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Exit 92	Exit 91	Rolling	2	AM	2870	D (28.6)
Exit 93	Exit 92	Rolling	2	AM	2420	C (23.2)
State Line	Exit 93	Rolling	2	AM	2460	C (24.5)

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

Table 3-4B Freeway Section Analysis – Summary of Future No-Build 2045 PM Peak conditions

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	PM	4800	**F (63.9)**
Exit 55	Exit 56	Level	2	PM	4570	**F (55.1)**
Exit 56	Exit 57	Level	2	PM	4420	**F (51.1)**
Exit 57	Exit 58	Level	2	PM	4280	**F (47.2)**
Exit 58	Exit 59	Level	2	PM	4050	**E (41.8)**
Exit 59	Exit 60	Rolling	2	PM	3850	**E (42.3)**
Exit 60	Exit 61	Rolling	2	PM	4060	**F (47.6)**
Exit 61	Exit 62	Rolling	2	PM	3770	**E (40.5)**
Exit 62	Exit 63	Rolling	2	PM	3750	**E (40.1)**
Exit 63	Exit 64	Rolling	2	PM	3550	**E (36.1)**
Exit 64	Exit 65	Rolling	2	PM	3490	**E (35.0)**
Exit 65	Exit 66	Rolling	2	PM	3420	D (33.8)
Exit 66	Exit 67	Rolling	2	PM	3400	D (33.5)
Exit 67	Exit 68	Rolling	2	PM	3790	**E (40.9)**
Exit 68	Exit 69	Rolling	3	PM	3930	C (23.2)
Exit 69	Exit 70	Rolling	4	PM	4880	C (20.4)
Exit 70	Exit 71	Rolling	2	PM	3930	**E (42.9)**
Exit 71	Exit 72	Rolling	2	PM	4060	**F (46.1)**
Exit 72	Exit 73	Rolling	2	PM	3960	**E (43.6)**
Exit 73	Exit 74	Rolling	2	PM	3950	**E (43.3)**
Exit 74	Exit 75	Rolling	2	PM	4330	**F (54.2)**
Exit 75	Exit 76	Rolling	2	PM	4570	**F (63.6)**
Exit 76	Exit 80	Rolling	2	PM	2810	C (24.9)
Exit 80	Exit 81	Rolling	2	PM	2840	C (24.8)
Exit 81	Exit 82	Rolling	2	PM	3230	D (29.6)

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Exit 82	Exit 82A	Rolling	2	PM	3680	**E (36.6)**
Exit 82A	Exit 83	Rolling	3	PM	3430	C (19.3)
Exit 83	Exit 84	Rolling	4	PM	4600	C (18.4)
Exit 84	Exit 85	Rolling	5	PM	6350	C (20.7)
Exit 85	Exit 86	Rolling	3	PM	5240	D (33.5)
Exit 86	Exit 87	Rolling	3	PM	3940	C (22.9)
Exit 87	Exit 88	Rolling	3	PM	5140	D (34.0)
Exit 88	Exit 89	Rolling	3	PM	4870	D (31.1)
Exit 89	Exit 90	Rolling	2	PM	4490	**F (65.8)**
Exit 90	Exit 91	Rolling	2	PM	3890	**E (44.5)**
Exit 91	Exit 92	Rolling	2	PM	3320	D (32.9)
Exit 92	Exit 93	Rolling	2	PM	2950	D (28.1)
Exit 93	State Line	Rolling	2	PM	3020	D (29.1)
Southbound						
Exit 55	Exit 54	Level	2	PM	5060	**F (82.3)**
Exit 56	Exit 55	Level	2	PM	4760	**F (65.3)**
Exit 57	Exit 56	Level	2	PM	4530	**F (56.8)**
Exit 58	Exit 57	Level	2	PM	4520	**F (56.5)**
Exit 59	Exit 58	Level	2	PM	4470	**F (54.7)**
Exit 60	Exit 59	Rolling	2	PM	4010	**F (52.8)**
Exit 61	Exit 60	Rolling	2	PM	4160	**F (58.6)**
Exit 62	Exit 61	Rolling	2	PM	3860	**F (48.0)**
Exit 63	Exit 62	Rolling	2	PM	3920	**F (49.8)**
Exit 64	Exit 63	Rolling	2	PM	4020	**F (53.2)**
Exit 65	Exit 64	Rolling	2	PM	4170	**F (59.0)**
Exit 66	Exit 65	Rolling	2	PM	3850	**F (47.7)**
Exit 67	Exit 66	Rolling	2	PM	3720	**E (44.1)**
Exit 67	Exit 67	Rolling	2	PM	4090	**F (55.8)**
Exit 68	Exit 67 (Saybrook)	Rolling	2	PM	3620	**E (41.6)**
Exit 69	Exit 68	Rolling	3	PM	4050	C (25.8)
Exit 70	Exit 69	Rolling	4	PM	4880	C (21.8)
Exit 71	Exit 70	Rolling	2	PM	4220	**F (61.2)**
Exit 72	Exit 71	Rolling	2	PM	4430	**F (68.9)**
Exit 73	Exit 72	Rolling	2	PM	4170	**F (56.8)**
Exit 74	Exit 73	Rolling	2	PM	4180	**F (55.1)**
Exit 75	Exit 74	Rolling	2	PM	4440	**F (69.5)**
Exit 76	Exit 75	Rolling	3	PM	5170	**E (36.0)**

Section		Terrain	Number of Lanes	Peak hour	Future No-Build 2045 Volumes (vph) [1]	Level of Service [2]
From	To					
Exit 80	Exit 76	Rolling	2	PM	3710	**E (40.3)**
Exit 81	Exit 80	Rolling	2	PM	3780	**E (41.9)**
Exit 82	Exit 81	Rolling	2	PM	4130	**F (49.7)**
Exit 82A	Exit 82	Rolling	2	PM	5060	**F (103.2)**
Exit 83	Exit 82A	Rolling	2	PM	3900	**E (42.2)**
Exit 84	Exit 83	Rolling	4	PM	5020	C (20.7)
Exit 85	Exit 84	Rolling	5	PM	6840	C (22.7)
Exit 86	Exit 85	Rolling	4	PM	6420	D (34.5)
Exit 87	Exit 86	Rolling	3	PM	4800	D (29.8)
Exit 87A	Exit 87	Rolling	3	PM	4150	C (25.3)
Exit 88	Exit 87A	Rolling	3	PM	4400	D (27.9)
Exit 89	Exit 88	Rolling	3	PM	4080	C (25.2)
Exit 90	Exit 89	Rolling	2	PM	3960	**F (49.5)**
Exit 91	Exit 90	Rolling	2	PM	3420	**E (37.2)**
Exit 92	Exit 91	Rolling	2	PM	3080	D (31.8)
Exit 93	Exit 92	Rolling	2	PM	2880	D (29.3)
State Line	Exit 93	Rolling	2	PM	3010	D (32.6)

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

Northbound Freeway Sections

As shown in Table 3-4A, during the AM Peak hour, all segments in the northbound direction operate at LOS D or better, except the following segments:

- Exits 74 to 76 in East Lyme.

During the PM Peak hour (see Table 3-4B), a majority of segments deteriorate in operations to LOS E or worse including:

- Exit 54 in Branford to 65 in Westbrook;
- Exits 67 to 68 in Old Saybrook;
- Exit 70 in Old Lyme to 76 in East Lyme;
- Exits 82 to 82A in New London; and
- Exits 89 to 91 in Mystic.

Southbound Freeway Sections

As shown in Table 3-4A, during the AM Peak hour, all segments in the southbound direction operate at LOS D or better, except the following segments:

- Exit 54 in Branford to Exit 67 in Madison;

- Exits 70 to 72 in East Lyme; and
- Exits 89 to 91 in Mystic.

During the PM Peak hour (see Table 3-4B), a majority of segments deteriorate in operations to LOS E or worse including:

- Exit 54 in Branford to Exit 67 in Old Saybrook;
- Exits 70 in East Lyme to 82A in New London; and
- Exits 89 to 91 in Mystic.

3.3.2 Ramp Operations

No updates are provided to this section.

3.3.3 Weaves

The results of the freeway weaving segment analysis for Future No-Build 2045 traffic conditions during the AM and PM Peak hours are summarized in Tables 3-5AB and 3-5B respectively.

Table 3-5A Weaving Sections Analysis – Summary of Future No-Build 2045 AM Peak hour conditions

Section Description	Weave Length (ft.)	Peak hour	Level of Service [1]	Density (pc/mi/ln)
Northbound				
Exit 68 to Exit 69	1,040	AM	B	17.6
Exit 71 to Exit 72	800	AM	C	22.1
Exit 75 to Exit 76	1,250	AM	C	27.5
Exit 82A to Exit 83	2,300	AM	B	15.9
Southbound				
Exit 69 to Exit 68	900	AM	C	21.3
Exit 72 to Exit 71	500	AM	C	27.0
Exit 76 to Exit 75	1,000	AM	C	25.0
Exit 82A (Frontage Road) to Exit 82	1,000	AM	C	24.0

Notes:
[1] Boldface entries denote capacity deficiencies during the peak period

Table 3-5B Weaving Sections Analysis – Summary of Future No-Build 2045 PM Peak hour conditions

Section Description	Weave Length (ft.)	Peak hour	Level of Service [1]	Density (pc/mi/ln)
Northbound				
Exit 68 to Exit 69	1,040	PM	D	28.4
Exit 71 to Exit 72	800	PM	D	30.5
Exit 75 to Exit 76	1,250	PM	D	32.4
Exit 82A to Exit 83	2,300	PM	B	17.9
Southbound				
Exit 69 to Exit 68	900	PM	D	31.1
Exit 72 to Exit 71	500	PM	**E**	**36,2**
Exit 76 to Exit 75	1,000	PM	**F**	-

Exit 82A (Frontage Road) to Exit 82	1,000	PM	**F**	-

Notes:
[1] Boldface entries denote capacity deficiencies during the peak period

Northbound Freeway Sections

As shown in Tables 3-5A and 3-5B, all weave segments in the northbound direction during the AM and PM peak hours operate at LOS D or better, except the segment between Exit 75 and 76 (I-395).

Southbound Freeway Sections

As shown in Tables 3-5A and 3-5B, all weave segments in the southbound direction during the AM and PM peak hours operate at LOS D or better, except the following segments in the PM Peak hour:

- Between Exits 72 and 71 in East Lyme;
- Between Exits 76 and 75 in Old Lyme; and
- Between Exits 82A and 82 in New London.

3.3.4 Intersections

No updates are provided to this section.

3.3.5 Comparison of Existing 2016 and Future No-Build 2045 Conditions

Table 3-9 of the 2004 Feasibility Study Report, which summarizes the comparison of existing and future conditions from year 2002 to 2025, has been updated to present the year 2016 to 2045 traffic conditions (see Table 3-9A).

Table 3-9A Comparison of Existing and Future Traffic Conditions – 2016 to 2045 No-Build

Location	Total Locations Reviewed 2016 / (2045)	Summary of Deficient Locations (LOS E or F)			
		Existing 2016 Peak hour		Future No-Build 2045 Peak hour	
Mainline					
		AM	PM	AM	PM
Northbound	38	-	3	2	21
Southbound	40	1	2	10	28
Weaves					
		AM	PM	AM	PM
Northbound	4	1	1	1	1
Southbound	4	-	-	-	3

Mainline

As shown in Tables 3-9A**,** in the AM Peak hour the number of congested mainline segments (LOS E or worse) is anticipated to increase from zero to two (2) in the northbound direction and from one (1) to ten (10) in the southbound direction. During the PM Peak hour, the number of congested mainline segments (LOS E or worse) is anticipated to dramatically increase from three (3) to twenty-one (21) in the northbound direction and from two (2) to twenty-eight (28) in the southbound direction.

Weaves

As shown in Tables 3-9A, one (1) segment is anticipated to operate at LOS E or worse during the AM and PM Peak hours in the northbound direction. In the southbound direction, during the PM Peak hour three (3) segments are anticipated to operate at LOS E or worse.

3.4 Future No-Build 2045 Demand vs. Capacity

The level of forecasted traffic demand expected to exceed the capacity of the I-95 corridor are quantified and discussed in the following section of this report.

3.4.1 Future No-Build 2045 Demands Exceeding Capacity

Table 3-10A compares the estimated capacity of I-95 to the projected Future No-Build 2045 demand. The "unmet demand," as defined in the table, is the demand over capacity that the roadway cannot accommodate.

Table 3-10A Forecasted Future No-Build 2045 Demand Compared to Capacity- AM Peak hour

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 54	Exit 55	2	4400	3690	-
Exit 55	Exit 56	2	4400	3520	-
Exit 56	Exit 57	2	4400	3240	-
Exit 57	Exit 58	2	4400	3190	-
Exit 58	Exit 59	2	4400	3100	-
Exit 59	Exit 60	2	4400	2660	-
Exit 60	Exit 61	2	4400	2860	-
Exit 61	Exit 62	2	4400	2600	-
Exit 62	Exit 63	2	4400	2680	-
Exit 63	Exit 64	2	4400	2730	-
Exit 64	Exit 65	2	4400	2800	-
Exit 65	Exit 66	2	4400	2540	-
Exit 66	Exit 67	2	4400	2480	-
Exit 67	Exit 68	2	4400	2680	-
Exit 68	Exit 69	3	6900	2560	-
Exit 69	Exit 70	4	9200	3330	-
Exit 70	Exit 71	2	4400	2950	-
Exit 71	Exit 72	2	4400	3110	-
Exit 72	Exit 73	2	4400	3160	-
Exit 73	Exit 74	2	4400	3220	-
Exit 74	Exit 75	2	4400	3610	-
Exit 75	Exit 76	2	4400	3950	-
Exit 76	Exit 80	2	4400	2650	-
Exit 80	Exit 81	2	4400	2690	-
Exit 81	Exit 82	2	4400	2780	-

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 82	Exit 82A	2	4400	3180	-
Exit 82A	Exit 83	3	6900	3020	-
Exit 83	Exit 84	4	9200	3830	-
Exit 84	Exit 85	5	11500	4580	-
Exit 85	Exit 86	3	6900	3430	-
Exit 86	Exit 87	3	6900	2740	-
Exit 87	Exit 88	3	6900	2460	-
Exit 88	Exit 89	3	6900	2240	-
Exit 89	Exit 90	2	4400	2210	-
Exit 90	Exit 91	2	4400	1650	-
Exit 91	Exit 92	2	4400	1380	-
Exit 92	Exit 93	2	4400	1260	-
Exit 93	State Line	2	4400	1310	-
Southbound					
Exit 55	Exit 54	2	4400	4950	550
Exit 56	Exit 55	2	4400	4520	120
Exit 57	Exit 56	2	4400	4170	-
Exit 58	Exit 57	2	4400	4060	-
Exit 59	Exit 58	2	4400	3820	-
Exit 60	Exit 59	2	4400	3440	-
Exit 61	Exit 60	2	4400	3630	-
Exit 62	Exit 61	2	4400	3230	-
Exit 63	Exit 62	2	4400	3030	-
Exit 64	Exit 63	2	4400	2670	-
Exit 65	Exit 64	2	4400	2480	-
Exit 66	Exit 65	2	4400	2400	-
Exit 67	Exit 66	2	4400	2430	-
Exit 67	Exit 67	2	4400	2740	-
Exit 68	Exit 67 (Saybrook)	2	4400	2480	-
Exit 69	Exit 68	3	6900	2950	-
Exit 70	Exit 69	4	9200	4070	-
Exit 71	Exit 70	2	4400	3400	-
Exit 72	Exit 71	2	4400	3480	-
Exit 73	Exit 72	2	4400	3240	-
Exit 74	Exit 73	2	4400	3170	-
Exit 75	Exit 74	2	4400	3180	-
Exit 76	Exit 75	3	6900	3440	-
Exit 80	Exit 76	2	4400	2390	-

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 81	Exit 80	2	4400	2420	-
Exit 82	Exit 81	2	4400	2670	-
Exit 82A	Exit 82	2	4400	3060	-
Exit 83	Exit 82A	2	4400	2540	-
Exit 84	Exit 83	4	9200	3230	-
Exit 85	Exit 84	5	11500	5130	-
Exit 86	Exit 85	4	9200	4820	-
Exit 87	Exit 86	3	6900	3880	-
Exit 87A	Exit 87	3	6900	3880	-
Exit 88	Exit 87A	3	6900	4590	-
Exit 89	Exit 88	3	6900	4240	-
Exit 90	Exit 89	2	4400	3750	-
Exit 91	Exit 90	2	4400	3410	-
Exit 92	Exit 91	2	4400	2870	-
Exit 93	Exit 92	2	4400	2420	-
State Line	Exit 93	2	4400	2460	-

[1] The 2010 Highway Capacity Manual defines ideal freeway capacity to be 2,200 passenger cars per flour per Jane (pcphpl) for 2-lane sections end 2,300 (pcphpl) for sections with 3 or wore lanes. This assumes no obstructions and 12-foot June widths.
[2] The unmet demand is the difference between the unconstrained demand and the ideal capacity, expressed in passenger cars per hour (pcph).

As shown in Tables 3-10A, majority of sections are forecasted to operate under constrained conditions- capacity exceeding demand- in the AM peak periods, except two (2) segments between Exit 54 and 56 in the southbound direction.

Table 3-10B Forecasted Future No-Build 2045 Demand Compared to Capacity - PM Peak hour

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 54	Exit 55	2	4400	4800	400
Exit 55	Exit 56	2	4400	4570	170
Exit 56	Exit 57	2	4400	4420	20
Exit 57	Exit 58	2	4400	4280	-
Exit 58	Exit 59	2	4400	4050	-
Exit 59	Exit 60	2	4400	3850	-
Exit 60	Exit 61	2	4400	4060	-
Exit 61	Exit 62	2	4400	3770	-

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 62	Exit 63	2	4400	3750	-
Exit 63	Exit 64	2	4400	3550	-
Exit 64	Exit 65	2	4400	3490	-
Exit 65	Exit 66	2	4400	3420	-
Exit 66	Exit 67	2	4400	3400	-
Exit 67	Exit 68	2	4400	3790	-
Exit 68	Exit 69	3	6900	3930	-
Exit 69	Exit 70	4	9200	4880	-
Exit 70	Exit 71	2	4400	3930	-
Exit 71	Exit 72	2	4400	4060	-
Exit 72	Exit 73	2	4400	3960	-
Exit 73	Exit 74	2	4400	3950	-
Exit 74	Exit 75	2	4400	4330	-
Exit 75	Exit 76	2	4400	4570	170
Exit 76	Exit 80	2	4400	2810	-
Exit 80	Exit 81	2	4400	2840	-
Exit 81	Exit 82	2	4400	3230	-
Exit 82	Exit 82A	2	4400	3680	-
Exit 82A	Exit 83	3	6900	3430	-
Exit 83	Exit 84	4	9200	4600	-
Exit 84	Exit 85	5	11500	6350	-
Exit 85	Exit 86	3	6900	5240	-
Exit 86	Exit 87	3	6900	3940	-
Exit 87	Exit 88	3	6900	5140	-
Exit 88	Exit 89	3	6900	4870	-
Exit 89	Exit 90	2	4400	4490	90
Exit 90	Exit 91	2	4400	3890	-
Exit 91	Exit 92	2	4400	3320	-
Exit 92	Exit 93	2	4400	2950	-
Exit 93	State Line	2	4400	3020	-
Southbound					
Exit 55	Exit 54	2	4400	5060	660
Exit 56	Exit 55	2	4400	4760	360
Exit 57	Exit 56	2	4400	4530	130
Exit 58	Exit 57	2	4400	4520	120
Exit 59	Exit 58	2	4400	4470	70
Exit 60	Exit 59	2	4400	4010	-
Exit 61	Exit 60	2	4400	4160	-

Section		Number of Lanes	Ideal Capacity (pcph) [1]	Unconstrained Demand (pcph)	Unmet Demand (pcph) [2]
From	To				
Northbound					
Exit 62	Exit 61	2	4400	3860	-
Exit 63	Exit 62	2	4400	3920	-
Exit 64	Exit 63	2	4400	4020	-
Exit 65	Exit 64	2	4400	4170	-
Exit 66	Exit 65	2	4400	3850	-
Exit 67	Exit 66	2	4400	3720	-
Exit 67	Exit 67	2	4400	4090	-
Exit 68	Exit 67 (Saybrook)	2	4400	3620	-
Exit 69	Exit 68	3	6900	4050	-
Exit 70	Exit 69	4	9200	4880	-
Exit 71	Exit 70	2	4400	4220	-
Exit 72	Exit 71	2	4400	4430	30
Exit 73	Exit 72	2	4400	4170	-
Exit 74	Exit 73	2	4400	4180	-
Exit 75	Exit 74	2	4400	4440	40
Exit 76	Exit 75	3	6900	5170	-
Exit 80	Exit 76	2	4400	3710	-
Exit 81	Exit 80	2	4400	3780	-
Exit 82	Exit 81	2	4400	4130	-
Exit 82A	Exit 82	2	4400	5060	660
Exit 83	Exit 82A	2	4400	3900	-
Exit 84	Exit 83	4	9200	5020	-
Exit 85	Exit 84	5	11500	6840	-
Exit 86	Exit 85	4	9200	6420	-
Exit 87	Exit 86	3	6900	4800	-
Exit 87A	Exit 87	3	6900	4150	-
Exit 88	Exit 87A	3	6900	4400	-
Exit 89	Exit 88	3	6900	4080	-
Exit 90	Exit 89	2	4400	3960	-
Exit 91	Exit 90	2	4400	3420	-
Exit 92	Exit 91	2	4400	3080	-
Exit 93	Exit 92	2	4400	2880	-
State Line	Exit 93	2	4400	3010	-

[1] The 2010 Highway Capacity Manual defines ideal freeway capacity to be 2,200 passenger cars per flour per Jane (pcphpl) for 2-lane sections end 2,300 (pcphpl) for sections with 3 or wore lanes. This assumes no obstructions and 12-foot June widths.

[2] The unmet demand is the difference between the unconstrained demand and the ideal capacity, expressed in passenger cars per hour (pcph).

As shown in Tables 3-10B, majority of sections are forecasted to operate under constrained conditions- capacity exceeding demand- in the PM peak periods, except five (5) segments in the northbound direction and eight (8) segments in the southbound direction.

3.5 Future No-Build 2045 Deficiencies Summary

The following is a summary of the specific locations where existing traffic operations do not meet current operational guidelines based on analysis of I-95 Freeway mainline analysis. This chapter presented the future transportation conditions within the study area under the No-Build condition. Analysis indicates that existing deficiencies presented in Chapter 2 are anticipated to worsen in the year 2045 as traffic demands increase due to land use and demographics changes. Most of mainline and weaving sections are anticipated to degrade to unacceptable levels under Future No-Build 2045 condition, especially during the PM Peak hour. The traffic demand changes from 2016 to 2045, the future operating deficiencies, and the impacts of unmet demands for the study area corridor are summarized below.

Traffic Demand:
From 2016 to 2045 (No-Build), average weekday daily and peak hour traffic volumes on I-95 are anticipated to increase by an average of 31 percent - about 1.0 percent per year. In general, the traffic growth is spread evenly along the corridor.

Traffic Operations:
The operational problems identified in the existing conditions are anticipated to exacerbate under Future No-Build 2045 condition, especially during the PM Peak hour. The sheer magnitude of growth in traffic volumes result in constrained operations where capacity cannot accommodate the projected peak hour demands given the current geometry.

In the northbound direction, two (2) of thirty-eight (38) segments during the AM Peak hour and twenty-one (21) of the thirty-eight (38) segments during the PM Peak hour are anticipated to operate at LOS E or worse by 2045. In the southbound direction, ten (10) of forty (40) segments during the AM Peak hour and twenty-eight (28) of the forty (40) segments during the PM Peak hour are anticipated to operate at LOS E or worse by 2045. Under LOS E conditions, the facility is operating at its capacity. At LOS F, the facility is operating under "forced flow" conditions. LOS E and F are both considered to be unstable conditions where the slightest disruption in traffic flow could result in gridlock conditions.

Tables 3-11A and 3-11B compares the Existing 2016 LOS and volume over capacity (v/c) on the I-95 northbound and southbound mainline sections to those that would be experienced under Future No-Build 2045 traffic conditions assuming no geometric improvements are made.

Table 3-11A Comparative Levels of Service for northbound Freeway Sections – Existing 2016 vs. Future No-Build 2045 conditions

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 54	Exit 55	0.68	C (25.2)	0.84	D (34.7)	0.87	**E (36.9)**	**1.09**	**F (63.9)**

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 55	Exit 56	0.64	C (23.6)	0.80	D (32.1)	0.83	D (33.7)	**1.04**	**F (55.1)**
Exit 56	Exit 57	0.59	C (21.6)	0.74	D (28.5)	0.80	D (32.3)	**1.00**	**F (51.1)**
Exit 57	Exit 58	0.58	C (21.2)	0.73	D (27.9)	0.77	D (30.6)	0.97	**F (47.2)**
Exit 58	Exit 59	0.57	C (20.6)	0.70	D (26.8)	0.73	D (28.4)	0.92	**E (41.8)**
Exit 59	Exit 60	0.49	C (18.5)	0.60	C (23.7)	0.70	D (28.6)	0.88	**E (42.3)**
Exit 60	Exit 61	0.52	C (20.0)	0.65	C (26.0)	0.73	D (30.9)	0.92	**F (47.6)**
Exit 61	Exit 62	0.48	C (18.2)	0.59	C (23.0)	0.68	D (27.7)	0.86	**E (40.5)**
Exit 62	Exit 63	0.49	C (18.6)	0.61	C (23.9)	0.68	D (27.5)	0.85	**E (40.1)**
Exit 63	Exit 64	0.50	C (19.1)	0.62	C (24.4)	0.64	C (25.4)	0.81	**E (36.1)**
Exit 64	Exit 65	0.51	C (19.6)	0.64	C (25.3)	0.63	C (24.9)	0.79	**E (35.0)**
Exit 65	Exit 66	0.47	B (17.7)	0.58	C (22.4)	0.62	C (24.3)	0.78	D (33.8)
Exit 66	Exit 67	0.45	B (17.3)	0.56	C (21.8)	0.62	C (24.2)	0.77	D (33.5)
Exit 67	Exit 68	0.49	C (18.7)	0.61	C (23.9)	0.69	D (28.1)	0.86	**E (40.9)**
Exit 68	Exit 69	0.31	B (11.9)	0.39	B (14.8)	0.48	C (18.1)	0.60	C (23.2)
Exit 69	Exit 70	0.30	A (10.7)	0.38	B (13.4)	0.44	B (15.7)	0.55	C (20.4)
Exit 70	Exit 71	0.53	C (20.2)	0.67	D (26.6)	0.71	D (28.8)	0.89	**E (42.9)**
Exit 71	Exit 72	0.56	C (21.4)	0.71	D (28.6)	0.73	D (30.2)	0.92	**F (46.1)**
Exit 72	Exit 73	0.57	C (21.7)	0.72	D (29.2)	0.72	D (29.1)	0.90	**E (43.6)**
Exit 73	Exit 74	0.58	C (22.3)	0.73	D (30.1)	0.72	D (29.1)	0.90	**E (43.3)**
Exit 74	Exit 75	0.66	C (25.8)	0.82	**E (36.3)**	0.78	D (33.5)	0.98	**F (54.2)**
Exit 75	Exit 76	0.72	D (29.2)	0.90	**E (43.3)**	0.83	**E (37.0)**	**1.04**	**F (63.6)**
Exit 76	Exit 80	0.48	B (17.9)	0.60	C (23.2)	0.50	C (18.9)	0.64	C (24.9)
Exit 80	Exit 81	0.48	B (17.9)	0.61	C (23.2)	0.51	C (18.8)	0.65	C (24.8)
Exit 81	Exit 82	0.50	C (18.5)	0.63	C (24.1)	0.58	C (21.6)	0.73	D (29.6)
Exit 82	Exit 82A	0.58	C (21.6)	0.72	D (28.9)	0.66	C (25.6)	0.84	**E (36.6)**
Exit 82A	Exit 83	0.36	B (13.5)	0.46	B (16.9)	0.41	B (15.1)	0.52	C (19.3)
Exit 83	Exit 84	0.34	B (11.8)	0.44	B (15.1)	0.41	B (14.1)	0.52	C (18.4)
Exit 84	Exit 85	0.33	B (11.2)	0.42	B (14.4)	0.45	B (15.6)	0.58	C (20.7)
Exit 85	Exit 86	0.40	B (14.9)	0.52	C (19.3)	0.61	C (23.2)	0.79	D (33.5)
Exit 86	Exit 87	0.32	B (11.9)	0.42	B (15.6)	0.45	B (17.1)	0.60	C (22.9)
Exit 87	Exit 88	0.29	A (10.9)	0.37	B (14.2)	0.60	C (23.7)	0.78	D (34.0)
Exit 88	Exit 89	0.26	A (9.9)	0.34	B (12.9)	0.57	C (22.3)	0.74	D (31.1)
Exit 89	Exit 90	0.38	B (14.8)	0.50	C (19.5)	0.79	**E (35.3)**	**1.02**	**F (65.8)**
Exit 90	Exit 91	0.28	A (10.6)	0.38	B (14.5)	0.67	D (27.6)	0.88	**E (44.5)**
Exit 91	Exit 92	0.22	A (8.6)	0.31	B (12.1)	0.56	C (21.8)	0.75	D (32.9)
Exit 92	Exit 93	0.20	A (7.8)	0.29	B (11.2)	0.48	C (19.0)	0.67	D (28.1)
Exit 93	State Line	0.21	A (8.2)	0.30	B (11.6)	0.50	C (19.6)	0.69	D (29.1)
Section		Southbound AM				Southbound PM			

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
		2016 Existing Conditions		2045 Future No-Build Conditions		2016 Existing Conditions		2045 Future No-Build Conditions	
From	To	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
Exit 55	Exit 54	0.85	**E (36.6)**	**1.13**	**F (75.2)**	0.87	**E (37.9)**	**1.15**	**F (82.3)**
Exit 56	Exit 55	0.77	D (31.1)	**1.03**	**F (55.7)**	0.81	D (33.6)	**1.08**	**F (65.3)**
Exit 57	Exit 56	0.71	D (27.7)	0.95	**F (45.9)**	0.77	D (31.2)	**1.03**	**F (56.8)**
Exit 58	Exit 57	0.69	D (26.6)	0.92	**E (43.3)**	0.77	D (30.9)	**1.03**	**F (56.5)**
Exit 59	Exit 58	0.65	C (24.7)	0.87	**E (38.3)**	0.76	D (30.6)	**1.02**	**F (54.7)**
Exit 60	Exit 59	0.59	C (24.4)	0.78	**E (37.6)**	0.68	D (29.8)	0.91	**F (52.8)**
Exit 61	Exit 60	0.62	D (26.1)	0.83	**E (41.8)**	0.71	D (31.6)	0.95	**F (58.6)**
Exit 62	Exit 61	0.55	C (22.4)	0.73	D (33.6)	0.65	D (28.2)	0.88	**F (48.0)**
Exit 63	Exit 62	0.51	C (20.8)	0.69	D (30.4)	0.67	D (28.9)	0.89	**F (49.8)**
Exit 64	Exit 63	0.45	C (18.1)	0.61	C (25.5)	0.68	D (30.1)	0.91	**F (53.2)**
Exit 65	Exit 64	0.42	B (16.7)	0.56	C (23.2)	0.71	D (31.8)	0.95	**F (59.0)**
Exit 66	Exit 65	0.40	B (16.2)	0.55	C (22.3)	0.65	D (28.2)	0.88	**F (47.7)**
Exit 67	Exit 66	0.41	B (16.4)	0.55	C (22.6)	0.63	D (26.8)	0.85	**E (44.1)**
Exit 67	Exit 67	0.46	C (18.6)	0.62	D (26.3)	0.70	D (31.0)	0.93	**F (55.8)**
Exit 68	Exit 67 (Saybrook)	0.42	B (16.8)	0.56	C (23.2)	0.61	C (25.8)	0.82	**E (41.6)**
Exit 69	Exit 68	0.34	B (13.5)	0.45	B (18.0)	0.46	C (18.6)	0.61	C (25.8)
Exit 70	Exit 69	0.34	B (12.9)	0.46	B (17.6)	0.41	B (15.5)	0.55	C (21.8)
Exit 71	Exit 70	0.58	C (23.9)	0.77	**E (36.8)**	0.72	D (32.3)	0.96	**F (61.2)**
Exit 72	Exit 71	0.59	C (24.2)	0.79	**E (37.5)**	0.75	D (34.3)	**1.01**	**F (68.9)**
Exit 73	Exit 72	0.55	C (22.1)	0.74	D (33.1)	0.71	D (31.0)	0.95	**F (56.8)**
Exit 74	Exit 73	0.54	C (21.2)	0.72	D (31.3)	0.71	D (30.5)	0.95	**F (55.1)**
Exit 75	Exit 74	0.54	C (21.9)	0.72	D (32.1)	0.76	D (34.7)	**1.01**	**F (69.5)**
Exit 76	Exit 75	0.39	B (15.3)	0.52	C (20.6)	0.59	C (23.9)	0.78	**E (36.0)**
Exit 80	Exit 76	0.40	B (15.5)	0.54	C (21.2)	0.63	C (25.2)	0.84	**E (40.3)**
Exit 81	Exit 80	0.41	B (15.7)	0.55	C (21.5)	0.64	C (25.9)	0.86	**E (41.9)**
Exit 82	Exit 81	0.45	B (17.0)	0.61	C (23.8)	0.70	D (28.6)	0.94	**F (49.7)**
Exit 82A	Exit 82	0.52	C (19.7)	0.70	D (28.5)	0.86	**E (40.9)**	**1.15**	**F (103.2)**
Exit 83	Exit 82A	0.43	B (16.0)	0.58	C (22.0)	0.66	C (26.0)	0.89	**E (42.2)**
Exit 84	Exit 83	0.27	A (9.6)	0.37	B (12.9)	0.43	B (15.0)	0.57	C (20.7)
Exit 85	Exit 84	0.36	B (12.4)	0.47	B (16.2)	0.48	B (16.6)	0.62	C (22.7)
Exit 86	Exit 85	0.42	C (19.8)	0.55	C (25.8)	0.56	D (26.2)	0.73	D (34.5)
Exit 87	Exit 86	0.44	B (16.7)	0.59	C (22.5)	0.54	C (20.6)	0.73	D (29.8)
Exit 87A	Exit 87	0.45	B (17.2)	0.59	C (23.3)	0.46	B (17.7)	0.63	C (25.3)
Exit 88	Exit 87A	0.54	C (21.2)	0.70	D (29.6)	0.49	C (19.3)	0.67	D (27.9)

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 89	Exit 88	0.49	C (19.3)	0.64	D (26.5)	0.45	B (17.7)	0.62	C (25.2)
Exit 90	Exit 89	0.64	D (26.8)	0.85	**E (43.6)**	0.65	D (27.6)	0.90	**F (49.5)**
Exit 91	Exit 90	0.58	C (23.8)	0.78	**E (37.0)**	0.55	C (22.4)	0.78	**E (37.2)**
Exit 92	Exit 91	0.46	C (18.9)	0.65	D (28.6)	0.48	C (19.6)	0.70	D (31.8)
Exit 93	Exit 92	0.38	B (15.5)	0.55	C (23.2)	0.44	C (18.1)	0.65	D (29.3)
State Line	Exit 93	0.38	B (16.1)	0.56	C (24.5)	0.47	C (19.8)	0.68	D (32.6)

Notes:
[1] Boldface entries denote capacity deficiencies during the peak period

As shown in Table 3-11A, twelve (12) of the seventy-eight (78) segments during the AM Peak hour are anticipated to operate at LOS E or worse during the Future No-Build 2045 condition. On the other hand, two (2) of seventy-eight (78) segments are anticipated to have a v/c ratio at or above 1.0 (capacity). During the PM Peak hour, forty-nine (49) of the seventy-eight (78) segments are anticipated to operate at LOS E or worse during the Future No-Build 2045 condition. On the other hand, thirteen (3) of seventy-eight (78) segments are anticipated to have a v/c ratio at or above 1.0 (capacity).

Section 4

Existing Environmental Conditions

This chapter provides updated information on the environmental resources found within the 58-mile I-95 Corridor study area. While the same environmental resources investigated in 2004 were also investigated for the purposes of this update, the focus of the analysis is on environmental resources that may have changed since the original 2004 study and that may provide constraints to improvements and/or result in permitting and mitigation requirements. Particular attention was paid to those resources that have increased in number or size since 2004. The areas of focus include:

- Wetlands
- Critical habitats
- Threatened and endangered species
- Environmental risk sites

4.1 Constraint Mapping Process

Data used in the constraint mapping process was collected from a variety of sources, outlines below. In general, mapping and analysis focused on a 150-foot area on either side of the centerline of I-95.

Surface Water Source Files and Metadata:

- **CT Hydrography Polygon** (CT DEEP, 2005)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Hydrography_gdb.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/HYDROGRAPHY_POLY_FGDC_Plus.htm*
- **CT Sub-Regional Watersheds** (CT DEEP, 2006)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Watershed_gdb.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/SUBREGIONAL_BASIN_POLY_FGDC_Plus.htm*
- **FEMA National Flood Hazard Layer** (FEMA, September 2016)
  - **Source**: *https://msc.fema.gov/*
  - **Metadata**: NFHL_09_20161223_metadata.xml (file)
- **Inland Wetland Soils** (CT DEEP, 2009)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Soils_gdb.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/SOILS_POLY_DATA_FGDC_Plus.htm*

▪ **National Wetland Inventory Wetlands** (US Fish and Wildlife Services, 2010)

- **Source**: *https://www.fws.gov/wetlands/Downloads/State/CT_wetlands.zip*
- **Documentation**: *https://www.fws.gov/wetlands/documents/Wetlands-Mapper-Documentation-Manual.pdf*
- **Note:** *Additional project specific metadata is available in the file geodatabase*

▪ **Tidal Wetlands** (CT DEEP, published 1999, last updated 2012)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Coastal_Habitat_gdb.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/tidal_wetlands_1990s_fgdc_plus.htm*

Ground Water Source Files and Metadata:

▪ **CT Hydrography Polygon** (CT DEEP, 2005)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Hydrography_gdb.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/HYDROGRAPHY_POLY_FGDC_Plus.htm*

▪ **CT Aquifer Protection Areas** (CT DEEP, 2012)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/Aquifer_Protection_Area_shp.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/AQUIFER_PROTECTION_AREA_FGDC_Plus.htm*

▪ **CT Ground Water Quality Classification Polygons** (CT DEEP, 2015)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/WaterQualityClass_shp.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/WATERQUALITYCLASS_GROUND_FGDC_Plus.htm*

Cultural Resources Source Files and Metadata:

▪ **CT Coastal Zone Boundary** (CT DEEP, 1999)

- **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/Coastal_Boundary_shp.zip*
- **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/COASTAL_BOUNDARY_FGDC_Plus.htm*

- **CT Critical Habitats** (CT DEEP, 2009)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/Critical_Habitat_shp.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/CRITICAL_HABITAT_POLY_FGDC_Plus.htm*

- **CT DEEP Property** (CT DEEP, 2010)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/DEP_Property_shp.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/DEP_PROPERTY_FGDC_Plus.htm*

- **CT Hydrography Polygon** (CT DEEP, 2005)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Hydrography_gdb.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/HYDROGRAPHY_POLY_FGDC_Plus.htm*

- **CT Natural Diversity Database Area** (CT DEEP, 2016)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/Natural_Diversity_Database_shp.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/NATURAL_DIVERSITY_DATABASE_FGDC_Plus.htm*

- **Estuarine and Marine Deepwater (subset of National Wetland Inventory)** (US Fish and Wildlife Services, 2010)
  - **Source**: *https://www.fws.gov/wetlands/Downloads/State/CT_wetlands.zip*
  - **Documentation**: *https://www.fws.gov/wetlands/documents/Wetlands-Mapper-Documentation-Manual.pdf*
  - **Note:** *Additional project specific metadata is available in the file geodatabase*

- **Shellfish Area** (CT DEEP, 1997)
  - **Source:** *ftp://ftp.state.ct.us/pub/dep/gis/shapefile_format_zip/Shellfish_shp.zip*
  - **Metadata:** *http://www.cteco.uconn.edu/metadata/dep/document/shellfish_fgdc_plus.htm*

- **Tidal Wetlands** (CT DEEP, published 1999, last updated 2012)
  - **Source**: *ftp://ftp.state.ct.us/pub/dep/gis/geodatabase_format_zip/Coastal_Habitat_gdb.zip*
  - **Metadata**: *http://www.cteco.uconn.edu/metadata/dep/document/tidal_wetlands_1990s_fgdc_plus.htm*

4.2 Corridor Environmental Constraints

Each of the mapped environmental constraints for the I-95 study corridor is described below. Each set of data (combined in logical groupings for mapping purposes) is shown on 1” = 2000’ figures (presented in the report figures booklet) with the corridor divided into 13 sheets.

The following environmental resources are depicted:

- Natural Diversity Database Areas/Critical Habitats
- National Wetland Inventory Wetlands/Wetland Soils
- Environmental Risk Sites

4.2.1 Surface Water Resources

There have been no significant increases in surface water resources since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.2 Groundwater Resources

There have been no significant increases in groundwater resources since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.3 Farmland

There have been no significant increases in farmland since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.4 Coastal Resources

There have been no significant increases in coastal resources since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.5 Historic and Archeological Resources

An update to the 2004 Feasibility Study was completed utilizing the same methodology as the prior work. The research and field work was completed during June and July of 2017. The research included a review of files at the Connecticut State Historic Preservation Office (CT SHPO), a review of property tax records, communication with local officials, and windshield surveys.

The following areas were reviewed within the project corridor:

- Listed Architectural Resources- 1,000-foot buffer defined as 500’ offset from edge of corridor pavement
- Potential Historic Resources- 800-foot buffer at interchanges, defined as a 400-foot offset from edge of pavement
- Know Archeological Resources- 1,000-foot buffer defined as a 500-foot offset from edge of corridor pavement

Potential Undiscovered Archeological Resources- 1,000-foot buffer at interchanges, defined as a 500-foot offset from edge of pavement

Based on the updated work effort, no listed architectural resources identified in the 2004 Feasibility Study have been removed/delisted/destroyed. The 2004 Feasibility Study only provided a total number of architectural resources that may be eligible. Thus, this update identifies all architectural resources which may meet the criteria for listing on the National Register of Historic Places. Further study and coordination with CT SHPO would be required to determine eligibility of these properties and to define potential historic districts.

Newly listed and/or identified historic and archeological resources are outlined below. Due to the limited documentation available from the 2004 Study for archeological resources, this update identifies all listed and potential resources identified during this update effort.

Listed (National or State Register) Architectural Resources

Historic Districts

- One additional State Register-listed historic district- Mystic Oral School in Groton (located northeast of Exit 89 on Oral School Road)

The historic districts within the review area are outlined in Table 4-3A.

Table 4-3A State and National Register Listed Historic Districts

Town	Resource Name	Location	Status	Source
Groton	Groton Bank Historic District	Exit 85	NRHP	NRHP
Guilford	Dudleytown Historic District	Corridor North	NRHP	NRHP
Guilford	Guilford Historic Town Center	Exit 58	NRHP	NRHP
New London	Post Hill Historic District	Exit 83	NRHP	NRHP
Groton	Mystic Oral School	Corridor North	State Register	State Register
Old Lyme	Old Lyme Historic District	Exit 70	State Register	State Register

Architectural Resources

- One additional National Register-listed property- Deshon Allyn House in New London (Williams Street North of Exit 83/84 Off ramps to Route 32)

Archeological Resources (based on SHPO Site Files)

- Overall 30 archeological sites have been identified within the project area, nine archeological sites within project corridor buffers and 21 within the interchange areas and associated buffers
- Eight potentially eligible archeological sites for NHRP
- Of the 30 archeological sites identified, eleven sites (two along corridor and nine within interchange areas) have been destroyed, or are in such poor condition they are not considered eligible
- Ten sites (four along the corridor and six within interchange areas) have undetermined eligibility at this time
- One site is a potential pre-historic cemetery

Potentially Eligible Historic Architectural and Archeological Resources

Architectural Resources

- 265 architectural resources have been identified as being 50 years or older and therefore may be eligible for listing on the National Register. Many of these buildings are single family homes constructed between 1950 and 1965. Further assessment of the eligibility of these structures for listing on the State or National Registers, either individually or as historic districts, would be required.

Undiscovered Archaeological Resources

- There are 58 potential pre-historic and historic archeological sites within the project corridor and interchange areas.

All state and national registered eligible historic properties within the review area are outlined in Table 4-3B.

Table 4-3B State and National Register-Listed and Formally Determined Elidable Historic Properties

Town	Resource Name	Address/ Location	Resource Type	Age / Date	Position	Condition	Status	Source
Guilford	Calvin Crampton House	234 Long Hill Road	Historic House	1756	Corridor South		State Register	State Register
Guilford	Capt. Samuel Lee House	292 State Street	Historic House	1794	Corridor South		State Register	State Register
Guilford	Timothy Chittenden House	361 Long Hill Road	Historic House	1778	Corridor North		State Register	State Register
Clinton	Jeremiah Stevens House	23 Old Mill Road	Historic House	1707-1708	Exit 63		State Register	State Register
Clinton	Horatio Kelsey House	98 High Street	Historic House	1886	Exit 63	Good	Eligible	Town survey
Westbrook	Becker House	505 Old Clinton Road	Historic House	1760	Corridor South		State Register	State Register
Old Saybrook	Jedidiah Dudley House	Springbrook Road	Historic House	1750	Corridor North	Good	NRHP	NRHP
Old Saybrook	John Whittlesey Jr. House	40 Ferry Road	Historic House	1693	Exit 68/69	Good	NRHP	NRHP
Old Lyme	Florence Griswold House & Museum	Historic House	1899	Exit 70	Good	NHL	SHPO site files	
Old Lyme	Huntley House	15 Neck Road	Historic House	1820-1826	Exit 70		State Register	State Register
East Lyme	Sylvanus Griswold House	16 East Society Road	Historic House	1750	Exit 73		State Register	State Register
East Lyme	Allen Manwaring House	24 Gurley Road	Historic House	1800	Exit 76	Good	Eligible	SHPO site files

Town	Resource Name	Address/ Location	Resource Type	Age / Date	Position	Condition	Status	Source
East Lyme	Daniel Crocker House	25 Gurley Road	Historic House	1770	Exit 76	Good	Eligible	SHPO site files
New London	Deshon Allyn House	613 Williams Street	Historic House	1829	Exit 83	Good	NRHP	NRHP
New London	U.S. Coast Guard Academy	Historic Military Structures	1932	Exit 83/84	Good	Eligible	SHPO site files	
New London	Old Town Mill	Historic Industrial Structures	1650	Corrid or South	Good	NRHP	NRHP	
Groton	715 Noank Ledyard Road	Historic House	1763	Corrid or South	Good	Eligible	SHPO site files	
Stonington	Whitehall Mansion	Historic House	1771	Exit 90	Good	NRHP	NRHP	

4.2.6 Section 4(f) and Section 6(f) Resources

Section 4(f) Resources

Section 4(f) applies to all historic sites that are listed, or eligible for inclusion, in the National Register of Historic Places. Thus, National Register-listed and eligible properties identified in the 2004 Feasibility Study, as well as the Deshon Allyn House which was identified as part of this update, would be subject to Section 4(f). After further evaluation, if additional historic properties are identified as eligible for the National Register, they would also be subject to Section 4(f). Section 4(f) applies to archeological sites that are on or eligible for the National Register and that warrant preservation in place. Evaluation would need to be undertaken to determine if archaeological resources within the project area meet the criteria. Additional recreational resources that may be subject to Section 4(f) include the Mystic Oral School which is owned by CT DEEP and provides water access to the Thames River, and the Thames River Boat Launch which is also owned by CTDEEP, south of the Gold Star Bridge in New London.

Section 6(f) Resources

There have been no new Land and Water Conservation Fund (LWCF) properties purchased or developed within the project area since the inception of the 2004 Feasibility Study.

4.2.7 Rare, Threatened and Endangered Species

Similar to the methodology used in 2004, the Natural Diversity Data Base (NDDB) was used as the source of information on federally listed endangered, threatened and candidate species, as well as state listed endangered, threatened, and special concern species.

As shown in Table 4-3C below, there has been a significant increase in NDDB acreage since 2004 (a net total of 270.59 acres). Further information about specific plant and animal species will be requested from CTDEP as design progresses. Consultation with CTDEP, based upon specifics of potential transportation improvements will reveal if impacts will likely occur and if investigation or mitigation is warranted.

A 150-ft. wide area, measured from the centerline of both the northbound and southbound travel lanes of the I-95 corridor, was used to calculate and compare current 2017 environmental impact areas to the environmental impact areas calculated in the 2004 Feasibility Study report. In most areas, this corelated to a 300-ft. wide area of analysis along the corridor, however within Area 3, since the northbound and southbound travel lanes are separated by a wide grass median, the analysis area is measured as 150 ft. from the centerline of the travel lanes.

The 2004 Feasibility Study Cultural Resource plans were digitized in GIS to determine the areas of the 2004 Impacts, broken out by town, within the 150-ft. offset area of I-95. The 2017 environmental areas were then calculated by town within the same 150 ft. offset area of I-95 to find the current acreage of environmental impacts, which can be directly compared to the 2004 environmental impact areas.

Table 4-3C Environmental Impact Summary – NDDB Acreage

Town	2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
Branford	13.49	11.05	-2.44
Clinton	16.22	37.39	+21.17
East Haven	35.32	32.50	-2.82
East Lyme	2.02	36.26	+34.24
Groton	32.05	88.86	+56.81
Guilford	36.69	48.31	+11.62
Madison	16.75	36.53	+19.78
New London	0.00	18.29	+18.29
North Stonington	22.71	70.33	+47.62
Old Lyme	75.59	58.21	-17.38
Old Saybrook	41.27	65.79	+24.52
Stonington	0.00	41.07	+41.07
Waterford	0.00	0.17	+0.17
Westbrook	26.57	44.52	+17.95
Total	**318.69**	**589.28**	**+270.60**

4.2.8 Land Use

There have been no significant changes in land use since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources provided.

4.2.9 Environmental Risk Sites

The relative environmental risk associated with current and former land uses in the vicinity of the I-95 study areas was determined. The need for further evaluation as appropriate was also assessed.

A federal and state environmental database search was conducted for the study area. Environmental Data Resources, Inc. (EDR) performed the search. A corridor study for the I-95 project area was requested from EDR, and CDM Smith received the EDR DataMap ™ Environmental Atlas ™ summarizing the results of the federal and state databases available for their search. While current EDR corridor studies return database results within a 1-mile radius of the project area, in order to mimic the results of the 2004 environmental risk investigation, the following discussion details search results set at 1/8 mile on each side of the I-95 project area, ¼ of a mile in total along the full length of the project area.

The databases searched in support of the update to the 2004 Environmental Risk Sites include the same 19 databases searched in 2004, as well as new databases which are now available to EDR and included in their environmental records reviews. Twenty-seven new databases were included in the 2017 EDR report which were not included in the 2004 discussions. Only those new databases with hits within the reduced ¼ mile search area are mentioned in this discussion.

Databases Searched

The 2004 database searches reproduced in this new report include the following:

- *SEMS (Formerly CERCLIS)* - The Superfund Enterprise Management System (SEMS), formerly referred to as CERCLIS, contains data on potentially hazardous waste sites that have been reported to the United States Environmental Protection Agency (USEPA) by states, municipalities, private companies, and private persons. CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

- *SEMS ARCHIVE (Formerly CERCLIS-NFRAP)* - The SEMS-ARCHIVE site list, formerly known as CERCLIS-NFRAP, contains archived sites which have been removed and archived from the inventory of CERCLIS sites.

- *CORRACTS* – database is a list of handlers of RCRA corrective action activity.

- *RCRA Databases (formerly RCRIS)* - the RCRA database includes selective information on sites which generate, transport, store, treat, and/or dispose of hazardous waste as defined by RCRA The database consists of multiple categories including Transporters, Storage and Disposal (TSDF), large quantity generators (LCG), small quantity generators (SQGs), conditionally exempt small quantity generators (CESQGs), Non-Generators (NonGen)/No Longer Regulated (NLR) do not presently generate hazardous waste.

- *Emergency Response Notification System (ERNS)* – An EPA database of reported release of oil and hazardous materials

- *Hazardous Materials Information Reporting System (HMIRS)* – An EPA list containing hazardous materials spill incidents reported to the Department of Transportation

- *Toxic Chemical Release Inventory System (TRIS)* – This database identifies facilities that release toxic chemicals to the air, water, and land in reportable quantities under SARA Title III, Section 313. The EPA maintains the list.

- *FIFRA/TSCA Tracking System Administrative Case Listing (FTTS)* – This database tracks administrative and pesticides enforcement actions and compliance activities related to FIFRA, TSCA, and EMPCRA (Emergency Planning and Community Right to Know).

- *PCB Activity Database System (PADS)* – This database is maintained by the EPA and identifies generators, transporters, commercial stores and/or brokers and disposers of PCBs

- *Material Licensing Tracking System (MLTS)* – This list is maintained by the Nuclear Regulatory Commission and contains sites that possess or use radioactive materials

- *Facility Index System/Facility Registry System (FINDS)* – This database contains facility information and pointers to other databases and sources of information.

- *State Hazardous Waste Sites (SHWS)* - SHWS contains information about state hazardous waste sites from MassDEP and is equivalent to the federal CERCLIS database. The database contains information on releases of oil and hazardous materials that have been reported to MassDEP and are subject to the Massachusetts Contingency Plan (MCP) regulations.

- *Site Discovery and Assessment Database (SDADB)* – This database includes sites reported to CTDEEP where hazardous waste may have been disposed or sites eligible for listing on the State Inventory of Hazardous Waste Disposal Sites.

- *Solid Waste Management Facilities (SWF/LF)* – The database contains an inventory of solid waste disposal facilities or landfills and comes from CTDEEP's inventory of hazardous disposal sites.

- *Leaking Underground Storage Tanks (LUST)* - the Leaking Underground Storage Tank facilities list contains an inventory of reported leaking underground storage tanks. USTs are regulated under Subtitle I of RCRA. The LUST sites are within the Releases Database that list a UST as its source.

- *The Leachate and Waste Water Discharge Inventory Data Layer (LWDS)* - includes point locations digitized from Leachate and Wastewater Discharge Source maps compiled by the Connecticut DEP

- *Registered Underground Storage Tank list (UST)* - The Underground Storage Tank (UST) database contains registered USTs.

- *Oil & Chemical Spill Database (SPILLS)* – a database of oil and chemical spills, maintained by CT DEEP.

- *CT PROPERTY* - A listing of sites that meet the definition of a hazardous waste establishment. These sites have been sold to another owner. The sites can be generators, dry cleaners, furniture strippers, etc.

The EDR review retrieved a total of 395 sites or locations listed in various databases within 1/8-mile radius of I-95, including 1 site cluster, a southbound rest area located in Madison, CT, which included 21 individual database sites. Subsequently, there are approximately 810 specific references to the environmental databases within the concentrated search area of ¼ mile around the project area, which accounts for individual sites which may be listed in more than one database. These references include specific properties as well as locations where hazardous materials spill incidents have occurred. Approximately one third of the total site references (185) include spill incidents reported from the CT Oil and Chemical Spills (SPILLS) database. Within the ¼ mile search area of the project area (1/8 mile on each side of I-95), the EDR recorded hits on the following databases:

Original 2004 Database Hits:

- UST
- RCRA / SEMS - ARCHIVE
- FINDS
- LUST
- SPILLS
- SDADB
- PROPERTY
- LWDS
- SWF/LF
- PADS

Additional Databases with hits since 2004:

- MANIFEST: Facility and manifest data. Lists and tracks hazardous waste form the generator through transporters to a tsd facility
- ECHO: Enforcement and Compliance History Online (EPA)
- CPCS: A list of contaminated or potentials contaminated sites within CT
- VCP: Sites involved in the Voluntary Cleanup Program
- EDR HIST AUTO: a list of historic gas station/filling station/service station sites
- EDR HIST CLEANER: An EDR compiled list of historic dry cleaners
- ENF: Enforcement actions, including administrative consent orders, final unilateral orders, and final depositions of civil cases through the Attorney General's Office
- NPDES: NPDES permit
- ICIS: integrated compliance information system,
- US MINES: Mines Master Index File. The source of this database is the Dept. of Labor, Mine Safety and Health Administration
- SWRCY: List of Department of Environmental Protection's Recycling Facilities
- BROWNFIELDS: A listing of Brownfield sites

- AUL: Environmental Land Use Restriction sites (Activity and Use Limitations)
- SHE: Significant environmental hazard statue, to identify and abate short-term risks associated with environmental conditions
- AIRS: Aeromantic Information Retrieval System, compliance data on regulated air pollution point sources
- 2020 COR ACTION: A site listed on the 2020 Corrective Action Universe
- CT DRYCLEANERS: A listing of drycleaner facility location

An initial screening was conducted to identify those sites and spill locations that are adjacent to the I-95 study area. The data was reviewed to identify sites or spill locations within approximately 350 feet of I-95, which would be the ones most likely to impact the project area. The screening analysis identified 108 sites within 350 feet of the roadway, and 176 of the 185 spill incidents. The following summarizes the data for locations that may warrant further research due to the nature of the database reported for the site. Sites not included below include those for which the reported database is not likely to suggest a hazardous condition. These include record of an underground storage tank (though a leaking underground storage tank is reported), a RCRA generator, or one only listed on an online tracking or manifest database. The spill incidents, most of which occurred on I-95 and/or at an interchange or ramp, occur throughout the corridor however, most incidents occurred in Branford (36), Groton (26), East Lyme (20), and Old Saybrook (18). Additional research would be necessary to further identify specifics of these incidents.

East Hartford:
- SPILLS (1)

Branford:
- EDR Historic Auto (4)
- CT SDADB (4)
- LWDS (2)
- LUST (3)
- ENF (1)
- CPCS (3)
- EDR DRYCLEANER (1)
- SPILLS (36)

Guilford:
- SDADB (5)
- LWDS (2)
- PROPERTY (2)
- EDR Historic Auto (5)
- LUST (7)
- CPCS (4)
- ENF (1)
- SPILLS (14)

Madison:
- LWDS (2)
- SDADB (1)
- EDR HIST AUTO (2)
- LUST (1)
- SPILLS (11)

Clinton:
- EDR Historic Auto (4)
- LWDS (1)
- SWF/LF (1)
- ENF (1)
- SPILLS (10)

Westbrook:
- LUST (1)
- CT PROPERTY (1)
- EDR HIST AUTO (1)
- LWDS (1)
- SDADB (2)
- VCP (1)
- BROWNFIELD (1)
- SPILLS (3)

Old Saybrook:
- CPCS (5)
- LUST (2)
- SDADB (4)
- LWDS (2)
- EDR HIST AUTO (2)
- VCP (1)
- CT PROPERTY (1)
- SPILLS (18)

Old Lyme:
- LWDS (1)
- SWF/LF (1)
- LUST (1)
- CPCS (1)
- SPILLS (10)

East Lyme:
- EDR DRYCLEANER (1)
- LWDS (1)
- CPCS (2)
- SDADB (1)
- LUST (3)
- SEH (2)
- SPILLS (20)

Waterford:
- CPCS (1)
- SPILLS (12)

New London:
- SDADB (2)
- EDR HIST AUTO (3)
- EDR DRYCLEANER (1)
- LUST (2)
- CPCS (2)
- VCP (1)
- SWF/LF (1)
- SPILLS (5)

Groton:
- LUST (1)
- CPCS (1)
- SPILLS (26)

Stonington:

- LWDS (1)
- SPILLS (5)

North Stonington:

- LUST (3)
- CPCS (3)
- SDADB (1)
- VCP (1)
- EDR HIST AUTO (1)
- CT PROPERTY (1)
- SPILLS (5)

4.2.10 Environmental Justice

There have been no significant changes in environmental justice areas since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.11 Other Unique Features

There have been no significant changes in unique features since 2004; therefore, no mapping is provided of current resources, nor is a comparison of current and 2004 resources.

4.2.12 Air Quality

No updates are provided to this section.

4.2.13 Noise

No updates are provided to this section.

Section 5

Future Build 2045 Transportation Conditions-Improvements Analysis

This chapter presents the potential widening planned to address the transportation- related deficiencies along the I-95 corridor that were presented in Chapters 2 and 3 of this report. The overall feasibility, derived benefits, construction costs and impacts were evaluated for the planned addition of an operational lane along I-95.

The following updates to Section 5 of the 2004 I-95 Feasibility Study Report are included within:

5.1 Future No-Build 2045 Demand vs. Capacity

Table 5-1 of the 2004 Feasibility Study Report has been updated to include the Future No-Build 2045 Volume to Capacity (V/C) ratio and Levels of Service (LOS) for the existing mainline sections of both northbound and southbound I-95.

As Table 5-1A shows, approximately 15% (12 segments) of the northbound and southbound sections experience operational deficiencies at LOS E or LOS F in the year 2045 No-Build condition, during the AM Peak hour. In the PM Peak hour, approximately 60% (47 segments) of the northbound and southbound sections experience operational deficiencies at LOS E or LOS F in the year 2045 No-Build condition.

Table 5-1A Comparative Levels of Service for Freeway Sections – Existing 2016 vs. 2045 No-Build Conditions

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 54	Exit 55	0.68	C (25.2)	0.84	D (34.7)	0.87	**E (36.9)**	**1.09**	**F (63.9)**
Exit 55	Exit 56	0.64	C (23.6)	0.80	D (32.1)	0.83	D (33.7)	**1.04**	**F (55.1)**
Exit 56	Exit 57	0.59	C (21.6)	0.74	D (28.5)	0.80	D (32.3)	**1.00**	**F (51.1)**
Exit 57	Exit 58	0.58	C (21.2)	0.73	D (27.9)	0.77	D (30.6)	0.97	**F (47.2)**
Exit 58	Exit 59	0.57	C (20.6)	0.70	D (26.8)	0.73	D (28.4)	0.92	**E (41.8)**
Exit 59	Exit 60	0.49	C (18.5)	0.60	C (23.7)	0.70	D (28.6)	0.88	**E (42.3)**
Exit 60	Exit 61	0.52	C (20.0)	0.65	C (26.0)	0.73	D (30.9)	0.92	**F (47.6)**
Exit 61	Exit 62	0.48	C (18.2)	0.59	C (23.0)	0.68	D (27.7)	0.86	**E (40.5)**
Exit 62	Exit 63	0.49	C (18.6)	0.61	C (23.9)	0.68	D (27.5)	0.85	**E (40.1)**
Exit 63	Exit 64	0.50	C (19.1)	0.62	C (24.4)	0.64	C (25.4)	0.81	**E (36.1)**
Exit 64	Exit 65	0.51	C (19.6)	0.64	C (25.3)	0.63	C (24.9)	0.79	**E (35.0)**
Exit 65	Exit 66	0.47	B (17.7)	0.58	C (22.4)	0.62	C (24.3)	0.78	D (33.8)
Exit 66	Exit 67	0.45	B (17.3)	0.56	C (21.8)	0.62	C (24.2)	0.77	D (33.5)
Exit 67	Exit 68	0.49	C (18.7)	0.61	C (23.9)	0.69	D (28.1)	0.86	**E (40.9)**

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 68	Exit 69	0.31	B (11.9)	0.39	B (14.8)	0.48	C (18.1)	0.60	C (23.2)
Exit 69	Exit 70	0.30	A (10.7)	0.38	B (13.4)	0.44	B (15.7)	0.55	C (20.4)
Exit 70	Exit 71	0.53	C (20.2)	0.67	D (26.6)	0.71	D (28.8)	0.89	**E (42.9)**
Exit 71	Exit 72	0.56	C (21.4)	0.71	D (28.6)	0.73	D (30.2)	0.92	**F (46.1)**
Exit 72	Exit 73	0.57	C (21.7)	0.72	D (29.2)	0.72	D (29.1)	0.90	**E (43.6)**
Exit 73	Exit 74	0.58	C (22.3)	0.73	D (30.1)	0.72	D (29.1)	0.90	**E (43.3)**
Exit 74	Exit 75	0.66	C (25.8)	0.82	**E (36.3)**	0.78	D (33.5)	0.98	**F (54.2)**
Exit 75	Exit 76	0.72	D (29.2)	0.90	**E (43.3)**	0.83	**E (37.0)**	**1.04**	**F (63.6)**
Exit 76	Exit 80	0.48	B (17.9)	0.60	C (23.2)	0.50	C (18.9)	0.64	C (24.9)
Exit 80	Exit 81	0.48	B (17.9)	0.61	C (23.2)	0.51	C (18.8)	0.65	C (24.8)
Exit 81	Exit 82	0.50	C (18.5)	0.63	C (24.1)	0.58	C (21.6)	0.73	D (29.6)
Exit 82	Exit 82A	0.58	C (21.6)	0.72	D (28.9)	0.66	C (25.6)	0.84	**E (36.6)**
Exit 82A	Exit 83	0.36	B (13.5)	0.46	B (16.9)	0.41	B (15.1)	0.52	C (19.3)
Exit 83	Exit 84	0.34	B (11.8)	0.44	B (15.1)	0.41	B (14.1)	0.52	C (18.4)
Exit 84	Exit 85	0.33	B (11.2)	0.42	B (14.4)	0.45	B (15.6)	0.58	C (20.7)
Exit 85	Exit 86	0.40	B (14.9)	0.52	C (19.3)	0.61	C (23.2)	0.79	D (33.5)
Exit 86	Exit 87	0.32	B (11.9)	0.42	B (15.6)	0.45	B (17.1)	0.60	C (22.9)
Exit 87	Exit 88	0.29	A (10.9)	0.37	B (14.2)	0.60	C (23.7)	0.78	D (34.0)
Exit 88	Exit 89	0.26	A (9.9)	0.34	B (12.9)	0.57	C (22.3)	0.74	D (31.1)
Exit 89	Exit 90	0.38	B (14.8)	0.50	C (19.5)	0.79	**E (35.3)**	**1.02**	**F (65.8)**
Exit 90	Exit 91	0.28	A (10.6)	0.38	B (14.5)	0.67	D (27.6)	0.88	**E (44.5)**
Exit 91	Exit 92	0.22	A (8.6)	0.31	B (12.1)	0.56	C (21.8)	0.75	D (32.9)
Exit 92	Exit 93	0.20	A (7.8)	0.29	B (11.2)	0.48	C (19.0)	0.67	D (28.1)
Exit 93	State Line	0.21	A (8.2)	0.30	B (11.6)	0.50	C (19.6)	0.69	D (29.1)
Section		Southbound AM				Southbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
Exit 55	Exit 54	0.85	**E (36.6)**	**1.13**	**F (75.2)**	0.87	**E (37.9)**	**1.15**	**F (82.3)**
Exit 56	Exit 55	0.77	D (31.1)	**1.03**	**F (55.7)**	0.81	D (33.6)	**1.08**	**F (65.3)**
Exit 57	Exit 56	0.71	D (27.7)	0.95	**F (45.9)**	0.77	D (31.2)	**1.03**	**F (56.8)**
Exit 58	Exit 57	0.69	D (26.6)	0.92	**E (43.3)**	0.77	D (30.9)	**1.03**	**F (56.5)**
Exit 59	Exit 58	0.65	C (24.7)	0.87	**E (38.3)**	0.76	D (30.6)	**1.02**	**F (54.7)**
Exit 60	Exit 59	0.59	C (24.4)	0.78	**E (37.6)**	0.68	D (29.8)	0.91	**F (52.8)**
Exit 61	Exit 60	0.62	D (26.1)	0.83	**E (41.8)**	0.71	D (31.6)	0.95	**F (58.6)**
Exit 62	Exit 61	0.55	C (22.4)	0.73	D (33.6)	0.65	D (28.2)	0.88	**F (48.0)**
Exit 63	Exit 62	0.51	C (20.8)	0.69	D (30.4)	0.67	D (28.9)	0.89	**F (49.8)**
Exit 64	Exit 63	0.45	C (18.1)	0.61	C (25.5)	0.68	D (30.1)	0.91	**F (53.2)**

Section		Northbound AM				Northbound PM			
		Existing 2016 Conditions		Future No-Build 2045 Conditions		Existing 2016 Conditions		Future No-Build 2045 Conditions	
From	To	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]	V/C	LOS [1]
Exit 65	Exit 64	0.42	B (16.7)	0.56	C (23.2)	0.71	D (31.8)	0.95	**F (59.0)**
Exit 66	Exit 65	0.40	B (16.2)	0.55	C (22.3)	0.65	D (28.2)	0.88	**F (47.7)**
Exit 67	Exit 66	0.41	B (16.4)	0.55	C (22.6)	0.63	D (26.8)	0.85	**E (44.1)**
Exit 67	Exit 67	0.46	C (18.6)	0.62	D (26.3)	0.70	D (31.0)	0.93	**F (55.8)**
Exit 68	Exit 67 (Saybrook)	0.42	B (16.8)	0.56	C (23.2)	0.61	C (25.8)	0.82	**E (41.6)**
Exit 69	Exit 68	0.34	B (13.5)	0.45	B (18.0)	0.46	C (18.6)	0.61	C (25.8)
Exit 70	Exit 69	0.34	B (12.9)	0.46	B (17.6)	0.41	B (15.5)	0.55	C (21.8)
Exit 71	Exit 70	0.58	C (23.9)	0.77	**E (36.8)**	0.72	D (32.3)	0.96	**F (61.2)**
Exit 72	Exit 71	0.59	C (24.2)	0.79	**E (37.5)**	0.75	D (34.3)	**1.01**	**F (68.9)**
Exit 73	Exit 72	0.55	C (22.1)	0.74	D (33.1)	0.71	D (31.0)	0.95	**F (56.8)**
Exit 74	Exit 73	0.54	C (21.2)	0.72	D (31.3)	0.71	D (30.5)	0.95	**F (55.1)**
Exit 75	Exit 74	0.54	C (21.9)	0.72	D (32.1)	0.76	D (34.7)	**1.01**	**F (69.5)**
Exit 76	Exit 75	0.39	B (15.3)	0.52	C (20.6)	0.59	C (23.9)	0.78	**E (36.0)**
Exit 80	Exit 76	0.40	B (15.5)	0.54	C (21.2)	0.63	C (25.2)	0.84	**E (40.3)**
Exit 81	Exit 80	0.41	B (15.7)	0.55	C (21.5)	0.64	C (25.9)	0.86	**E (41.9)**
Exit 82	Exit 81	0.45	B (17.0)	0.61	C (23.8)	0.70	D (28.6)	0.94	**F (49.7)**
Exit 82A	Exit 82	0.52	C (19.7)	0.70	D (28.5)	0.86	**E (40.9)**	**1.15**	**F (103.2)**
Exit 83	Exit 82A	0.43	B (16.0)	0.58	C (22.0)	0.66	C (26.0)	0.89	**E (42.2)**
Exit 84	Exit 83	0.27	A (9.6)	0.37	B (12.9)	0.43	B (15.0)	0.57	C (20.7)
Exit 85	Exit 84	0.36	B (12.4)	0.47	B (16.2)	0.48	B (16.6)	0.62	C (22.7)
Exit 86	Exit 85	0.42	C (19.8)	0.55	C (25.8)	0.56	D (26.2)	0.73	D (34.5)
Exit 87	Exit 86	0.44	B (16.7)	0.59	C (22.5)	0.54	C (20.6)	0.73	D (29.8)
Exit 87A	Exit 87	0.45	B (17.2)	0.59	C (23.3)	0.46	B (17.7)	0.63	C (25.3)
Exit 88	Exit 87A	0.54	C (21.2)	0.70	D (29.6)	0.49	C (19.3)	0.67	D (27.9)
Exit 89	Exit 88	0.49	C (19.3)	0.64	D (26.5)	0.45	B (17.7)	0.62	C (25.2)
Exit 90	Exit 89	0.64	D (26.8)	0.85	**E (43.6)**	0.65	D (27.6)	0.90	**F (49.5)**
Exit 91	Exit 90	0.58	C (23.8)	0.78	**E (37.0)**	0.55	C (22.4)	0.78	**E (37.2)**
Exit 92	Exit 91	0.46	C (18.9)	0.65	D (28.6)	0.48	C (19.6)	0.70	D (31.8)
Exit 93	Exit 92	0.38	B (15.5)	0.55	C (23.2)	0.44	C (18.1)	0.65	D (29.3)
State Line	Exit 93	0.38	B (16.1)	0.56	C (24.5)	0.47	C (19.8)	0.68	D (32.6)

Notes:
[1] Boldface entries denote capacity deficiencies during the peak period

5.2 Alternatives to Reduce Demands

No updates are provided to this section.

5.3 Mainline Improvement Concepts to Increase Capacity

Based on information presented in the previous sections it will be necessary to increase the capacity of the overall corridor in areas where deficient LOS exists in order to meet the 2045 traffic demands. This will require widening of the corridor to accommodate the addition of a third travel lane in the northbound and southbound directions.

5.3.1 Approach to Mainline Widening Analysis

No updates are provided to this section.

5.3.2 Locations Warranting Additional Capacity

The initial step in the mainline analysis process considered all existing two-lane sections of I-95 with unacceptable LOS E or F in the AM and PM peak hour periods potential candidates for mainline widening to three lanes. Existing sections with three or more travel lanes were not considered candidates for widening, even though some of these sections exhibit unacceptable LOS in the peak hours. Tables 5-2A and 5-2B summarizes the freeway section analysis for the 2045 future No-Build condition during the AM and PM peak hours.

Table 5-2A Freeway Section Analysis – Summary of Future No-Build 2045 AM Peak hour conditions

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future N-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	AM	3690	D (34.7)
Exit 55	Exit 56	Level	2	AM	3520	D (32.1)
Exit 56	Exit 57	Level	2	AM	3240	D (28.5)
Exit 57	Exit 58	Level	2	AM	3190	D (27.9)
Exit 58	Exit 59	Level	2	AM	3100	D (26.8)
Exit 59	Exit 60	Rolling	2	AM	2660	C (23.7)
Exit 60	Exit 61	Rolling	2	AM	2860	C (26.0)
Exit 61	Exit 62	Rolling	2	AM	2600	C (23.0)
Exit 62	Exit 63	Rolling	2	AM	2680	C (23.9)
Exit 63	Exit 64	Rolling	2	AM	2730	C (24.4)
Exit 64	Exit 65	Rolling	2	AM	2800	C (25.3)
Exit 65	Exit 66	Rolling	2	AM	2540	C (22.4)
Exit 66	Exit 67	Rolling	2	AM	2480	C (21.8)
Exit 67	Exit 68	Rolling	2	AM	2680	C (23.9)
Exit 68	Exit 69	Rolling	3	AM	2560	B (14.8)
Exit 69	Exit 70	Rolling	4	AM	3330	B (13.4)
Exit 70	Exit 71	Rolling	2	AM	2950	D (26.6)
Exit 71	Exit 72	Rolling	2	AM	3110	D (28.6)
Exit 72	Exit 73	Rolling	2	AM	3160	D (29.2)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future N-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Exit 73	Exit 74	Rolling	2	AM	3220	D (30.1)
Exit 74	Exit 75	Rolling	2	AM	3610	**E (36.3)**
Exit 75	Exit 76	Rolling	2	AM	3950	**E (43.3)**
Exit 76	Exit 80	Rolling	2	AM	2650	C (23.2)
Exit 80	Exit 81	Rolling	2	AM	2690	C (23.2)
Exit 81	Exit 82	Rolling	2	AM	2780	C (24.1)
Exit 82	Exit 82A	Rolling	2	AM	3180	D (28.9)
Exit 82A	Exit 83	Rolling	3	AM	3020	B (16.9)
Exit 83	Exit 84	Rolling	4	AM	3830	B (15.1)
Exit 84	Exit 85	Rolling	5	AM	4580	B (14.4)
Exit 85	Exit 86	Rolling	3	AM	3430	C (19.3)
Exit 86	Exit 87	Rolling	3	AM	2740	B (15.6)
Exit 87	Exit 88	Rolling	3	AM	2460	B (14.2)
Exit 88	Exit 89	Rolling	3	AM	2240	B (12.9)
Exit 89	Exit 90	Rolling	2	AM	2210	C (19.5)
Exit 90	Exit 91	Rolling	2	AM	1650	B (14.5)
Exit 91	Exit 92	Rolling	2	AM	1380	B (12.1)
Exit 92	Exit 93	Rolling	2	AM	1260	B (11.2)
Exit 93	State Line	Rolling	2	AM	1310	B (11.6)
Southbound						
Exit 55	Exit 54	Level	2	AM	4950	**F (75.2)**
Exit 56	Exit 55	Level	2	AM	4520	**F (55.7)**
Exit 57	Exit 56	Level	2	AM	4170	**F (45.9)**
Exit 58	Exit 57	Level	2	AM	4060	**E (43.3)**
Exit 59	Exit 58	Level	2	AM	3820	**E (38.3)**
Exit 60	Exit 59	Rolling	2	AM	3440	**E (37.6)**
Exit 61	Exit 60	Rolling	2	AM	3630	**E (41.8)**
Exit 62	Exit 61	Rolling	2	AM	3230	D (33.6)
Exit 63	Exit 62	Rolling	2	AM	3030	D (30.4)
Exit 64	Exit 63	Rolling	2	AM	2670	C (25.5)
Exit 65	Exit 64	Rolling	2	AM	2480	C (23.2)
Exit 66	Exit 65	Rolling	2	AM	2400	C (22.3)
Exit 67	Exit 66	Rolling	2	AM	2430	C (22.6)
Exit 67	Exit 67	Rolling	2	AM	2740	D (26.3)
Exit 68	Exit 67 (Saybrook)	Rolling	2	AM	2480	C (23.2)
Exit 69	Exit 68	Rolling	3	AM	2950	B (18.0)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future N-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Exit 70	Exit 69	Rolling	4	AM	4070	B (17.6)
Exit 71	Exit 70	Rolling	2	AM	3400	**E (36.8)**
Exit 72	Exit 71	Rolling	2	AM	3480	**E (37.5)**
Exit 73	Exit 72	Rolling	2	AM	3240	D (33.1)
Exit 74	Exit 73	Rolling	2	AM	3170	D (31.3)
Exit 75	Exit 74	Rolling	2	AM	3180	D (32.1)
Exit 76	Exit 75	Rolling	3	AM	3440	C (20.6)
Exit 80	Exit 76	Rolling	2	AM	2390	C (21.2)
Exit 81	Exit 80	Rolling	2	AM	2420	C (21.5)
Exit 82	Exit 81	Rolling	2	AM	2670	C (23.8)
Exit 82A	Exit 82	Rolling	2	AM	3060	D (28.5)
Exit 83	Exit 82A	Rolling	2	AM	2540	C (22.0)
Exit 84	Exit 83	Rolling	4	AM	3230	B (12.9)
Exit 85	Exit 84	Rolling	5	AM	5130	B (16.2)
Exit 86	Exit 85	Rolling	4	AM	4820	C (25.8)
Exit 87	Exit 86	Rolling	3	AM	3880	C (22.5)
Exit 87A	Exit 87	Rolling	3	AM	3880	C (23.3)
Exit 88	Exit 87A	Rolling	3	AM	4590	D (29.6)
Exit 89	Exit 88	Rolling	3	AM	4240	D (26.5)
Exit 90	Exit 89	Rolling	2	AM	3750	**E (43.6)**
Exit 91	Exit 90	Rolling	2	AM	3410	**E (37.0)**
Exit 92	Exit 91	Rolling	2	AM	2870	D (28.6)
Exit 93	Exit 92	Rolling	2	AM	2420	C (23.2)
State Line	Exit 93	Rolling	2	AM	2460	C (24.5)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

Table 5-2B Freeway Section Analysis – Summary of Future No-Build 2045 PM Peak hour conditions

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future No-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Northbound						
Exit 54	Exit 55	Level	2	PM	4800	**F (63.9)**

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future No-Build 2045 Volumes (vph) [3]	Level of Service [4]
From	To					
Exit 55	Exit 56	Level	2	PM	4570	**F (55.1)**
Exit 56	Exit 57	Level	2	PM	4420	**F (51.1)**
Exit 57	Exit 58	Level	2	PM	4280	**F (47.2)**
Exit 58	Exit 59	Level	2	PM	4050	**E (41.8)**
Exit 59	Exit 60	Rolling	2	PM	3850	**E (42.3)**
Exit 60	Exit 61	Rolling	2	PM	4060	**F (47.6)**
Exit 61	Exit 62	Rolling	2	PM	3770	**E (40.5)**
Exit 62	Exit 63	Rolling	2	PM	3750	**E (40.1)**
Exit 63	Exit 64	Rolling	2	PM	3550	**E (36.1)**
Exit 64	Exit 65	Rolling	2	PM	3490	**E (35.0)**
Exit 65	Exit 66	Rolling	2	PM	3420	D (33.8)
Exit 66	Exit 67	Rolling	2	PM	3400	D (33.5)
Exit 67	Exit 68	Rolling	2	PM	3790	**E (40.9)**
Exit 68	Exit 69	Rolling	3	PM	3930	C (23.2)
Exit 69	Exit 70	Rolling	4	PM	4880	C (20.4)
Exit 70	Exit 71	Rolling	2	PM	3930	**E (42.9)**
Exit 71	Exit 72	Rolling	2	PM	4060	**F (46.1)**
Exit 72	Exit 73	Rolling	2	PM	3960	**E (43.6)**
Exit 73	Exit 74	Rolling	2	PM	3950	**E (43.3)**
Exit 74	Exit 75	Rolling	2	PM	4330	**F (54.2)**
Exit 75	Exit 76	Rolling	2	PM	4570	**F (63.6)**
Exit 76	Exit 80	Rolling	2	PM	2810	C (24.9)
Exit 80	Exit 81	Rolling	2	PM	2840	C (24.8)
Exit 81	Exit 82	Rolling	2	PM	3230	D (29.6)
Exit 82	Exit 82A	Rolling	2	PM	3680	**E (36.6)**
Exit 82A	Exit 83	Rolling	3	PM	3430	C (19.3)
Exit 83	Exit 84	Rolling	4	PM	4600	C (18.4)
Exit 84	Exit 85	Rolling	5	PM	6350	C (20.7)
Exit 85	Exit 86	Rolling	3	PM	5240	D (33.5)
Exit 86	Exit 87	Rolling	3	PM	3940	C (22.9)
Exit 87	Exit 88	Rolling	3	PM	5140	D (34.0)
Exit 88	Exit 89	Rolling	3	PM	4870	D (31.1)
Exit 89	Exit 90	Rolling	2	PM	4490	**F (65.8)**
Exit 90	Exit 91	Rolling	2	PM	3890	**E (44.5)**
Exit 91	Exit 92	Rolling	2	PM	3320	D (32.9)
Exit 92	Exit 93	Rolling	2	PM	2950	D (28.1)
Exit 93	State Line	Rolling	2	PM	3020	D (29.1)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future No-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Southbound						
Exit 55	Exit 54	Level	2	PM	5060	**F (82.3)**
Exit 56	Exit 55	Level	2	PM	4760	**F (65.3)**
Exit 57	Exit 56	Level	2	PM	4530	**F (56.8)**
Exit 58	Exit 57	Level	2	PM	4520	**F (56.5)**
Exit 59	Exit 58	Level	2	PM	4470	**F (54.7)**
Exit 60	Exit 59	Rolling	2	PM	4010	**F (52.8)**
Exit 61	Exit 60	Rolling	2	PM	4160	**F (58.6)**
Exit 62	Exit 61	Rolling	2	PM	3860	**F (48.0)**
Exit 63	Exit 62	Rolling	2	PM	3920	**F (49.8)**
Exit 64	Exit 63	Rolling	2	PM	4020	**F (53.2)**
Exit 65	Exit 64	Rolling	2	PM	4170	**F (59.0)**
Exit 66	Exit 65	Rolling	2	PM	3850	**F (47.7)**
Exit 67	Exit 66	Rolling	2	PM	3720	**E (44.1)**
Exit 67	Exit 67	Rolling	2	PM	4090	**F (55.8)**
Exit 68	Exit 67 (Saybrook)	Rolling	2	PM	3620	**E (41.6)**
Exit 69	Exit 68	Rolling	3	PM	4050	C (25.8)
Exit 70	Exit 69	Rolling	4	PM	4880	C (21.8)
Exit 71	Exit 70	Rolling	2	PM	4220	**F (61.2)**
Exit 72	Exit 71	Rolling	2	PM	4430	**F (68.9)**
Exit 73	Exit 72	Rolling	2	PM	4170	**F (56.8)**
Exit 74	Exit 73	Rolling	2	PM	4180	**F (55.1)**
Exit 75	Exit 74	Rolling	2	PM	4440	**F (69.5)**
Exit 76	Exit 75	Rolling	3	PM	5170	**E (36.0)**
Exit 80	Exit 76	Rolling	2	PM	3710	**E (40.3)**
Exit 81	Exit 80	Rolling	2	PM	3780	**E (41.9)**
Exit 82	Exit 81	Rolling	2	PM	4130	**F (49.7)**
Exit 82A	Exit 82	Rolling	2	PM	5060	**F (103.2)**
Exit 83	Exit 82A	Rolling	2	PM	3900	**E (42.2)**
Exit 84	Exit 83	Rolling	4	PM	5020	C (20.7)
Exit 85	Exit 84	Rolling	5	PM	6840	C (22.7)
Exit 86	Exit 85	Rolling	4	PM	6420	D (34.5)
Exit 87	Exit 86	Rolling	3	PM	4800	D (29.8)
Exit 87A	Exit 87	Rolling	3	PM	4150	C (25.3)
Exit 88	Exit 87A	Rolling	3	PM	4400	D (27.9)
Exit 89	Exit 88	Rolling	3	PM	4080	C (25.2)
Exit 90	Exit 89	Rolling	2	PM	3960	**F (49.5)**

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future No-Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Exit 91	Exit 90	Rolling	2	PM	3420	**E (37.2)**
Exit 92	Exit 91	Rolling	2	PM	3080	D (31.8)
Exit 93	Exit 92	Rolling	2	PM	2880	D (29.3)
State Line	Exit 93	Rolling	2	PM	3010	D (32.6)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

Northbound Freeway Sections
As shown in Table 5-2A, during the AM Peak hour, all segments in the northbound direction operate at LOS D or better, except the following segments:

- Exits 74 to 76 in East Lyme.

During the PM Peak hour (see Table 5-2B), a majority of segments deteriorate in operations to LOS E or worse including:

- Exit 54 in Branford to 65 in Westbrook;
- Exits 67 to 68 in Old Saybrook;
- Exit 70 in Old Lyme to 76 in East Lyme;
- Exits 82 to 82A in New London; and
- Exits 89 to 91 in Mystic.

Southbound Freeway Sections
As shown in Table 5-2A, during the AM Peak hour, all segments in the southbound direction operate at LOS D or better, except the following segments:

- Exit 54 in Branford to Exit 67 in Madison;
- Exits 70 to 72 in East Lyme; and
- Exits 89 to 91 in Mystic.

During the PM Peak hour (see Table 5-2B), a majority of segments deteriorate in operations to LOS E or worse including:

- Exit 54 in Branford to Exit 67 in Old Saybrook;
- Exits 70 in East Lyme to 82A in New London; and
- Exits 89 to 91 in Mystic.

5.3.3 Engineering Considerations for Widening

Typical Roadway Cross Section:

The typical cross section developed for I-95 presented under the 2004 Study Report was used in the analysis for the study update. The ultimate cross section used to determine the construction costs consisted of 14 ft. shoulders, 12ft. travel lanes, and a 10-ft. median barrier. From the 2014 CTDOT Highway Design Manual, Figure 5A for New Construction/ Major Reconstruction of Urban Freeways, the minimum shoulder widths are 12 ft. when truck volumes exceed 250 DDHV. However, it is recommended to provide wider 14 ft. shoulders to increase safety and provide a wider area for roadside emergencies, as well as routine maintenance operations. Additionally, a 10-ft. wide concrete median with is recommended for this section of I-95, which would provide an adequate width to accommodate bridge piers and highway lighting, without having to narrow left shoulders to accommodate these structures.

It is recommended that any future widening to I-95 between Branford and the Connecticut/Rhode Island State Line utilize the ultimate cross-sectional widths.

Shoulder Widening:
Like the 2004 Feasibility Study, this report update utilized the strategy of breaking the study corridor into three analysis areas, since each area is distinctive in its existing geometrics and terrain.

Area 1 is located between the beginning of the project study area at Exit 54 and extends to the Baldwin Bridge in Old Saybrook and is approximately 25 miles in directional length. This section of I-95 features left and right shoulders with varying widths of 10 ft. to 12 ft., along with a paved median with concrete barrier curb separating the northbound and southbound travel lanes. The existing pavement is comprised of concrete ridged pavement overlaid with several bituminous layers. The existing available right-of-way is fairly wide swath along this segment, varying approximately 250’ to 300’ in total width centered off the I-95 median, limiting the number of parcels required to be taken to widen the freeway to the ultimate cross section.

Area 2 is located between the Baldwin Bridge on Old Lyme and the Gold Star Memorial Bridge in New London and is approximately 15 miles in directional length. The cross-sectional area of the roadway differs greatly as you pass through this area. Between the Baldwin Bridge and the I-95/I-395 interchange, the northbound and southbound lanes of I-95 feature narrow left shoulders varying between 4 ft. and 8 ft. in width, and right shoulders varying between 8 ft. and 10 ft. in width. This segment of I-95 also features steep longitudinal grades and has been the location of several deadly crashes over the years. Projects 104-164, 44-151, and 172-442 were recently completed between 2014 and 2017, and addressed some of the safety concerns by removing the existing metal beam rail separating the northbound and southbound I-95 travel lanes and replacing it with concrete median barrier with a grassed median. Project 44-156 is currently under design, which addresses vehicular safety on I-95 at Interchange 74, and addresses traffic operations between Interchange 74 and Interchange 75 in East Lyme. The existing available right-of-way is fairly wide swath along this segment, varying approximately 200’ to 300’ in total width centered off the I-95 median, but due to the topography, several existing properties will be impacted from widening the roadway to the ultimate cross section.

Area 3 is located between the Gold Star Memorial Bridge in Groton and the Connecticut/Rhode Island State Line and is approximately 16 miles in directional length. The cross-sectional area of the roadway is fairly consistent as you pass through this area. The northbound and southbound lanes of I-95 feature 8 ft. +/- left shoulders and right shoulders varying between 10 ft. and 12 ft. in width. This section of I-95 also features steep longitudinal grades and a wide grassed median separating the northbound and southbound travel lanes. Project 58-307 is currently under design, which provides safety improvements to the acceleration and deceleration lanes along I-95, as well as improvements to the interchange operations at Exit 88, Exit 89, Exit 90, Exit 91, Exit 92, and Exit 93, in the towns of Gorton, Stonington, and North Stonington. The existing available right-of-way is fairly wide swath along this section, varying approximately 330' to 1,050' in total width centered off the I-95 grassed median, limiting the number of parcels required to be taken to widen the freeway to the ultimate cross section.

Median Widening:
In Area 1 and 2, widening will be performed to the outside shoulders as the existing median width is less than the ultimate typical sections width. However, since there is an existing grassed median in Area 3, all widening will be performed towards the grass median, limiting the number of impacts to right-of-way.

Other Engineering Considerations:
Continued consideration of the major engineering considerations and design assumptions identified in the 2004 CHA study were also updated and analyzed with more updated and relevant data. These components are discussed below:

1. **Bridge Structures** –A total of 150 existing structures (including 31 culverts) were evaluated between East Haven mile point (MP) 50.81 and the Rhode Island State line MP 111.14 for this update study. The three major structures and their approaches which include: the Baldwin Bridge (Bridge No. 06200A/B), Gold Star Memorial Bridge (Bridge No. 03819 (NB), and 02514A (SB)), and Groton Reservoir Bridges (Bridge Nos. 01777/01778), currently carry six or more travel lanes and will continue to not require any modification for any widening strategy proposed. Since the last update study, several existing structures have undergone rehabilitations such as parapet, median replacement/modifications, repair/widening, substructure repair and modifications over the years. All other major bridge structures and box culverts affected by the mainline widening located in Areas 1, 2 and 3 were also assumed to be completely reconstructed for estimating construction costs and impacts. A detailed summary evaluation chart of the bridges and culverts along I-95 is provided in Appendix B.

   CTDOT also conducted a forecast of structures that would need to be replaced by 2040, which includes 16 structures located within Area 1, 6 structures located within Area 2, and 26 structures located within Area 3. This evaluation of structure needs does not account for structures that would need to be replaced/widened due to future widening of I-95 to construct an additional operation lane. A detailed summary of the forecasted bridge work needed by 2040 is also shown in Appendix B.

2. **Widening of Existing Shoulders** – For the purposes for the construction cost estimate, it was assumed that the future pavement structure of the shoulders would be full depth,

to accommodate traffic loading in the event that traffic needs to be shifted for future rehabilitation projects.

3. **Environmental Resources** – Impacts to environmental resources are important consideration in evaluating the feasibility of the mainline widening improvement concept. New areas of wetlands, wetland soils, tidal wetlands, NDDB areas and environmental risk since 2004 were previously identified in Section 4. A qualitative and quantitative evaluation of impacts to the resources, compared to impacts estimated in 2004, are presented in Section 5.3.4.

4. **Land Use** – No updates to land use, other than environmental risk sites, is presented in this report.

5. **Route 11 Construction -** Since the inception of the 2004 I-95 Feasibility Study Report, the Route 11/I-95/I-395 interchange improvement project has been modified to exclude accommodations for a Route 11 connection. A new I-95/I-395 interchange improvement concept plan, without the inclusion of Route 11, has been developed as part of the Feasibility Study Report Update. Refer to Section 8.5 for the revised concept plan.

6. **Interchange Improvements** – This report has not updated traffic volumes or performed an updated intersection analysis. Further studies of the individual interchanges is required to confirm the validity of the interchange improvements proposed under the 2004 Feasibility Study Report.

5.3.4 Analysis of Mainline Widening Concept

5.3.4.a Overall Feasibility

The Preliminary Engineering plans developed with the 2004 Feasibility Study were used to update the construction costs to the current year 2018, and depict the future planning of I-95 construction projects as supplemented in Appendix E.

5.3.4.b Area 1 – Exit 54 to Connecticut River (Exit 69)

Using the three separate areas of the 2004 Feasibility Study Report, Area 1 is the section of roadway located within Exit 54 interchange in Branford and terminating at the Baldwin Bridge and consists of three travel lanes in each direction. The conceptual typical section is still maintained with a 10-foot-wide median barrier and 14-foot-wide shoulders throughout this area and matches the existing cross section at the Baldwin Bridge. Additionally, 60 bridges and 14 culverts require complete replacement to provide sufficient width, or sufficient vertical or lateral clearance to accommodate any mainline widening strategy. Within this area, it is assumed that the existing concrete pavement course under the bituminous overlay will be repaired rather than removed and replaced with full depth bituminous pavement.

Environmental Evaluation – Area 1

Table 5-3 of the 2004 Feasibility Study Report has been updated to summarize the current environmental impacts associated with the mainline sections in Area 1 and provide a comparison of impacts in 2004 vs. 2017. C Impacts within 150 feet on either side of the centerline were estimated from both 2004 and 2017 mapping.

Impacts are divided into National Wetland Inventory wetlands, wetland soils, NDDB areas and tidal wetlands. If National Wetland Inventory wetlands or NDDB areas were not present in an exit to exit interval, the internal is omitted from the table.

Table 5-3A Environmental Impact Summary for Area 1 – National Wetland Inventory Wetlands

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 54	Exit 55	0.31	0.28	-0.03
Exit 55	Exit 56	0.31	0.04	-0.27
Exit 56	Exit 57	0.00	0.09	+0.09
Exit 57	Exit 58	0.56	0.26	-0.30
Exit 60	Exit 61	0.00	0.66	+0.66
Exit 61	Exit 62	0.38	0.18	-0.20
Exit 62	Exit 63	0.00	0.27	+0.27
Exit 66	Exit 67	0.27	0.14	-0.13
Totals		**1.83**	**1.92**	**+0.09**

Table 5-3B Environmental Impact Summary for Area 1 – Wetland Soils

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 54	Exit 55	3.92	3.92	0.00
Exit 55	Exit 56	0.47	0.47	0.00
Exit 56	Exit 57	24.78	24.78	0.00
Exit 57	Exit 58	0.68	0.68	0.00
Exit 58	Exit 59	11.99	11.99	0.00
Exit 59	Exit 60	24.96	24.96	0.00
Exit 60	Exit 61	9.07	9.07	0.00
Exit 61	Exit 62	4.39	4.39	0.00
Exit 62	Exit 63	15.62	16.20	+0.58
Exit 63	Exit 64	6.81	6.81	0.00
Exit 64	Exit 65	26.71	26.71	0.00
Exit 65	Exit 66	3.25	3.25	0.00
Exit 66	Exit 67	1.74	1.74	0.00
Exit 67	Exit 67	5.24	5.24	0.00
Exit 67	Exit 68	6.88	6.88	0.00
Exit 69	Exit 70	1.37	1.37	0.00
Totals		**147.88**	**148.46**	**+0.58**

Table 5-3C Environmental Impact Summary for Area 1 – Tidal Wetlands

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 59	Exit 60	7.41	1.92	-5.49
Exit 62	Exit 63	0.04	0.04	0.00
Exit 63	Exit 64	0.00	0.03	+0.03
Exit 64	Exit 65	2.67	0.85	-1.82
Exit 67	Exit 67	0.00	0.30	+0.30
Exit 69	Exit 70	0.00	3.69	+3.69
Totals		**10.12**	**6.83**	**-3.29**

5.3.4.c Area 2 – Connecticut River (Exit 70) to Thames River (Exit 84)

Area 2 consists of the section of roadway located within the Exit 70 interchange area beginning at the Baldwin Bridge and terminating at the Gold Star Memorial Bridge. The mainline widening strategy increases the overall roadway width to provide six travel lanes and 14 ft. shoulders by approximately 50 feet. In addition, through this section, 34 bridges and 6 culverts require full replacement to provide the sufficient width, or vertical and lateral clearance to accommodate the mainline widening.

Environmental Evaluation – Area 2

Table 5-4 of the 2004 Feasibility Study Report has been updated to summarize the current environmental impacts associated with the mainline sections in Area 2. If National Wetland Inventory wetlands or NDDB areas were not present in an exit to exit interval, the internal is omitted from the table.

Table 5-4A Environmental Impact Summary for Area 2 – National Wetland Inventory Wetlands

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 70	Exit 70	0.31	0.00	-0.31
Exit 70	Exit 71	0.26	0.00	-0.26
Exit 71	Exit 72	0.00	0.17	+0.17
Exit 72	Exit 73	1.15	1.12	-0.03
Exit 73	Exit 74	0.31	0.24	-0.07
Exit 75	Exit 80	0.00	0.33	+0.33
Exit 80	Exit 81	0.53	0.00	-0.53
Exit 81	Exit 82	0.74	0.51	-0.23
Exit 82A	Exit 83	0.15	0.15	0.00
Totals		**3.45**	**2.52**	**-0.93**

Table 5-4B Environmental Impact Summary for Area 2 – Wetland Soils

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 70	Exit 70	2.82	2.82	0.00
Exit 70	Exit 71	25.24	25.24	0.00
Exit 71	Exit 72	2.65	2.65	0.00
Exit 72	Exit 73	3.34	3.34	0.00
Exit 73	Exit 74	1.41	2.75	+1.34
Exit 75	Exit 80	1.47	1.47	0.00
Exit 80	Exit 81	2.04	2.04	0.00
Exit 81	Exit 82	0.95	0.95	0.00
Totals		**39.92**	**41.26**	**+1.34**

Table 5-4C Environmental Impact Summary for Area 2 – Tidal Wetlands

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 70	Exit 70	4.70	4.34	-0.36
Exit 70	Exit 71	1.54	1.54	0.00
Exit 75	Exit 80	0.38	0.00	-0.38
Totals		**6.62**	**5.88**	**-0.74**

5.3.4.d Area 3 –Thames River (Exit 85) to Rhode Island State Line

Area 3 consists of the section of roadway located between the Gold Star Memorial Bridge to the Rhode Island State line. Between the Gold Star Memorial Bridge and Exit 88, the existing of roadway already consists of three travel lanes in each direction. The mainline widening strategy in Area 3 is accomplished within the two-lane sections within the existing median and additional pavement widening on the inside and outside shoulders. Additionally, 56 bridges and 11 culverts require complete replacement to provide sufficient width, or vertical and lateral clearance to accommodate the mainline widening.

Environmental Evaluation – Area 3

Table 5-5 of the 2004 Feasibility Study Report has been updated to summarize the current environmental impacts associated with the mainline sections in Area 3.

Table 5-5A Environmental Impact Summary for Area 3 – National Wetland Inventory Wetlands

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 87	Exit 88	0.94	1.13	+0.19

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 88	Exit 89	0.32	0.85	+0.53
Exit 90	Exit 91	0.00	1.96	+1.96
Exit 92	Exit 92	0.00	0.34	+0.34
Exit 91	Exit 92	0.00	0.28	+0.28
Exit 92	Exit 93	0.00	0.36	+0.36
Exit 93	State Line	0.00	0.21	+0.21
Totals		**1.26**	**5.13**	**+3.87**

Table 5-5B Environmental Impact Summary for Area 3 – Wetland Soils

Section		2004 Impacts (Acres)	2017 Impacts (Acres)	Change in Acreage
From	To			
Exit 85	Exit 86	0.14	0.14	0.00
Exit 86	Exit 87	1.03	1.03	0.00
Exit 87	Exit 88	1.14	1.14	0.00
Exit 88	Exit 89	3.10	3.10	0.00
Exit 89	Exit 90	0.76	0.76	0.00
Exit 90	Exit 91	3.90	3.90	0.00
Exit 91	Exit 92	26.33	26.33	0.00
Exit 92	Exit 92	0.14	0.14	0.00
Exit 92	Exit 93	1.02	1.02	0.00
Exit 93	State Line	2.34	2.34	0.00
Totals		**39.89**	**39.89**	**0.00**

5.3.5 Mainline Operations Summary – Future Build 2045 Condition

5.3.5.a Forecasting Future Traffic Conditions – 2016 to 2045

Traffic growth projections were based on historical growth data- between 2016 and 2040- estimated from the updated CTDOT's Statewide Travel Demand Model developed as part of the I-95 Value Pricing Pilot (VPPP) and CT Lets GO CT Statewide Long-range Transportation Planning studies. Widening improvements were coded into the model and growth estimates using the Model population and employment forecasts for the Future Build 2040 were applied to the 2016 Base Year Volumes discussed in Section 2 earlier to estimate (by extrapolation) Future Build 2045 traffic demand volumes.

5.3.5.b Future Traffic Demand – Year 2045

Estimates of Future Build 2045 Average Summer Weekday daily and peak hour traffic volumes were calculated using the growth projections estimated from the updated CTDOT's Statewide

CDM Smith

Travel Demand Model for the mainline, interchange ramps and mainline weaving sections within the study area.

5.3.5.c 2045 Daily Volumes

Table 5-6A summarizes the I-95 mainline ADT volumes between Existing 2016 and Future Build 2045.

Table 5-6A I-95 Mainline Average Summer Weekday Daily Traffic Volumes (ADT) Comparison– Existing 2016 to Future Build 2045 (Two-Way)

Section	Existing 2016 ASWDT	Future Build 2045 ASWDT	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	104360	139924	34%	1.1%
Exit 55 to 56	98570	131573	33%	1.1%
Exit 56 to 57	94090	125408	33%	1.1%
Exit 57 to 58	92330	123226	33%	1.1%
Exit 58 to 59	89640	119175	33%	1.1%
9Exit 59 to 60	83610	111198	33%	1.1%
Exit 60 to 61	86990	115616	33%	1.1%
Exit 61 to 62	81080	107786	33%	1.1%
Exit 62 to 63	80290	106840	33%	1.1%
Exit 63 to 64	78150	103963	33%	1.1%
Exit 64 to 65	77970	103671	33%	1.1%
Exit 65 to 66	74690	99397	33%	1.1%
Exit 66 to 67 (Elm St)	73330	97681	33%	1.1%
Exit 67 (Elm St) to 67 (Rte 154)	79570	105583	33%	1.1%
Exit 67 (Rte 154) to 68	71310	95216	34%	1.1%
Exit 68 to 69	80810	107008	32%	1.1%
Exit 69 to 70	96610	129062	34%	1.1%
Exit 70 to 71	84350	112359	33%	1.1%
Exit 71 to 72	87050	115949	33%	1.1%
Exit 72 to 73	85270	113524	33%	1.1%
Exit 73 to 74	85710	114059	33%	1.1%
Exit 74 to 75	90650	120211	33%	1.1%
Exit 75 to 76	98660	130606	32%	1.1%
Exit 76 to 80	65250	87509	34%	1.1%
Exit 80 to 81	66100	88670	34%	1.1%
Exit 81 to 82	71550	96089	34%	1.1%
Exit 82 to 82A	82750	111322	35%	1.2%
Exit 82A to 83	71550	95988	34%	1.1%
Exit 83 to 84	91850	122814	34%	1.1%
Exit 84 to 85	121360	160268	32%	1.1%
Exit 85 to 86	103860	138550	33%	1.1%

Section	Existing 2016 ASWDT	Future Build 2045 ASWDT	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 86 to 87 (Rte 1)	78790	106986	36%	1.2%
Exit 87 (Rte 1) to 87 (Rte 349)	72630	99229	37%	1.2%
Exit 87 (Rte 349) to 88	85890	115527	35%	1.2%
Exit 88 to 89	80090	108283	35%	1.2%
Exit 89 to 90	75420	102826	36%	1.2%
Exit 90 to 91	64580	88916	38%	1.3%
Exit 91 to 92	55970	79048	41%	1.4%
Exit 92 to 93	50100	72300	44%	1.5%

Table 5-6A presents a comparison of the Average Summer Weekday Daily traffic volumes (ASWDT) in the Existing 2016 condition and Future Build 2045 condition for each Mainline section in the study area. All sections are projected to experience increased traffic demand. ASWDT volumes are projected to increase between 32 and 44 percent over the study period. The average change for this period is 34 per cent. This corresponds to an average yearly change of 1.1 percent assuming uniform annual increases.

5.3.5.d 2045 Peak hour volumes

Table 5-6B and 5-6C summarizes the updated I-95 mainline Existing 2016 and Future Build 2045 AM and PM Peak hour volumes.

Table 5-6B I-95 Mainline AM Peak hour Volume Comparison – Existing 2016 to Future Build 2045 (Two-Way)

Section	Existing 2016 Volume (vph)[1]	Future Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	6,720	9,020	34%	1.1%
Exit 55 to 56	6,220	8,310	34%	1.1%
Exit 56 to 57	5,730	7,640	33%	1.1%
Exit 57 to 58	5,600	7,480	34%	1.1%
Exit 58 to 59	5,370	7,120	33%	1.1%
Exit 59 to 60	4,720	6,270	33%	1.1%
Exit 60 to 61	5,020	6,680	33%	1.1%
Exit 61 to 62	4,510	5,990	33%	1.1%
Exit 62 to 63	4,410	5,870	33%	1.1%
Exit 63 to 64	4,180	5,550	33%	1.1%
Exit 64 to 65	4,080	5,420	33%	1.1%
Exit 65 to 66	3,820	5,080	33%	1.1%
Exit 66 to 67 (Elm St)	3,800	5,040	33%	1.1%
Exit 67 (Elm St) to 67 (Rte 154)	4,200	5,570	33%	1.1%
Exit 67 (Rte 154) to 68	3,650	4,870	33%	1.1%

Section	Existing 2016 Volume (vph)[1]	Future Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 68 to 69	4,280	5,670	32%	1.1%
Exit 69 to 70	5,670	7,580	34%	1.1%
Exit 70 to 71	4,890	6,520	33%	1.1%
Exit 71 to 72	5,080	6,760	33%	1.1%
Exit 72 to 73	4,920	6,560	33%	1.1%
Exit 73 to 74	4,930	6,560	33%	1.1%
Exit 74 to 75	5,280	6,970	32%	1.1%
Exit 75 to 76	5,750	7,590	32%	1.1%
Exit 76 to 80	3,870	5,150	33%	1.1%
Exit 80 to 81	3,920	5,220	33%	1.1%
Exit 81 to 82	4,170	5,580	34%	1.1%
Exit 82 to 82A	4,800	6,430	34%	1.1%
Exit 82A to 83	4,270	5,700	33%	1.1%
Exit 83 to 84	5,400	7,200	33%	1.1%
Exit 84 to 85	7,520	9,870	31%	1.0%
Exit 85 to 86	6,340	8,400	32%	1.1%
Exit 86 to 87 (Rte 1)	5,030	6,770	35%	1.2%
Exit 87 (Rte 1) to 87 (Rte 349)	4,480	6,060	35%	1.2%
Exit 87 (Rte 349) to 88	5,430	7,230	33%	1.1%
Exit 88 to 89	4,970	6,650	34%	1.1%
Exit 89 to 90	4,500	6,100	36%	1.2%
Exit 90 to 91	3,740	5,120	37%	1.2%
Exit 91 to 92	3,020	4,310	43%	1.4%
Exit 92 to 93	2,530	3,730	47%	1.6%

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 5-6C I-95 Mainline PM Peak hour Volume Comparison – Existing 2016 to Future Build 2045 (Two-Way)

Section	Existing 2016 Volume (vph)[1]	Future Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 54 to 55	7,640	10,270	34%	1.1%
Exit 55 to 56	7,200	9,630	34%	1.1%
Exit 56 to 57	6,910	9,220	33%	1.1%
Exit 57 to 58	6,770	9,060	34%	1.1%
Exit 58 to 59	6,580	8,760	33%	1.1%
Exit 59 to 60	6,060	8,070	33%	1.1%
Exit 60 to 61	6,340	8,440	33%	1.1%

Section	Existing 2016 Volume (vph)[1]	Future Build 2045 Volume (vph)[1]	% Change (2016 to 2045)	Average Yearly % Change (2016 to 2045)
Exit 61 to 62	5,880	7,840	33%	1.1%
Exit 62 to 63	5,910	7,870	33%	1.1%
Exit 63 to 64	5,820	7,760	33%	1.1%
Exit 64 to 65	5,890	7,850	33%	1.1%
Exit 65 to 66	5,600	7,470	33%	1.1%
Exit 66 to 67 (Elm St)	5,490	7,320	33%	1.1%
Exit 67 (Elm St) to 67 (Rte 154)	6,100	8,090	33%	1.1%
Exit 67 (Rte 154) to 68	5,360	7,160	34%	1.1%
Exit 68 to 69	6,190	8,190	32%	1.1%
Exit 69 to 70	7,490	10,000	34%	1.1%
Exit 70 to 71	6,280	8,360	33%	1.1%
Exit 71 to 72	6,540	8,710	33%	1.1%
Exit 72 to 73	6,260	8,350	33%	1.1%
Exit 73 to 74	6,270	8,340	33%	1.1%
Exit 74 to 75	6,780	8,990	33%	1.1%
Exit 75 to 76	7,560	10,000	32%	1.1%
Exit 76 to 80	4,970	6,670	34%	1.1%
Exit 80 to 81	5,050	6,780	34%	1.1%
Exit 81 to 82	5,600	7,540	35%	1.2%
Exit 82 to 82A	6,700	9,030	35%	1.2%
Exit 82A to 83	5,600	7,530	34%	1.1%
Exit 83 to 84	7,340	9,830	34%	1.1%
Exit 84 to 85	10,170	13,430	32%	1.1%
Exit 85 to 86	8,930	11,890	33%	1.1%
Exit 86 to 87 (Rte 1)	6,590	8,950	36%	1.2%
Exit 87 (Rte 1) to 87 (Rte 349)	5,820	8,000	37%	1.2%
Exit 87 (Rte 349) to 88	7,240	9,740	35%	1.2%
Exit 88 to 89	6,770	9,160	35%	1.2%
Exit 89 to 90	6,330	8,640	36%	1.2%
Exit 90 to 91	5,360	7,410	38%	1.3%
Exit 91 to 92	4,560	6,480	42%	1.4%
Exit 92 to 93	4,060	5,900	45%	1.5%

Notes:

[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Tables 5-6D and 5-6E summarize the I-95 mainline Future Build 2045 AM and PM peak hour volumes in the northbound and southbound directions.

Table 5-6D I-95 Mainline AM Peak hour volumes –Future Build 2045 condition (Two-Way)

Section	Future Build 2045 AM Peak hour					
	2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 54 to 55	9,020	6.4%	3840	5180	43	57
Exit 55 to 56	8,310	6.3%	3630	4680	44	56
Exit 56 to 57	7,640	6.1%	3330	4310	44	56
Exit 57 to 58	7,480	6.1%	3280	4200	44	56
Exit 58 to 59	7,120	6.0%	3180	3940	45	55
Exit 59 to 60	6,270	5.6%	2720	3550	43	57
Exit 60 to 61	6,680	5.8%	2930	3750	44	56
Exit 61 to 62	5,990	5.6%	2660	3330	44	56
Exit 62 to 63	5,870	5.5%	2740	3130	47	53
Exit 63 to 64	5,550	5.3%	2790	2760	50	50
Exit 64 to 65	5,420	5.2%	2860	2560	53	47
Exit 65 to 66	5,080	5.1%	2600	2480	51	49
Exit 66 to 67 (Elm St)	5,040	5.2%	2530	2510	50	50
Exit 67 (Elm St) to 67 (Rte 154)	5,570	5.3%	2740	2830	49	51
Exit 67 (Rte 154) to 68	4,870	5.1%	2310	2560	47	53
Exit 68 to 69	5,670	5.3%	2620	3050	46	54
Exit 69 to 70	7,580	5.9%	3390	4190	45	55
Exit 70 to 71	6,520	5.8%	3010	3510	46	54
Exit 71 to 72	6,760	5.8%	3170	3590	47	53
Exit 72 to 73	6,560	5.8%	3220	3340	49	51
Exit 73 to 74	6,560	5.8%	3290	3270	50	50
Exit 74 to 75	6,970	5.8%	3690	3280	53	47
Exit 75 to 76	7,590	5.8%	4040	3550	53	47
Exit 76 to 80	5,150	5.9%	2690	2460	52	48
Exit 80 to 81	5,220	5.9%	2730	2490	52	48
Exit 81 to 82	5,580	5.8%	2830	2750	51	49
Exit 82 to 82A	6,430	5.8%	3260	3170	51	49
Exit 82A to 83	5,700	5.9%	3090	2610	54	46
Exit 83 to 84	7,200	5.9%	3890	3310	54	46
Exit 84 to 85	9,870	6.2%	4640	5230	47	53
Exit 85 to 86	8,400	6.1%	3480	4920	41	59
Exit 86 to 87 (Rte 1)	6,770	6.3%	2800	3970	41	59
Exit 87 (Rte 1) to 87 (Rte 349)	6,060	6.1%	2090	3970	34	66
Exit 87 (Rte 349) to 88	7,230	6.3%	2520	4710	35	65
Exit 88 to 89	6,650	6.1%	2300	4350	35	65
Exit 89 to 90	6,100	5.9%	2270	3830	37	63
Exit 90 to 91	5,120	5.8%	1670	3450	33	67

Section	Future Build 2045 AM Peak hour					
	2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 91 to 92	4,310	5.5%	1410	2900	33	67
Exit 92 to 93	3,730	5.2%	1290	2440	35	65

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 5-6E I-95 Mainline PM Peak hour volumes –Future Build 2045 condition (Two-Way)

Section	Future Build 2045 PM Peak hour					
	2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 54 to 55	10,270	7.0%	4970	5300	48	52
Exit 55 to 56	9,630	7.1%	4700	4930	49	51
Exit 56 to 57	9,220	7.1%	4540	4680	49	51
Exit 57 to 58	9,060	7.1%	4390	4670	48	52
Exit 58 to 59	8,760	7.1%	4140	4620	47	53
Exit 59 to 60	8,070	7.1%	3930	4140	49	51
Exit 60 to 61	8,440	7.1%	4140	4300	49	51
Exit 61 to 62	7,840	7.1%	3850	3990	49	51
Exit 62 to 63	7,870	7.2%	3820	4050	49	51
Exit 63 to 64	7,760	7.3%	3610	4150	47	53
Exit 64 to 65	7,850	7.4%	3550	4300	45	55
Exit 65 to 66	7,470	7.3%	3490	3980	47	53
Exit 66 to 67 (Elm St)	7,320	7.3%	3470	3850	47	53
Exit 67 (Elm St) to 67 (Rte 154)	8,090	7.5%	3870	4220	48	52
Exit 67 (Rte 154) to 68	7,160	7.3%	3420	3740	48	52
Exit 68 to 69	8,190	7.5%	4010	4180	49	51
Exit 69 to 70	10,000	7.6%	4970	5030	50	50
Exit 70 to 71	8,360	7.3%	4010	4350	48	52
Exit 71 to 72	8,710	7.3%	4140	4570	48	52
Exit 72 to 73	8,350	7.2%	4040	4310	48	52
Exit 73 to 74	8,340	7.1%	4030	4310	48	52
Exit 74 to 75	8,990	7.3%	4410	4580	49	51
Exit 75 to 76	10,000	7.5%	4660	5340	47	53
Exit 76 to 80	6,670	7.5%	2850	3820	43	57
Exit 80 to 81	6,780	7.5%	2880	3900	42	58
Exit 81 to 82	7,540	7.7%	3280	4260	44	56
Exit 82 to 82A	9,030	7.9%	3770	5260	42	58
Exit 82A to 83	7,530	7.6%	3500	4030	46	54
Exit 83 to 84	9,830	7.8%	4670	5160	48	52

Section	Future Build 2045 PM Peak hour					
	2045 Volume (vph)[1]	% of Daily Traffic	Directional Split (vph)[1]		Directional Distribution	
			NB	SB	NB	SB
Exit 84 to 85	13,430	8.2%	6430	7000	48	52
Exit 85 to 86	11,890	8.4%	5310	6580	45	55
Exit 86 to 87 (Rte 1)	8,950	8.2%	4010	4940	45	55
Exit 87 (Rte 1) to 87 (Rte 349)	8,000	7.9%	3740	4260	47	53
Exit 87 (Rte 349) to 88	9,740	8.3%	5220	4520	54	46
Exit 88 to 89	9,160	8.3%	4960	4200	54	46
Exit 89 to 90	8,640	8.2%	4570	4070	53	47
Exit 90 to 91	7,410	8.2%	3930	3480	53	47
Exit 91 to 92	6,480	8.1%	3350	3130	52	48
Exit 92 to 93	5,900	8.1%	2980	2920	51	49

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

Table 5-6 of the 2004 Feasibility Study Report, which summarizes the freeway section analysis showing future LOS and traffic volumes for each mainline section, has been updated to include the 2045 build volumes. The AM and PM peak hour LOS for 2045 build condition are shown in Tables 5-6F and 5-6G to illustrate the operational improvements derived from the addition of a third travel lane in areas where additional capacity is needed in the design year to accommodate future traffic demands.

Table 5-6F Freeway Section Analysis – Summary of Future Build 2045 AM Peak hour condition

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph) [3]	Level of Service [4]
From	To					
Northbound						
Exit 54	Exit 55	Level	3	AM	3840	C (21.1)
Exit 55	Exit 56	Level	3	AM	3630	C (19.8)
Exit 56	Exit 57	Level	3	AM	3330	C (18.2)
Exit 57	Exit 58	Level	3	AM	3280	B (17.9)
Exit 58	Exit 59	Level	3	AM	3180	B (17.3)
Exit 59	Exit 60	Rolling	3	AM	2720	B (15.7)
Exit 60	Exit 61	Rolling	3	AM	2930	B (16.9)
Exit 61	Exit 62	Rolling	3	AM	2660	B (15.3)
Exit 62	Exit 63	Rolling	3	AM	2740	B (15.8)
Exit 63	Exit 64	Rolling	3	AM	2790	B (16.1)
Exit 64	Exit 65	Rolling	3	AM	2860	B (16.5)
Exit 65	Exit 66	Rolling	3	AM	2600	B (15.0)
Exit 66	Exit 67	Rolling	3	AM	2530	B (14.6)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph) [3]	Level of Service [4]
From	To					
Exit 67	Exit 68	Rolling	3	AM	2740	B (15.8)
Exit 68	Exit 69	Rolling	3	AM	2620	B (15.1)
Exit 69	Exit 70	Rolling	4	AM	3390	B (13.7)
Exit 70	Exit 71	Rolling	3	AM	3010	B (17.1)
Exit 71	Exit 72	Rolling	3	AM	3170	C (18.0)
Exit 72	Exit 73	Rolling	3	AM	3220	C (18.3)
Exit 73	Exit 74	Rolling	3	AM	3290	C (18.8)
Exit 74	Exit 75	Rolling	3	AM	3690	C (21.2)
Exit 75	Exit 76	Rolling	3	AM	4040	C (23.6)
Exit 76	Exit 80	Rolling	3	AM	2690	B (15.3)
Exit 80	Exit 81	Rolling	3	AM	2730	B (15.3)
Exit 81	Exit 82	Rolling	3	AM	2830	B (15.9)
Exit 82	Exit 82A	Rolling	3	AM	3260	C (18.3)
Exit 82A	Exit 83	Rolling	3	AM	3090	B (17.3)
Exit 83	Exit 84	Rolling	4	AM	3890	B (15.3)
Exit 84	Exit 85	Rolling	5	AM	4640	B (14.6)
Exit 85	Exit 86	Rolling	3	AM	3480	C (19.6)
Exit 86	Exit 87	Rolling	3	AM	2800	B (15.9)
Exit 87	Exit 88	Rolling	3	AM	2520	B (14.5)
Exit 88	Exit 89	Rolling	3	AM	2300	B (13.3)
Exit 89	Exit 90	Rolling	3	AM	2270	B (13.3)
Exit 90	Exit 91	Rolling	3	AM	1670	A (9.8)
Exit 91	Exit 92	Rolling	3	AM	1410	A (8.2)
Exit 92	Exit 93	Rolling	2	AM	1290	B (11.5)
Exit 93	State Line	Rolling	2	AM	1340	B (11.9)
Southbound						
Exit 55	Exit 54	Level	3	AM	5180	D (31.8)
Exit 56	Exit 55	Level	3	AM	4680	D (27.4)
Exit 57	Exit 56	Level	3	AM	4310	C (24.7)
Exit 58	Exit 57	Level	3	AM	4200	C (23.9)
Exit 59	Exit 58	Level	3	AM	3940	C (22.2)
Exit 60	Exit 59	Rolling	3	AM	3550	C (22.0)
Exit 61	Exit 60	Rolling	3	AM	3750	C (23.4)
Exit 62	Exit 61	Rolling	3	AM	3330	C (20.4)
Exit 63	Exit 62	Rolling	3	AM	3130	C (19.1)
Exit 64	Exit 63	Rolling	3	AM	2760	B (16.8)
Exit 65	Exit 64	Rolling	3	AM	2560	B (15.6)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph) [3]	Level of Service [4]
From	To					
Exit 66	Exit 65	Rolling	3	AM	2480	B (15.1)
Exit 67	Exit 66	Rolling	3	AM	2510	B (15.3)
Exit 67	Exit 67	Rolling	3	AM	2830	B (17.2)
Exit 68	Exit 67 (Saybrook)	Rolling	3	AM	2560	B (15.6)
Exit 69	Exit 68	Rolling	3	AM	3050	C (18.6)
Exit 70	Exit 69	Rolling	4	AM	4190	C (18.1)
Exit 71	Exit 70	Rolling	3	AM	3510	C (21.7)
Exit 72	Exit 71	Rolling	3	AM	3590	C (21.9)
Exit 73	Exit 72	Rolling	3	AM	3340	C (20.2)
Exit 74	Exit 73	Rolling	3	AM	3270	C (19.4)
Exit 75	Exit 74	Rolling	3	AM	3280	C (19.8)
Exit 76	Exit 75	Rolling	3	AM	3550	C (21.3)
Exit 80	Exit 76	Rolling	3	AM	2460	B (14.4)
Exit 81	Exit 80	Rolling	3	AM	2490	B (14.6)
Exit 82	Exit 81	Rolling	3	AM	2750	B (15.9)
Exit 82A	Exit 82	Rolling	3	AM	3170	C (18.3)
Exit 83	Exit 82A	Rolling	3	AM	2610	B (14.8)
Exit 84	Exit 83	Rolling	4	AM	3310	B (13.2)
Exit 85	Exit 84	Rolling	5	AM	5230	B (16.6)
Exit 86	Exit 85	Rolling	4	AM	4920	D (26.3)
Exit 87	Exit 86	Rolling	3	AM	3970	C (23.1)
Exit 87A	Exit 87	Rolling	3	AM	3970	C (23.9)
Exit 88	Exit 87A	Rolling	3	AM	4710	D (30.8)
Exit 89	Exit 88	Rolling	3	AM	4350	D (27.4)
Exit 90	Exit 89	Rolling	3	AM	3830	C (23.7)
Exit 91	Exit 90	Rolling	3	AM	3450	C (21.2)
Exit 92	Exit 91	Rolling	3	AM	2900	B (17.9)
Exit 93	Exit 92	Rolling	2	AM	2440	C (23.5)
State Line	Exit 93	Rolling	2	AM	2480	C (24.7)

Notes:

[1] Number of travel lanes differ from 2004 Feasibility Study Report.

[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.

[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

[4] Boldface entries denote capacity deficiencies during the peak period

Table 5-6G Freeway Section Analysis – Summary of Future Build 2045 PM Peak hour condition

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Northbound						
Exit 54	Exit 55	Level	3	PM	4970	D (29.2)
Exit 55	Exit 56	Level	3	PM	4700	D (27.0)
Exit 56	Exit 57	Level	3	PM	4540	C (26.0)
Exit 57	Exit 58	Level	3	PM	4390	C (24.9)
Exit 58	Exit 59	Level	3	PM	4140	C (23.1)
Exit 59	Exit 60	Rolling	3	PM	3930	C (23.2)
Exit 60	Exit 61	Rolling	3	PM	4140	C (24.8)
Exit 61	Exit 62	Rolling	3	PM	3850	C (22.7)
Exit 62	Exit 63	Rolling	3	PM	3820	C (22.5)
Exit 63	Exit 64	Rolling	3	PM	3610	C (21.0)
Exit 64	Exit 65	Rolling	3	PM	3550	C (20.7)
Exit 65	Exit 66	Rolling	3	PM	3490	C (20.3)
Exit 66	Exit 67	Rolling	3	PM	3470	C (20.1)
Exit 67	Exit 68	Rolling	3	PM	3870	C (22.8)
Exit 68	Exit 69	Rolling	3	PM	4010	C (23.8)
Exit 69	Exit 70	Rolling	4	PM	4970	C (20.9)
Exit 70	Exit 71	Rolling	3	PM	4010	C (23.4)
Exit 71	Exit 72	Rolling	3	PM	4140	C (24.4)
Exit 72	Exit 73	Rolling	3	PM	4040	C (23.6)
Exit 73	Exit 74	Rolling	3	PM	4030	C (23.6)
Exit 74	Exit 75	Rolling	3	PM	4410	D (26.4)
Exit 75	Exit 76	Rolling	3	PM	4660	D (28.5)
Exit 76	Exit 80	Rolling	3	PM	2850	B (16.2)
Exit 80	Exit 81	Rolling	3	PM	2880	B (16.2)
Exit 81	Exit 82	Rolling	3	PM	3280	C (18.4)
Exit 82	Exit 82A	Rolling	3	PM	3770	C (21.4)
Exit 82A	Exit 83	Rolling	3	PM	3500	C (19.7)
Exit 83	Exit 84	Rolling	4	PM	4670	C (18.7)
Exit 84	Exit 85	Rolling	5	PM	6430	C (21.0)
Exit 85	Exit 86	Rolling	3	PM	5310	D (34.2)
Exit 86	Exit 87	Rolling	3	PM	4010	C (23.4)
Exit 87	Exit 88	Rolling	3	PM	5220	D (34.9)
Exit 88	Exit 89	Rolling	3	PM	4960	D (32.0)
Exit 89	Exit 90	Rolling	3	PM	4570	D (28.9)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To					
Exit 90	Exit 91	Rolling	3	PM	3930	C (23.6)
Exit 91	Exit 92	Rolling	3	PM	3350	C (19.7)
Exit 92	Exit 93	Rolling	2	PM	2980	D (28.5)
Exit 93	State Line	Rolling	2	PM	3050	D (29.5)
Southbound						
Exit 55	Exit 54	Level	3	PM	5300	D (33.0)
Exit 56	Exit 55	Level	3	PM	4930	D (29.5)
Exit 57	Exit 56	Level	3	PM	4680	D (27.6)
Exit 58	Exit 57	Level	3	PM	4670	D (27.5)
Exit 59	Exit 58	Level	3	PM	4620	D (27.1)
Exit 60	Exit 59	Rolling	3	PM	4140	D (26.6)
Exit 61	Exit 60	Rolling	3	PM	4300	D (28.0)
Exit 62	Exit 61	Rolling	3	PM	3990	C (25.3)
Exit 63	Exit 62	Rolling	3	PM	4050	C (25.8)
Exit 64	Exit 63	Rolling	3	PM	4150	D (26.7)
Exit 65	Exit 64	Rolling	3	PM	4300	D (28.0)
Exit 66	Exit 65	Rolling	3	PM	3980	C (25.2)
Exit 67	Exit 66	Rolling	3	PM	3850	C (24.2)
Exit 67	Exit 67	Rolling	3	PM	4220	D (27.3)
Exit 68	Exit 67 (Saybrook)	Rolling	3	PM	3740	C (23.4)
Exit 69	Exit 68	Rolling	3	PM	4180	D (26.9)
Exit 70	Exit 69	Rolling	4	PM	5030	C (22.7)
Exit 71	Exit 70	Rolling	3	PM	4350	D (28.5)
Exit 72	Exit 71	Rolling	3	PM	4570	D (30)
Exit 73	Exit 72	Rolling	3	PM	4310	D (27.6)
Exit 74	Exit 73	Rolling	3	PM	4310	D (27.1)
Exit 75	Exit 74	Rolling	3	PM	4580	D (30.1)
Exit 76	Exit 75	Rolling	3	PM	5340	**E (38.2)**
Exit 80	Exit 76	Rolling	3	PM	3820	C (22.8)
Exit 81	Exit 80	Rolling	3	PM	3900	C (23.4)
Exit 82	Exit 81	Rolling	3	PM	4260	C (25.7)
Exit 82A	Exit 82	Rolling	3	PM	5260	**E (35.3)**
Exit 83	Exit 82A	Rolling	3	PM	4030	C (23.6)
Exit 84	Exit 83	Rolling	4	PM	5160	C (21.5)
Exit 85	Exit 84	Rolling	5	PM	7000	C (23.4)
Exit 86	Exit 85	Rolling	4	PM	6580	**E (35.5)**
Exit 87	Exit 86	Rolling	3	PM	4940	D (31.1)

Section		Terrain	Number of Lanes[1,2]	Peak hour	Future Build 2045 Volumes (vph) [3]	Level of Service [4]
From	To					
Exit 87A	Exit 87	Rolling	3	PM	4260	D (26.2)
Exit 88	Exit 87A	Rolling	3	PM	4520	D (29.0)
Exit 89	Exit 88	Rolling	3	PM	4200	D (26.2)
Exit 90	Exit 89	Rolling	3	PM	4070	C (25.5)
Exit 91	Exit 90	Rolling	3	PM	3480	C (21.5)
Exit 92	Exit 91	Rolling	3	PM	3130	C (19.4)
Exit 93	Exit 92	Rolling	2	PM	2920	D (29.9)
State Line	Exit 93	Rolling	2	PM	3060	D (33.5)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

Northbound Freeway Sections

As shown in Tables 5-6F and 5-6G, during the AM and PM Peak hours, all segments are anticipated to operate at LOS D or better.

Southbound Freeway Sections

As shown in Table 5-6F, during the AM Peak hour, all segments in the southbound direction are anticipated to operate at LOS D or better.

During the PM Peak hour (see Table 5-6F), all segments in the southbound direction are anticipated to operate at LOS D or better, except:

- Exits 75 to 76 in East Lyme;
- Exits 82 to 82A in New London; and
- Exits 85 to 86 in Groton.

No widening is proposed between Exits 75 and 76 in East Lyme and between Exits 85 and 86 in Groton as they currently have three or more travel lanes in the southbound direction and hence were not considered candidates for widening, even though some of these sections exhibit unacceptable LOS in the peak hours. The segment between Exits 82 and 82A in New London is anticipated to operate at LOS E with the addition of a third lane. This degradation in operations could be partly attributed to increase in traffic demand (induced demand) as a result of the proposed addition of a third lane. Improvements to these and other areas will be addressed in detail in the next phase of the study based i.e. I-95 East Traffic Operations Study using Average Summer Friday and Weekday Traffic Volumes.

5.4 Interchange Improvement Concepts

No updates are provided to this section.

5.4.1 Generalized Interchange Improvements

No updates are provided to this section.

5.4.2 Interchange-Specific Improvements

No updates are provided to this section.

5.4.3 Analysis of Interchange Improvement Concepts

The fact sheets for each interchange presented in the 2004 Feasibility Study have been updated to reflect and document any construction updates to each interchange area since the inception of the 2004 report. Any additional issues or possible near-term solutions, differing from the 2004 Feasibility Study Report, have been identified for each intersection area on the fact sheets.

In addition, as part of the 2004 Feasibility Study Report update, nine areas along I-95 have been identified for additional analysis. Additional improvement concepts were developed to identify enhancements to both mainline I-95 and local interchange operations. Further discussion of these interchange areas is included in Section 8 of this report. The nine areas in which additional improvement concept plans have been completed are:

- I-95 northbound Widening from Exit 54 to Exit 55 (Branford)
- I-95 southbound Acceleration Lane Improvements at Exit 63 (Clinton)
- I-95 southbound Acceleration Lane Improvements at Exit 88 (Groton)
- I-95 southbound Acceleration Lane Improvements at Exit 89 (Mystic)
- I-95 northbound Acceleration and Truck Climbing Lane Improvements at Exit 90
- I-95 / I-395 Interchange Reconstruction and Widening (East Lyme/Waterford)
- I-95 northbound and southbound Widening between Exit 70 and Exit 74 (Old Lyme to East Lyme)
- I-95 northbound and southbound Widening between Exit 80 and Exit 82A (Waterford to New London)
- I-95 northbound and southbound Widening between Exit 54 and Exit 69 (Branford to Old Saybrook)
- I-95 / Route 32 Interchange Reconstruction (New London)

Environmental Evaluation – Interchange Improvement Concepts:
The update to the environmental analysis of the interchanges was not performed. Analysis of the interchanges within the study area was not performed under the study update.

5.4.4 Interchange / Intersection Operations Summary – Year 2045 Build Condition

No updates are provided to this section.

5.4.4.a Ramp Operations

No updates are provided to this section.

5.4.4.b Weaves

The results of the freeway weaving segment analysis for Future Build 2045 traffic conditions during the AM and PM Peak hours are summarized in Tables 5-10A and 5-10B respectively.

Table 5-10A Weaving Sections Analysis – Summary of Future Build 2045 AM Peak hour condition

Section Description	Weave Length (ft.)	Peak hour	Level of Service [1,2]	Density (pc/mi/ln)
northbound				
Exit 68 to Exit 69	1,040	AM	B	18.0
Exit 71 to Exit 72	800	AM	C	22.6
Exit 75 to Exit 76	1,250	AM	N/A	N/A
Exit 82A to Exit 83	2,300	AM	B	16.4
southbound				
Exit 69 to Exit 68	900	AM	C	22.1
Exit 72 to Exit 71	500	AM	C	27.9
Exit 76 to Exit 75	1,000	AM	N/A	N/A
Exit 82A (Frontage Road) to Exit 82	1,000	AM	C	25.2

Notes:
[1] N/A- weave segment is eliminated with interchange redesign
[2] Boldface entries denote capacity deficiencies during the peak period

Table 5-10B Weaving Sections Analysis – Summary of Future Build 2045 PM Peak hour condition

Section Description	Weave Length (ft.)	Peak hour	Level of Service [1,2]	Density (pc/mi/ln)
northbound				
Exit 68 to Exit 69	1,040	PM	D	29.0
Exit 71 to Exit 72	800	PM	D	31.0
Exit 75 to Exit 76	1,250	PM	N/A	N/A
Exit 82A to Exit 83	2,300	PM	B	18.4
southbound				
Exit 69 to Exit 68	900	PM	D	32.3
Exit 72 to Exit 71	500	PM	**E**	**37.7**
Exit 76 to Exit 75	1,000	PM	N/A	N/A
Exit 82A (Frontage Road) to Exit 82	1,000	PM	**F**	**-**

Notes:
[1] N/A- weave segment is eliminated with interchange redesign
[2] Boldface entries denote capacity deficiencies during the peak period

northbound Freeway Sections

As shown in Tables 3-5A and 3-5B, all weave segments in the northbound direction during the AM and PM peak hours operate at LOS D or better.

southbound Freeway Sections

As shown in Tables 3-5A and 3-5B, all weave segments in the southbound direction during the AM and PM peak hours continue to operate at LOS D or better, except the following segments in the PM Peak hour:

- Between Exits 72 and 71 in East Lyme;
- Between Exits 82A and 82 in New London.

Currently, the southbound segments operating at LOS E or worse, have three lanes including an auxiliary lane. No widening is proposed between these interchanges as they currently have three or more travel lanes in the southbound direction and hence were not considered candidates for widening, even though some of these sections exhibit unacceptable LOS in the peak hours.

5.4.4.c Signalized Intersections

No updates are provided to this section. Intersection analysis was not performed for the study update.

5.4.4.d Unsignalized Intersections

No updates are provided to this section. Intersection analysis was not performed for the study update.

5.5 Environmental Impact Summary

Table 5-13 of the 2004 Feasibility Study Report, which summarizes the environmental impacts associated with the mainline widening and interchange improvement concepts, has been updated and presented in Table 5-13A.

Table 5-13A Environmental Impact Summary

Section	Wetland Impacts (Acres)			Threatened & Endangered Species (Acres)
	NWI	Wetland Soils	Tidal Wetlands	
Area 1 – Exit 54 to Connecticut River (Exit 69)	1.93	148.46	6.84	267.40
Area 2 – Connecticut River (Exit 70) to Thames River (Exit 84)	2.53	41.26	5.88	118.49
Area 3 – Thames River (Exit 85) to Rhode Island State Line	5.13	39.89	0	183.91
TOTAL	**9.59**	**229.61**	**12.72**	**569.80**

As shown in Table 5-13A, these are the total number of impacts of each type within the 150-ft. offset from the median of the I-95 corridor.

5.6 Conceptual Construction Cost Estimate

A construction cost estimate has been prepared in year 2018 dollars to provide four (3) operational lanes from Exit 54 in Branford to Exit 92 in North Stonington, as well as for the directional improvements projects proposed for along the corridor. The estimates have been prepared using the following approach and guidelines:

- Connecticut DOT Cost Estimating Guidelines
- Actual construction cost estimates for various recent construction projects as well as past and planned projects along I-95. department in 2017
- Engineering judgement relating to the assignment of costs for miscellaneous, minor, and incidental items.

A construction workshop was conducted with members of the Department's staff including planning, concept development, engineering, district construction, rights of way and environmental planning and compliance. Based on the collaborative efforts of the group, a refined cost breakdown was prepared for major and minor items, as well as ranges for cost elements including State Police, clearing, and grubbing, etc.

The budget for State Police operations is something that should also be considered and is significant and is traditionally not included in the available construction cost history but can be obtained through values in the Department's Core System. Based on available data for projects the State Police component of a project is averaging 0.5%-2.5% of the construction cost based on project complexity. Engineering costs and construction inspection costs should be budgeted at 10% for engineering to include both design and program management and 10% for construction inspection.

The cost for roadway widening was developed using unit costs from recent I-95 project constructed and applying them to anticipated quantities for construction. Construction items included pavement, drainage, guide rail, lighting, maintenance, and protection of traffic, signing and markings were considered. Contingency and miscellaneous items were included at 25% each and added to the subtotal.

The following factors should also be considered when moving forward with portions of the project.

- Full depth shoulder reconstruction was included although some previous I-95 projects may have included all or portions of this previously.
- Cost for State Police should be budgeted as discussed previously.
- Cost for tolling, if an option, has not been included.
- Rights-of-way costs where provided by the Department, which included average costs/square foot of commercial, residential, and industrial properties for each Town within the study area.

5.6.1 Estimating Methodology and Assumptions

A base cost estimate was developed to determine a unit cost per directional mile for the construction of an additional operational lane on I-95 from Exit 54 in Branford to Exit 92 in North Stonington. All estimate quantities were calculated based on a total directional length within each of the three study areas in the corridor. The cost/mile calculated for each area of I-95 were then utilized to determine the short, mid, and long-term independent improvement projects. The base cost estimate was determined by estimating quantities and unit costs of the following contract items:

- Bituminous Pavement
- Excavation & Borrow
- Drainage
- Metal Beam Rail and Concrete Median Barrier
- Highway Lighting
- Existing Concrete Base Pavement Repair
- Noise Barrier Wall
- Signing
- Retaining Walls
- Pavement Markings
- Interchange Improvements
- Wetland Mitigation
- Structure Replacement
- Percentage Base Contract Items

Additionally, the following non-contract items costs were also estimated and included in the base cost estimate:

- Minor Item Allowance
- State Police Forces
- Intelligent Transportation Systems (ITS)
- Environmental Compliance
- Right-of-Way
- Construction Engineering & Inspection Services
- NEPA Documentation
- Program Management
- Design Services

Year of Expenditure and Escalation Factor:

Per the Connecticut Department of Transportation's 2017 Cost Estimating guidelines, for contracts with construction durations less than three years, the inflation adjustment factor is computed by determining the number of years between the estimate date and scheduled bid opening and multiplying this number by the annual inflation factor. For contracts with construction durations of three years or more, the inflation adjustment factor is computed from the number of years from the estimate date to the midpoint of construction. An annual inflation rate of 3.5 percent per year (non-compounded) is used.

Contingency:

Contingency was calculated through a Monte Carlo risk analysis for the I-95 Improvements – Feasibility Evaluation Study (Greenwich to New Haven), Technical Memorandum No. 2 Tasks 3-8, dated April 2018. The contingency was calculated as 8.10% for the I-95 West corridor. A risk analysis was not performed for the I-95 East corridor, but since many of the risks in the cost estimate are similar as the East corridor (concrete base repair, structure replacement costs, right-of-way, etc.), the same contingency was used. Refer to the I-95 West Technical Memorandum for further information on the Monte Carlo risk analysis and contingency calculation.

Structure Costs:

For the basis of the I-95 cost estimate, it was assumed that all structures within the project area will be replaced completely, with the exception of bridges that have already been recently replaced and were built to accommodate the ultimate I-95 cross section, and bridges that are outside the areas of widening (Baldwin Bridge, Gold Star Memorial Bridge, etc.). A unit cost of $525/SF structure replacement cost will be utilized, which matches the unit prices used on the I-95 West cost estimate and includes both demolition and removal of the existing bridge structure, as well as replacement with a new structure.

Interchange Costs:

Because the interchange analysis was not updated as part of this study update, the interchange design shown in the Preliminary Engineering plans under the 2004 Feasibility Study Report can no long be verified for their applicability. Each interchange will need a new study and preliminary engineering analysis prior to any future construction projects. For the purpose of including future interchange costs into the corridor cost estimate, a relative interchange design was chosen for a full cost estimate breakdown. Then all interchanges along the corridor are compared to the relative interchange based on a percentage of work either higher, equal, or lower based on factors like number of new intersections requiring signalization, required right-of-way, and percentage of secondary streets requiring expansion.

The interchange used as the relative comparison is Exit 61 in Madison. This intersection requires three new traffic signals, upgrades to the secondary collector roads, and improvements to acceleration and deceleration lanes. Every other interchange was compared to this interchange based on complexity, to determine an average cost for construction.

Area 1 Estimated Costs:

This area is located between the beginning of the project study area at Exit 54 and extends to the Baldwin Bridge in Old Saybrook, and is estimated at 25 miles in directional length, 50 miles of additional operational lane addition. Within Area 1, widening will be performed to the outside shoulders, providing for the ultimate typical section. The cost estimate for Area 1 assumes that the concrete base course will be repaired rather than removed and replaced with full depth construction. All structures both carrying I-95 and traveling over I-95 will be replaced within this section. Refer to the Area 1 cost estimate in Appendix C for a breakdown of the construction item estimates.

Table 5-14A – I-95 Cost Estimate – Area 1 Costs/Mile

Section Description	Total Cost* / Mile
Construction Subtotal	$18,016,647
Minor Item Allowance Subtotal	$4,504,162
Non-Contract Item Subtotal	$9,021,495
Contingency Subtotal	$2,554,927
Contract, Including Minor Item Allowance, and Contingency in Base Year (2018)	$34,097,233
Contract, Including Minor Item Allowance, Contingency, and Inflation (2045)	$66,319,118

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Table 5-14B – I-95 Cost Estimate – Area 1 Total Cost

Section Description	Total Cost*
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in Base Year (2018)	$1,704,861,650
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in 2045	$3,315,955,900

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Area 2 Estimated Costs:

This area is located between the Baldwin Bridge on Old Lyme and the Gold Star Memorial Bridge in New London, and is approximately 15 miles in directional length, 24 miles of additional operational lane addition. For estimate purposes, all construction costs were based on a total of 24 miles, as the I-95/I-395 interchange project includes the cost to widen I-95 to the ultimate typical section. Within Area 2, widening will be performed to the outside shoulders, providing for the ultimate typical section. The cost estimate for Area 2 assumes that the concrete base course will be removed and replaced with full depth construction, as the widening required to construct the median and shoulders full width most likely requires full depth reconstruction. All structures both carrying I-95 and traveling over I-95 will be replaced within this section, with the exceptions of structures that have already been replaced to accommodate the future I-95 widening. Refer to the Area 2 cost estimate in Appendix C for a breakdown of the construction item estimates.

Table 5-14C – I-95 Cost Estimate – Area 2 Costs/Mile

Section Description	Total Cost* / Mile
Construction Subtotal	$55,896,478
Minor Item Allowance Subtotal	$13,974,120
Non-Contract Item Subtotal	$26,020,592
Contingency Subtotal	$7,767,186
Contract, Including Minor Item Allowance, and Contingency in Base Year (2018)	$103,658,377
Contract, Including Minor Item Allowance, Contingency, and Inflation (2045)	$205,243,586

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Table 5-14D – I-95 Cost Estimate – Area 2 Total Cost

Section Description	Total Cost*
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in Base Year (2018)	$2,487,801,048
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in 2045	$4,925,846,064

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Area 3 Estimated Costs:

This area is located between the Gold Star Memorial Bridge in Groton and the Connecticut/Rhode Island State Line, and is approximately 16 miles in directional length, <u>17.5 miles of additional operational lane addition</u>. Within Area 3, widening will be performed to the inside shoulders, as there is a wide grass median that can accommodate widening to construct the ultimate typical cross section. The cost estimate for Area 3 assumes that the concrete base course will be repaired rather than removed and replaced with full depth construction. All structures both carrying I-95 and traveling over I-95 will be replaced within this section in the areas of the addition of the third operational travel lane. Refer to the Area 3 cost estimate in Appendix C for a breakdown of the construction item estimates.

Table 5-14E – I-95 Cost Estimate – Area 3 Costs/Mile

Section Description	Total Cost* / Mile
Construction Subtotal	$16,437,713
Minor Item Allowance Subtotal	$4,109,428
Non-Contract Item Subtotal	$8,294,235
Contingency Subtotal	$2,336,151

Section Description	Total Cost* / Mile
Contract, Including Minor Item Allowance, and Contingency in Base Year (2018)	$31,177,528
Contract, Including Minor Item Allowance, Contingency, and Inflation (2045)	$61,731,505

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Table 5-14F – I-95 Cost Estimate – Area 3 Total Cost

Section Description	Total Cost*
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in Base Year (2018)	$545,606,740
Total Contract Cost (northbound & southbound) Including Minor Item Allowance, Contingency, and Inflation in 2045	$1,080,301,337

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

Total Corridor Estimated Costs:

Table 5-14G summarizes the total cost, in year 2018 dollars, to construct the additional operational lane along I-95 from Exit 54 in Branford to Exit 92 in North Stonington. These costs reflect designs shown in the Preliminary Engineering Plans associated with the 2004 Feasibility Study Report.

Table 5-14G – I-95 Cost Estimate –Total Costs

Area for Additional of Operational Lane	Total Year 2018 Cost*
Area 1 (25 miles of Directional Widening)	$1,705,000,000
Area 2 (24 miles of Directional Widening)	$2,488,000,000
Area 3 (17.5 miles of Directional Widening)	$546,000,000

Note:
*Cost estimates are based on preliminary concepts and are subject to change subject to further study and design

The current recommendations are to perform directional improvements that can be considered independent utility, rather than perform costly directional widening for the entire length of I-95 East study corridor. Refer to Section 8 for a summary and cost of the short, mid, and long term directional improvements.

CTDOT also conducted a forecast of structures (Appendix B) that would need to be replaced by 2040, which includes 16 structures located within Area 1, 6 structures located within Area 2, and 26 structures located within Area 3. This evaluation of structure needs does not account for structures that would need to be replaced/widened due to future widening of I-95 to construct an additional operation lane.

5.7 Managed Lane Feasibility Analysis

No updates are provided to this section.

Section 6

Implementation Plan

No updates are provided to this section. The Implementation Plan presented in the 2004 Feasibility Study Report has been revised. Refer to Section 8 for the Implementation Plan proposed for the I-95 East Corridor.

Section 7

Products of Public Participation

No updates are provided to this section. Public Participation was not included in the update to the 2004 Feasibility Study Report.

Section 8

Conceptual Interchange Improvements & Implementation Plan

Due to the significant changes in traffic operations and crash history since the 2004 feasibility study, several conceptual improvement projects have been developed, which aim to provide directional improvement projects that exhibit independent utility. The proposed improvement projects have been organized into Short, Mid, and Long-Term Improvements, which targets the sections of the I-95 corridor which have either an operational or safety deficiency. Projects in the Short-Term category are projects that the Department should consider implementing immediately, as they will provide immediate operational and safety improvements, and can be constructed with independent utility. Projects in the Mid-Term category are projects that the department should be planning to implement and being preliminary engineering in the future, as they are larger in scale and will require extensive environmental coordination. Projects in the Long-Term category are projects that will require significant and more detailed planning and would be necessary if the future growth projections of the I-95 corridor continue on the anticipated trend.

Short Term Improvements:

- I-95 northbound Widening from Exit 54 to Exit 55 (Branford)
- I-95 southbound Acceleration Lane Improvements at Exit 63 (Clinton)
- I-95 southbound Acceleration Lane Improvements at Exit 88 (Groton)
- I-95 southbound Acceleration Lane Improvements at Exit 89 (Mystic)
- I-95 northbound Interchange Improvements at Exit 90 (Mystic)

Mid Term Improvements:

- I-95 / I-395 Interchange Reconstruction and Widening (East Lyme/Waterford)
- I-95 northbound and southbound Widening between Exit 70 and Exit 74 (Old Lyme to East Lyme)
- I-95 northbound and southbound Widening between Exit 80 and Exit 82A (Waterford to New London)

Long Term Improvements:

- I-95 northbound and southbound Widening between Exit 54 and Exit 69 (Branford to Old Saybrook)
- I-95 / Route 32 Interchange Reconstruction (New London)

The purpose of the conceptual interchange improvements are to identify areas along the I-95 corridor in which separate break-out projects can be implemented, which would provide an immediate improvement to the operations and safety of the corridor.

8.1 I-95 Northbound Exit 54 to Exit 55 Widening

8.1.1 Conceptual Interchange Design

A conceptual design for the extension of the 3rd northbound travel lane from Exit 54 to Exit 55 in Branford was developed to improve interchange geometry and traffic operations on the mainline at Exit 54.

Tables 8-1A and 8-1B summarize the I-95 Mainline Future No-Build 2045 and Future Build 2045 AM and PM peak hour LOS analysis results in the northbound direction between Exit 54 and 55 with and without widening.

Table 8-1A Freeway Section Analysis – Summary of 2045 AM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	Future No-Build 2045 Volumes (vph)[3]	Level of Service[4]	Number of Lanes[1,2]	Future Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To								
Northbound									
Exit 54	Exit 55	Level	AM	2	3690	D (34.7)	3	3840	C (21.1)
Southbound									
Exit 55	Exit 54	Level	AM	2	4950	**F (75.2)**	3	4970	D (29.2)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

Table 8-1B Freeway Section Analysis – Summary of 2045 PM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	Future No-Build 2045 Volumes (vph)[3]	Level of Service[4]	Number of Lanes[1,2]	Future Build 2045 Volumes (vph)[3]	Level of Service[4]
From	To								
Northbound									
Exit 54	Exit 55	Level	PM	2	4800	**F (63.9)**	3	5180	D (31.8)
Southbound									
Exit 55	Exit 54	Level	PM	2	5060	**F (82.3)**	3	5300	D (33.0)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

[4] Boldface entries denote capacity deficiencies during the peak period

As shown in Tables 8-1A and 8-1B, in the northbound direction, during the AM and PM Peak hour Future No-Build 2045 condition, the mainline segment between Exit 54 and Exit 55 operates at a LOS D and F, respectively. With the planned widening of a third lane, the segment is anticipated at acceptable LOS (LOS D or better), during the AM and PM peak hours.

There were a total of 103 crashes between northbound Exit 54 and Exit 55. Majority of these crashes were rear end or sideswipe collisions (82 out of 103). These crashes could be attributed to the drop of the 3rd northbound travel lane at the Exit 54 Off ramp. The proposed improvements are designed to improve safety and improve operations along northbound I-95 in this area. The 3rd northbound travel lane currently terminates at the Exit 54 Off ramp. There is currently a weaving area between the Branford northbound rest area On ramp and the Exit 54 Off ramp. The weaving between vehicles entering northbound I-95 from the rest area and vehicles exiting the Exit 54 Off ramp leads to the operational deficiencies of the interchange. In the proposed improvements, the weaving area will be lengthened, and the 3rd operational lane extended past Exit 54, and merging in with mainline I-95 in a tangent horizontal section prior to Exit 55.

Refer to Appendix E for the I-95 northbound Exit 54 to Exit 55 conceptual improvement plans.

8.1.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with widening approximately 1.6 miles between Exit 54 and Exit 55 is **$88 million*.**

Within the cost to construct this section of I-95, it is assumed that the following five (5) structures will need to be completely replaced to accommodate the widening and the third operational lane in the northbound direction:

- 00189 – Cherry Hill Road
- 00190 – Todds Hill Road
- 00191 – SR 740 (Cedar Street)
- 00192 – Ivy Street
- 00193 – Chestnut Street

8.2 I-95 Southbound Exit 63 Acceleration Lane Improvements

8.2.1 Conceptual Interchange Design

A conceptual design for the improvement to the southbound Exit 63 On ramp acceleration lane in Clinton was developed to improve interchange geometry and traffic safety.

Table 8-2A summarizes the 2045 AM and PM peak hour LOS analysis results in the southbound direction at Exit 63 On ramp merge before and after acceleration lane improvements.

Table 8-2A Ramp Merge/Diverge Analysis

Scenario	Terrain	Number of Mainline Lanes	Peak hour	Mainline Volume (vph) [1]	Ramp Length (ft.)	Ramp Volume (vph) [1]	Level of Service [2]
southbound							
Existing 2016	Rolling	2	AM	1800	610	450	C (23.5)
Future No-Build 2045	Rolling	2	AM	2450	610	580	D (31.1)
Future No-Build 2045 with ramp improvement	Rolling	2	AM	2450	1580	580	C (25.5)
Future Build 2045 [3]	Rolling	3	AM	2520	1580	600	B (16.8)
southbound							
Existing 2016	Rolling	2	PM	2590	610	330	D (30.3)
Future No-Build 2045	Rolling	2	PM	3490	610	420	**F (40.1)**
Future No-Build 2045 with ramp improvement	Rolling	2	PM	3490	1580	420	**F (34.5)**
Future Build 2045 [3]	Rolling	3	PM	3610	1580	440	C (22.2)

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period
[3] Assumes acceleration lane improvement

As shown in Table 8-2A, during the AM and PM Peak hour Existing 2016 condition, the southbound merge area operates at LOS D or better. By 2045, in the Future No-Build scenario, the ramp merge is anticipated to operate at LOS D and F in the AM and PM peak hours, respectively. With planned extension of the acceleration lane, in the Future No-Build scenario, the merge is anticipated to operate at LOS C and F in the AM and PM peak hours, respectively. With the planned addition of a third mainline operational lane, the merge is anticipated to operate at acceptable LOS (C) in the AM and PM peak hour periods.

There were a total of 35 crashes between On ramp from Route 81 (Exit 63) and Exit 62. Majority of these crashes were rear end or sideswipe collisions (24 out of 35). The proposed improvement of extending the southbound Exit 63 On ramp is designed to improve safety and improve operations in the southbound direction in this area. From Figure 8-2A of the CTDOT Highway design manual, the design speed of the Exit 63 On ramp is approximately 35 mph based on an exit radius of 400 ft. +/-. The I-95 mainline design speed was set to 70 mph throughout the corridor. Based on Table 12-3D, the length of the acceleration lane is 1,420 ft., measured from the PT station of the last curve on the On ramp.

Refer to Appendix E for the I-95 southbound Exit 63 acceleration lane improvements.

8.2.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with extending the southbound Exit 63 On ramp is **$11 million*.**

The cost to replace structure 00221 (Cow Hill Road), rather than widen the structure, is included in the cost for extending the Exit 63 southbound acceleration lane.

8.3 I-95 Southbound Exit 88 Acceleration Lane Improvements

8.3.1 Conceptual Interchange Design

A conceptual design for the improvement to the southbound Exit 88 On ramp acceleration lane in Groton was developed to improve interchange geometry and operational safety.

Table 8-3A summarizes the 2045 AM and PM peak hour LOS analysis results in the southbound direction at Exit 88 On ramp merge before and after acceleration lane improvements.

Table 8-3A Ramp Merge/Diverge Analysis

Scenario	Terrain	Number of Mainline Lanes	Peak hour	Mainline Volume (vph) [1]	Ramp Length (ft.)	Ramp Volume (vph) [1]	Level of Service [2]
southbound							
Existing 2016	Rolling	3	AM	3040	550	490	C (23.7)
Future No-Build 2045	Rolling	3	AM	4005	550	580	D (30.0)
Future No-Build 2045 with ramp improvement	Rolling	3	AM	4005	1570	580	C (25.1)
Future Build 2045 [3]	Rolling	-	-	-	-	-	N/A
southbound							
Existing 2016	Rolling	3	PM	2790	550	460	C (22.0)
Future No-Build 2045	Rolling	3	PM	3860	550	540	D (28.8)
Future No-Build 2045 with ramp improvement	Rolling	3	PM	3860	1570	540	C (23.9)
Future Build 2045 [3]	Rolling	-	-	-	-	-	N/A

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period
[3] N/A-. No widening is proposed at this interchange as it currently has three travel lanes in the southbound direction and hence was not considered a candidate for widening

As shown in Table 8-3A, during the AM and PM Peak hour Existing 2016 condition, the southbound merge area operates at LOS C. By 2045, in the No-Build scenario, the ramp merge is anticipated to operate at LOS D in the AM and PM peak hours. With the planned acceleration lane improvement, the merge is anticipated to operate at acceptable LOS (C) in the AM and PM peak hour periods. No widening is proposed at this interchange as it currently has three travel lanes in the southbound direction and hence was not considered a candidate for widening.

There were a total of 35 crashes between On ramp from Route 117 (Exit 88) and Exit 87. Majority of these crashes were rear end or sideswipe collisions (13 out of 35). There was one (1) head-on collision reported at this location. The proposed improvement of extending the southbound Exit 88 On ramp is designed to improve safety and improve operations in the southbound direction in this area. From Figure 8-2A of the CTDOT Highway design manual, the design speed of the Exit 88

On ramp is approximately 25 mph based on an exit radius of 250 ft. +/-. The I-95 mainline design speed was set to 70 mph throughout the corridor. Based on Table 12-3D, the length of the acceleration lane is 1,420 ft., measured from the PT station of the last curve on the On ramp.

Refer to Appendix E for the I-95 southbound Exit 88 acceleration lane improvements.

8.3.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with extending the southbound Exit 63 On ramp is **$5 million*.**

The cost to construct a retaining wall along the length of the acceleration lane to limit right-of-way impacts is included in the cost for the improvements. Additionally, it is assumed that Structure 00221 (Cow Hill Road) will need to be completely replaced to accommodate the widening for the acceleration lane.

8.4 I-95 Northbound Exit 89 Acceleration Lane Improvements

8.4.1 Conceptual Interchange Design

A conceptual design for the improvement to the southbound Exit 89 On ramp acceleration lane in Mystic was developed to improve interchange geometry and traffic safety.

LOS analysis was not performed at this location because it involved only striping improvements.

The proposed improvements of extending the southbound Exit 89 On ramp striping to have a solid white line is designed to improve safety and improve operations in the southbound direction in this area. Currently, the Exit 89 southbound On ramp forms the third I-95 southbound through lane. The acceleration lane currently has a dashed white line, allowing for vehicles to merge into the acceleration lane. It is proposed to extend the white pained line an additional 1,000 ft. to provide for an adequate acceleration lane length, allowing vehicles entering the highway to reach travel speeds prior to merging with I-95 southbound traffic. From Figure 8-2A of the CTDOT Highway design manual, the design speed of the Exit 89 On ramp is approximately 25 mph based on an exit radius of 250 ft. +/-. The I-95 mainline design speed was set to 70 mph throughout the corridor. Based on Table 12-3D, the length of the acceleration lane is 1,420 ft., measured from the PT station of the last curve on the On ramp. Thusly, a 1,000-ft. painted white line from the end of the gore area is needed to provide an acceleration lane length meeting the requirements of the CTDOT Highway Design Manual.

Refer to Appendix E for the I-95 southbound Exit 89 acceleration lane improvements.

8.4.2 Construction Cost

It is proposed to perform this work utilizing CTDOT maintenance forces. Thusly, no cost estimate is provided for this improvement.

8.5 I-95 Northbound Exit 90 Interchange Improvements

8.5.1 Conceptual Interchange Design

A conceptual design for the improvement to the northbound Exit 90 interchange area in Mystic was developed to improve interchange geometry and traffic safety.

Table 8-5A summarizes the 2045 AM and PM peak hour LOS analysis results in the southbound direction at Exit 90 On ramp merge before and after acceleration lane improvements.

Table 8-5A Ramp Merge/Diverge Analysis

Scenario	Terrain	Number of Mainline Lanes	Peak hour	Mainline Volume (vph) [1]	Ramp Length (ft.)	Ramp Volume (vph) [1]	Level of Service [2]
southbound							
Existing (2016)	Rolling	2	AM	1070	4530	140	A (7.5)
No-Build (2045)	Rolling	2	AM	1480	4530	160	B (11.6)
Build (2045) with ramp improvements	Rolling	3	AM	1480	2575	160	A (6.4)
southbound							
Existing (2016)	Rolling	2	PM	2650	4530	300	C (24.0)
No-Build (2045)	Rolling	2	PM	3540	4530	350	**F (32.9)**
Build (2045) with ramp improvements	Rolling	3	PM	3570	2575	350	C (20.2)

Notes:

[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

[2] Boldface entries denote capacity deficiencies during the peak period

[3] N/A-. No widening is proposed at this interchange as it currently has three travel lanes in the southbound direction and hence was not considered a candidate for widening

As shown in Table 8-4A, during the AM and PM Peak hour existing conditions (2016), the southbound merge area operates at LOS C or better. By 2045, in the No-Build scenario, the ramp merge is anticipated to operate at LOS D in the AM peak hour and LOS F in the PM peak hour. With the planned acceleration lane improvement, the merge is anticipated to operate at acceptable LOS (C or better) in the AM and PM peak hour periods.

There were a total of 24 crashes between On ramp from Route 654 (Exit 90) and Exit 91. Majority of these crashes were rear end or sideswipe collisions (10 out of 24). The proposed improvement of extending the southbound Exit 90 On ramp is designed to improve safety and improve operations in the southbound direction in this area.

It is proposed to construct a third northbound travel lane immediately after the Exit 90 northbound Off ramp. This third travel lane will be considered the truck climbing lane, as it is proposed to separate the existing truck climbing lane from the Exit 90 northbound On ramp. Additionally, the existing Exit 90 northbound On ramp will be widened to separate the truck climbing lane from the On ramp acceleration lane. This will prevent vehicles entering northbound I-95 from weaving with tractor trailers entering the truck climbing lane. The Exit 90 northbound On ramp acceleration lane will also be extended to 2,225 ft. to account for the steep grade of I-95 in this area. As part of this concept, the bridges over Route 27 and Jerry Browne Road will need to be either replaced or widened to accommodate the third travel lane.

Refer to Appendix E for the I-95 southbound Exit 90 interchange improvements.

8.5.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with widening approximately 1 mile of I-95, and construct Exit 90 northbound On ramp improvements is **$40 million*.**

The cost to completely replace structures 01791 (Route 27), 01794 (Jerry Browne Road), is included in the cost for the improvements associated with Exit 90 northbound On ramp improvements.

8.6 I-95 / I-395 Interchange Reconstruction & Widening

8.6.1 Conceptual Interchange Design

A conceptual design for the I-95/I-395 interchange was developed to improve interchange geometry and traffic operations on the mainlines, ramps and adjacent intersections.

The following are the highlights of the proposed design:

- I-95 is proposed to be widened in both directions from two lanes to three within the project limits, which are approximately from Interchange 74 northerly to the I-95 northbound On-Ramp from Waterford Parkway South.
- I-95 northbound to I-395 northbound exit ramp is proposed to be relocated from the left-side of the highway to the right side.
- New ramp connections from I-395 southbound to I-95 northbound and from I-95 southbound to I-395 northbound are proposed.
- Interchange 75 is reconfigured to eliminate geometric deficiencies such as the Route 1 southbound U-Turn to Route 1 northbound and the I-95 northbound Off-Ramp to Route 1 southbound.

The Conceptual design of Interchange 75 features a “teardrop” roundabout at the ramp termini, see Appendix A. The proposed teardrop roundabout consists of two multilane modern roundabouts and has the same maneuvers and operation of a single roundabout except for U-turns at the truncated end. This is considered to be the optimal design for the interchange since it substantially addresses prevailing capacity and safety issues by eliminating the stop condition at all approaches.

At the west end of the interchange, the proposed I-95/I-395southbound Off ramp will provide a left-turn lane for motorists to maneuver through the roundabout and proceed northbound on U.S. Route 1. A bypass right-turn lane is proposed at the roundabout west of the interchange. This avoids the anticipated high volume of vehicles, particularly from southbound I-95 connecting to Route 161, from entering the roundabout and creating unnecessary delays. At the east end of the interchange, the design features an exclusive left-turn lane from U.S. Route 1 to I-95 northbound. This allows motorists to maneuver through the roundabout without yielding to traffic. The proposed design maintains and enhances the existing connections to I-95 southbound and from I-95 northbound. Due to anticipated future volumes, it is recommended that two lanes in each direction be provided on U.S. Route 1. See Appendix E for the conceptual design.

Compared to traditional design of stop-controlled or signalized on/Off ramps, the proposed design provides greater efficiency and safer operation. Specifically, there is concern that the U.S. Route 1 left-turn approach to I-95 northbound may back-up to the I-95 southbound intersection. The proposed design allows this movement to proceed through the roundabout, uninterrupted. The proposed design is also a safer option compared to a traffic signal due to the general traffic calming effect of the roundabouts, leading to reduced operating speeds. The teardrop roundabout concept is not expected to add to the overall Right-of-Way, Environmental, or Historical impacts of the entire I-95/I-395/Route 1 Interchange project.

8.6.2 Environmental

This narrative incorporates a conglomeration of information based on desktop studies and is also augmented with field information gathered associated with the various Route 11 corridor environmental studies which were previously completed in an effort to evaluate various aspects of potential impact within the corridor to fulfill NEPA and CEPA.

8.6.2.a Wetlands

Wetlands were field delineated in 2002 in the area of the interchange in association with the planned completion of Route 11. Wetland soils mapping from the Natural Resources Conservation Service (NRCS) was utilized to fill in data gaps for properties where access was not granted by property owners. Wetland boundaries were extended, and some additional wetlands were delineated in 2012 in areas where property access was previously denied.

It is important to note that additional wetlands are known to exist, which could not be surveyed due to denied property access. For the purposes of this report, eight (8) wetlands associated with five (5) different wetland systems are considered to be within the interchange. These wetlands are associated with the Niantic River Brook sub-regional and Oil Mill Brook watersheds. Within various reports, these wetlands are known as wetlands PD-15, 16A, 16B, 17A, 17B, and 18A and B. The descriptions of these wetland areas are a collection of field investigations associated with the Route 11 studies over the years, by various entities.

Wetland PD-15 is described as relatively flat with a small intermittent stream flowing south towards I-395. The hydrology of this wetland is supported by precipitation and groundwater seeping from surrounding upland areas. Vernal Pool SP-24 is encompassed within Wetland PD-15. Vegetation is dominated by saw-timber sized Red Maple and Black Tupelo in the tree layer, Coastal Sweet Pepperbush, Highbush Blueberry and Common Winterberry in the shrub layer. Skunk cabbage forms a diffuse herbaceous layer. A liana layer composed of Horsebrier is present in some areas.

Functions and values identified for Wetland PD-15 are groundwater discharge, production export, and wildlife habitat. Wetland PD-15 is habitat for vernal pool organisms including herpetofauna.

Wetland PD-16A is a palustrine forested and emergent broad leaved deciduous seasonally flooded/saturated wetland (PFO/EM1E) with open water from spring to mid-summer. The wetland receives flow from an intermittent stream to the north, from groundwater, and runoff from steep slopes to the east. Most the wetland exists as open water early in its hydroperiod. By later summer, much of the open water area had receded and the emergent non-persistent wetland cover type predominates. A well-developed scrub-shrub fringe encircles the wetland, and a small-forested area is near the outlet stream. The diverse vegetative structure of the wetland includes Red Maple in forested areas, Buttonbush and Common Winterberry in the scrub-shrub zones. The herbaceous layer is diffuse and varies among the cover types. Wool Grass dominates in the emergent zone. A distinct liana layer composed of Grape and Horsebrier is also present around the wetland perimeter. Areas of sphagnum moss coverage are also present. Wetland PD-16A has been described to function as a seasonal breeding pool for herpetofauna. Principal functions of the wetland are wildlife habitat and sediment/toxicant retention. This wetland has a limited flood flow alteration function as a result of its wide, flat character and presence of a small steam in its western end.

Wetland PD-16B is a palustrine forested broad-leaved wetland associated with a perennial riverine watercourse (Niantic River) (USFWS classification: PFO1E and R2UB). The wetland receives water from an extensive watershed, which includes much of the area within the forested upland located north of the wetland. In the vicinity where the stream crosses the overhead power lines, the stream has relatively steep banks. However, north of the overhead lines, the banks flatten out to form small floodplain area. A tree layer within the adjacent upland, dominated by Red Maple, has coverage over the watercourse. Coastal Sweet Pepperbush and Northern Spicebush dominate a shrub layer. An herbaceous layer is also present dominated by Skunk Cabbage. Principal functions of the wetland are shoreline stabilization and wildlife habitat. The ground water discharge function is evident by seeps along the banks of the stream, emanating from upland areas. This lower perennial stream exhibits fish habitat, with overhanging bank vegetation, pool and riffle areas, and various instream cover. Although no fish were observed during the field investigation and the existing culverts under the overhead power line road crossing may inhibit fish movement during some parts of the year, this stream likely serves a fish habitat function. This wetland area is crossed by an overhead power line easement; and associated gravel access road.

The northern portion of **Wetland PD-17** was investigated and described as a perennial riverine watercourse (USFWS classification: R2UB) (i.e., Oil Mill Brook), the wetland receives water from an extensive watershed, which includes Lake Konomoc located upstream and to the north. The stream banks are relatively steep in this area, exhibiting little to no evidence of floodplain. A tree layer is present dominated by Black Birch and Yellow Birch. Multiflora rose, and Northern Spicebush dominate a shrub layer. An herbaceous layer is also present dominated by Skunk Cabbage.

The area located south of Route I-95, north of Gurley Road and west of Oil Mil Road consists of a floodplain system that is comprised of palustrine emergent and forested broad-leaved deciduous seasonally flooded/saturated system (USFWS Classification: PFO1 and PSS1E). It is located along both sides of Oil Mill Brook, extending from the toe of slope of Interstate 95 south towards Gurley Road, ending just upstream from where Gurley Road crosses Oil Mill Brook. Forested habitats are found within the northwest portion of this wetland and are comprised of large Red and Silver Maple. The remaining habitat is comprised mostly of emergent habitat with a few pockets of scrub shrub which border the eastern side of the stream. The brook is meandering in nature. The perennial watercourse has a defined bed and bank. At the time of the field visit, the watercourse was bankfull. The functions and values of Wetland PD-17 include ground water recharge/discharge, flood flow alteration, fish habitat, sediment/toxicant retention, nutrient removal, product export, wildlife habitat and visual quality/aesthetics. The principal functions of the wetland are fish habitat and shoreline stabilization.

Wetland PD-18A consists of floodplain system that is comprised of palustrine emergent and scrub shrub habitats (USFWS Classification: PFO/SS1E). The wetland is found bordering both sides of an intermittent stream running from drainage culvert and extended south of the investigative area and flows through a residential neighborhood. No flow was noted in the stream at the time of the investigation, however, the channel was saturated. Defined bed and bank with scour and detritus were present. Dominant vegetation boarding the watercourse incudes Green Ash for tree cover, Coastal Sweet Pepperbush, Silky Dogwood and Multiflora Rose for Shrub cover. The canopy opens over the watercourse where the herbaceous cover was dominant within the watercourse channel by Fowl Manna Grass, Rice Cut Grass, Japanese Stilt Grass, Sensitive Fern and Skunk Cabbage. The functions and values of Wetland PD-18A include ground water recharge/discharge, flood flow alteration, and sediment/toxicant retention. The principal function of this wetland is sediment/toxicant retention.

Wetland PD-18B is a riverine perennial watercourse with a palustrine forested broad-leaved deciduous fringe (USFWS Classification PFO4E and R2UB1) It lies approximately 10 feet to the nearest roadway and has no contiguous undeveloped buffer zone present. Red Maple and White Ash are dominant in the tree layer of this wetland. White Walnut, Eastern Red Cedar, and Black Cherry are present in the adjacent upland. A dense shrub layer has formed composed of Speckled Alder, Japanese Barberry, Silky Dogwood, Northern Spicebush, Multiflora Rose, and Highbush Blueberry. Marsh Fern, Spotted Touch-Me-Not, Sensitive Fern, Skunk Cabbage, King-of-the-Meadow, and American False Hellebore are abundant in the herbaceous layer. A liana layer is also present in the wetland, composed of Oriental Bittersweet and Grape. The functions and values have been identified as groundwater discharge, flood flow alteration, fish and shellfish habitat, sediment and toxicant retention, production export, and wildlife habitat. Its principal function is sediment and shoreline stabilization. Sediment accumulation from the adjacent roadway was noted.

Several wetlands located near the interchange fall within or adjacent to the Coastal Area Management (CAM) boundary. The CAM boundary encompasses the southern and western portions of the existing interchange. Tidal boundaries have yet to be confirmed by Coastal Jurisdiction Lines (CJL) elevations in the field, however limited desktop study has been performed based on the presence of culverts, dams, and riffles and pooling. Some areas of the interchange may fall within the jurisdiction of the Connecticut Department of Energy and Environmental Protection's Office of Long Island Sound Programs (CTDEEP-OLISP). Latimer Brook, The Niantic River, and Oil Mill Brook empty into Niantic Bay, and all of which appear tidally influenced for a portion of their length.

8.6.2.b Vernal Pools

Although a study was conducted regarding seasonal pools in 2002, another comprehensive study was conducted throughout the 2014 season. Within the area of the existing interchange, two vernal pools, identified as SP (Seasonal pool) 24 and 25 exist. They were originally identified in the 2002 study and trapping effort to verify species usage was conducted in 2014.

Seasonal Pool 24 is a 0.27-acre (11,916 ft2) pool located approximately 650 feet (200 m) east of SP-25. The closed canopy is dominated by red maples (Acer rubrum), and a shrub layer of sweet pepperbush (Clethra alnifolia), high bush blueberry (Vaccinium corymbosum), and some mountain laurel (Kalmia latifolia) can be found mixed in on the hummocks and surrounding the pool. When the pool dried, Sphagnum mosses colonized the basin and hummocks. Downed tree branches and other woody debris are also prevalent throughout the pool. Hydrology is largely dependent on precipitation and overland flow from a nearby wetland. An outlet to a nearby stream exists along the east side of the pool; there is no apparent inlet. Water quality remained tannic throughout trapping. Pool depth during trapping remained approximately 10 inches (25 cm) and by June the pool had almost completely dried up with the exception of a small area of pooled water less than 4 inches (10 cm) deep. The pool was noted to be dry during the field investigations in October of the 2014 study year.

This pool was productive for amphibians, specifically wood frogs (R. sylvatica) which appeared to dominate the pool. Over 500 wood frog egg masses were observed. The pool also provides breeding habitat for spotted salamanders (A. maculatum), with over 270 egg masses observed. Additionally, the pool hosts marbled salamanders (A. opacum) which were observed in March of 2014. Bullfrogs (R. catesbeiana), green frogs (R. clamitans), and red spotted newts (N. viridescens) were also observed in the pool. This pool is situated less than 100 feet (30 m) north of I-95. Low stone walls surround and intersect sections of the pool the northeast, east and south edges, which may affect amphibian movements.

Seasonal Pool 25 is a 0.50 acre (21,964 ft2) circular pool is located adjacent to the I-95 On ramp from I-395. It is situated at the bottom of a graded slope for the roadway. It lies approximately 650 feet (200 m) west of SP-24. The pool is vegetated predominantly by tussocks of wool grass (Scirpus cyperinus). The perimeter of the pool is forested by red maples (Acer rubrum) with a thick shrubby understory of high bush blueberry (Vaccinium corymbosum) and multiflora rose (Rosa multiflora) with grape vines (Vitis sp.) present into the canopy. The pool itself lacks a canopy and is exposed to direct sunlight year-round. Pool depth varied throughout the pool and ranged from 30 inches (76 cm) during trapping to over 36 inches (91 cm) during the June 2014 investigation. The pool lies at the bottom of a steep slope65 south of the highway and appears to act as a seep, receiving surface runoff from the highway in addition to precipitation. A temporary outlet exists along the western edge of the pool. Water in the pool appeared tannic with high algae content. The pool bottom is mucky and covered in leaf litter with very little woody debris present. It was believed based on previous studies that the pool does not dry out during the summer but merely drops to a lower water level. However, during the July 16, 2014 visit the pool appeared almost completely dry with the exception of a 100 ft2 area of pooled water, approximately 6 inches (15 cm) deep, present at the southern tip of the pool. In October of 2014, it was noted that the pool remained dry with the exception of the small area of pooling to the south.

Both spotted salamanders (A. maculatum) and wood frogs (R. sylvatica) were present in the pool and showed signs of breeding. Despite the copious attachment sites, productivity for both species was not noteably high; this may be due to the presence of predatory species such as bullfrogs (R. catesbeiana), green frogs (R. clamitans), painted turtles (Chrysemys picta), and spotted turtles (C. guttata). Additionally, fairy shrimp (Anostraca), another obligate vernal pool breeding species, were observed during the first round of trapping in April of 2014. It should also be noted that this appears to be prime foraging habitat for dragonflies and damselflies as many were observed in the area. I-95 is located immediately east of the pool; a stone wall running east to west creates a northern boundary, and a second stonewall running approximately north to south forms the western boundary of the pool. The existing roadway and manmade stone walls may influence amphibian movement.

8.6.2.c Floodplain

According to the latest 2011 available FEMA mapping, regulated floodplain in the area of the interchange consists of mapped floodplain and floodways associated with Latimer Brook and Oil Mill Brook. Latimer Brook is located west of the interchange and flows southerly, and then turns to the east where it parallels the southern side of I-95 before discharging to Banning Cove. Oil Mill Brook which is designated as Zone A, flows southwesterly into the interchange area, just east of the Waterford and East Lyme Town boundaries. Latimer Brook in the vicinity of the interchange has associated 100-year (Zone AE) and floodway designations. Both of these watercourses join into the Niantic Bay, and eventually the Niantic River, which is mapped as 100 year regulated floodplain (Zone AE). Some areas of 500-year floodplain exist particularly along the edges of Niantic Bay.

8.6.2.d Farmland

The Natural Resources Conservation Service (NRCS) (formerly the U.S. Soil Conservation Service) developed criteria for important farmlands; these include soils designated as Prime, Unique or Additional Farmlands of Statewide Importance. Farmlands may also be classified as locally important. The agricultural soils are categorized according to their relative ability to support farming. There are no unique farmland soils in Connecticut, however, there are many areas of prime farmland soils. Soils are mapped by the NRCS, and prime soils are classified based on soils characteristics, are high quality lands best suited to producing food, feed, fibers, forage and oilseed crops. Prime farmland soil designations are based on current land use and are only given to land that is currently being cultivated or undeveloped land that has the potential to be farmed. Additional Farmlands of Statewide Importance include areas that exhibit prime farmland soil qualities but may be wetter or present along steeper slopes. A desktop study utilizing information available on CTECO (Connecticut Environmental Conditions Online) reveals areas of Farmland of Statewide Importance in and around portions of the existing interchange, particularly to the south, and to the east. Farther east, areas of Prime Farmland also exist.

The 2014 Farm Bill consolidated the Federal Farm and Ranch Lands Protection Program, the Grassland Reserve Program, and the Wetlands Reserve Program into a new Agricultural Conservation Easement Program (ACEP), administered by the NRCS. Under the Agricultural Land Easement (ALE) component of ACEP, NRCS works with state and local governments, non-governmental organizations, and Indian tribes to protect working agricultural lands.

In an effort to curtail the irretrievable loss of farmland, legislation was enacted on a state and federal level to restrict development within areas of prime farmlands. Under the Farmland

Protection Policy Act, overall impacts of federally-funded projects to agricultural lands must be assessed using the USDA's Farmland Conversion Impact Rating Form.

Additionally, the Connecticut Department of Agriculture (CTDOA) must review any proposed capital project that would convert 10.1 ha. (25 ac.) or more of prime farmland to non-agricultural use. The State Farmlands Preservation Program provides help to farm owners wishing to retain their farmlands. This voluntary program was created in 1978 to allow the state to purchase agricultural easements on privately held farmland, permanently protecting the land from development and ensuring its use for agriculture in perpetuity. The properties remain in private ownership and on the local tax rolls, with a permanent conservation restriction placed on the property. An inquiry with CTDEEP's Program representative indicated no lands within the area of the interchange are protected under the State Farmlands Preservation Program.

8.6.2.e Listed Species and Habitat Blocks

According to CTDEEP Natural Diversity Database (NDDB) Mapping dated December 2016, there are no known populations of listed species or critical habitats within the immediate vicinity of the interchange. Various biological surveys were carried out in the overall Route 11 corridor in 1998, 2002, and during the 2004 and 2005. These earlier surveys included desktop and field assessments regarding vegetation, avian species, aquatic invertebrates, seasonal pools, specific studies regarding New England Cottontail, and overall wildlife movements. Additional field studies were initiated in 2012, largely at the request of the regulatory agencies and included further studies regarding possible listed vegetation, mussels and crayfish, terrestrial invertebrates, and bat acoustic monitoring. Each study was designed for target species that were thought to be present in the Route 11 corridor based on previous or historic sightings or appropriate habitat presence.

In the area of the interchange, five species of listed birds and one reptile, are either present, were noted in past records, or in the cases of some of the avian species, noted as a "fly-over". Avian species noted in the area include Cerulean Warbler, Northern Parula, Whip-poor-will, Snowy Egret, and Great Egret. Northern Parula, a species of special concern, have been observed northeast of proposed interchange, and Snowy Egrets and Great Egrets, both CT Threatened species have been sighted south of the interchange within Niantic Bay. Additionally, while no Peregrine Falcons (Falco peregrinus) were observed during the 2004/2005 avian studies, CT DEEP Wildlife Division conveyed their belief that the falcons are present in the Niantic Bay area and may utilize tall structures in the area for nesting. Spotted turtles, which are now listed as a species of special concern are present within the interchange area.

As of April 2, 2015, the Northern Long-Eared Bat (Myotis septentrionalis) has been federally listed as threatened. This species was detected at three different locations along the Route 11 corridor during acoustic bat monitoring in summer 2012, and it is possible that populations may be present in the area. The final 4(d) ruling for the Northern Long-Eared Bat was published on January 14, 2016 in the Federal Register. According to this ruling, the species is protected from "purposeful take" and specific habitats are protected with time-of-year restrictions. Known hibernacula for this species are protected as well as a quarter mile buffer area around each hibernaculum at any time of year. The removal/cutting/destruction of trees with known maternity roosts or any trees within a 150-foot radius of known roost trees is prohibited between June 1st and July 31st.

During development of the Draft EIS for the Route 11 corridor, unfragmented forested habitat blocks were identified and delineated based primarily upon aerial photography and field investigations. Forested blocks were categorized by forest cover type and size. Throughout the corridor, six (6) habitat blocks were identified, however, only 2 met the criteria set for "Unfragmented Forested Wildlife Habitat Block", which consisted of tracts of forested land over 200 hectares (500 acres) in size. Habitat Block 2, which was estimated to be 835 hectares (2,065 acres) in size is located north and northeast of the interchange. Of note, forest clearing by an unknown entity has been actively occurring within this area in 2015 and 2016.

8.6.2.f Cultural Resources

Cultural resources include tribal, sacred, architectural, and archaeologically significant sites (historic and prehistoric). A series of studies were conducted in conjunction with the Route 11 corridor evaluations. Property access issues prevented walk-over assessment and testing of some areas, however these previous studies represent important information regarding cultural resources within the vicinity of the interchange and also aid in identifying additional studies which remain to be completed to fully evaluate these resources.

Wolf Pit Village is roughly known as the area between Butlertown Road and Route 161 south toward the interchange. Many foundations, animal pens, charcoal mounds, and remnants of tanning and bark mills, and one historic cemetery were identified in a 1996 town wide archaeological survey. The historical background and archaeological research substantiated the conclusion that, collectively, the sites and landscape features in the undeveloped portions of this area constitute a National Register-eligible archaeological district. Designated the potential Wolf Pit Hills Archaeological District (WPHAD), this entity contains at least 31 individually significant archaeological sites and was determined to be a collectively eligible resource for the National Register of Historic Places (NRHP). The boundary of the potential district was initially determined as part of the Final Environmental Impact Statement (FEIS) for the Route 11 corridor and has also been recently revisited via additional documentary and deed research completed in 2017. Extensive undocumented cultural landscape features such as stone walls are also part of the district.

The Connecticut State Historic Preservation Office (SHPO) has been in the process of evaluating the Wolf Pit Hills Archaeological District (WPHAD) regarding its significance, and boundary. All or a portion (core area) of the WPHAD may be reconsidered as a 4(f) resource. Another issue of concern relative to the WPHAD are its actual boundary delineation. As a result of recent documentary and deed research, it is believed the WPHAD boundaries may warrant being expanded to the west and south and would include the Riverhead (newly identified) and currently proposed Oil Mill Districts. The "core" would also likely expand south along Pember Road, past (south of) the I-95 / I-395 Interchange.

Two cemeteries, The River Head Cemetery on Boston Post Road in East Lyme, and the Taber Cemetery, on Route 1 in East Lyme, are within the general vicinity of the interchange. Each of these 18th- and early 19th-century cemeteries is considered a contributing resource to the Wolf Pit Hills Archaeological District (WPHAD).

The c. 1770 Daniel Crocker House at 25 Gurley Road in East Lyme, and the c. 1840 Greek Revival Allen Manwaring House at 24 Gurley Road in East Lyme are individually eligible for the National

Register of Historic Places; they may also be considered affiliates of the WPHAD because of familial and contemporaneous connections with the WPHAD residents. Four houses, while not individually National Register-eligible, would contribute to a potential National Register District along Gurley Road and Oil Mill Road in Waterford:

- 44 Gurley Road, 19th century
- 46 Gurley Road, 18th or early 19th century
- 51 Gurley Road, 19th century
- 54 Gurley Road, 18th or early 19th century

This district would also logically include the 1844 D.W. Stanton House at 31 Oil Mill Road. The 17th-century Waller-Moore House, at 21 Gurley Road, would have been included had it not been razed (now National Register-eligible as an archaeological site) and is a contributing resource to the WPHAD. It should be noted that the Town of Waterford has recently prepared a National Register nomination of a district in the Oil Mill Road/Gurley Road vicinity, to include standing structures and archaeological sites.

One NRHP-eligible resource, 21 Gurley Road, is located immediately adjacent to the previously proposed Route 11/I-95 interchange in East Lyme. A commitment was made that the interchange ramps would be designed to avoid any encroachment on this property. The Taber Cemetery, which was identified within the area of the I-395/I-95 interchange improvements, does not fulfill criteria for NRHP eligibility, however, it was also considered in the overall planning effort so that the Route 11 project could avoid disturbance. It is anticipated that similar efforts for avoidance and minimization would need to be applied to alternatives moving forward associated with the interchange.

In summary; within the immediate interchange area, seven known archaeological sites are currently known to be present, however lack of property access and limitations of past studies exist in this area. The seven known archaeological sites consist of:

- Site 45-25 – Pre-Colonial Late Archaic, Early/Middle Woodland period site, currently considered NRHP-eligible
- Site 45-39 – Historic: 18th/19th Century domestic site, currently considered NRHP-eligible and a contributing resource in WPHAD.
- Site 45-40 – Pre-colonial: Late Archaic period.
- Site 45-42 – Historic: 18th/19th Century domestic site, currently considered NRHP-eligible and a contributing resource in WPHAD.
- Site 45-48 – Historic: 18th/19th Century domestic site, currently considered NRHP-eligible and a contributing resource in WPHAD.
- Site 152-108 – Pre-colonial: probably Late Archaic site, currently considered NRHP-eligible

- Site 152-129 – Precolonial: Late Archaic, Middle Woodland and Late Woodland site with features, currently considered NRHP-eligible

Concerns have been expressed by Native American groups regarding stone features which have been informally identified within the previously proposed Route 11 corridor and within the vicinity of the interchange. These features, if deemed to be of cultural significance, could represent additional 4(f) resources.

8.6.2.g Potential Impacts

Wetland impacts within the currently proposed interchange layout are estimated at 4 acres. Impact would also occur to the two vernal pools in the interchange and is estimated at approximately 0.77 acre of direct impact, with additional impacts to the pool 100 foot and 750-foot recognized buffers. Impacts to mapped FEMA floodplain would be required as well, however the reconfiguration of the interchange may allow for opportunities to daylight some watercourse sections which have been previously culverted. The southern and western portions of the interchange lie within the Coastal Management Zone, and the entire interchange lies within the Wolf Pit Hills Historic Archaeological District (WPHAD). Historic and archaeological, as well as potential tribal sites lie within and around the interchange. State and federally listed species have been noted in and around the interchange area as well.

8.6.2.h Recommendations

Due to the fact that the Northern Long Eared Bat was recorded within the nearby corridor, additional acoustic studies may be required / warranted within the interchange. The level of study and coordination with U.S Fish and Wildlife Service and the CTDEEP Wildlife Division will need to be determined. Additional archaeological studies are warranted as below-ground investigations were limited, particularly in the area of the interchange during previous studies. A determination as to the status of WPHAD under the auspices of 4(f) will be key to coordinate with the State Historic Preservation Office early on in project development. The recently nominated Oil Mill Historic District would likely be impacted by any changes within the corridor as well. Coordination with the tribes to determine the possible presence of Native American sites will also be paramount.

8.6.3 Construction Cost

Preliminary estimated construction cost of the entire interchange is approximately $900 million*, which includes Preliminary Engineering, Construction Engineering & Inspection, Right-of-Way, and NEPA Documentation costs. Construction item costs were estimated at $700 million* for this interchange.

8.7 I-95 Northbound & Southbound Widening Between Exit 70 and Exit 74

8.7.1 Conceptual Interchange Design

The widening to the ultimate planned typical section for northbound and southbound I-95 between the Baldwin Bridge in Old Lyme and Exit 74 in Niantic was analyzed, and an estimate of construction costs completed.

Tables 8-7A and 8-7B summarize the 2045 AM and PM peak hour LOS analysis results of the widening between Exits 70 and 74 in the northbound and southbound directions.

Table 8-7A Freeway Section Analysis – Summary of 2045 AM Peak hour No-Build and Build Conditions

Section		Terrain	Number of Lanes	Peak hour	2045 No-Build Volumes (vph) [1]	Level of Service [2]	Number of Lanes	2045 Volumes (vph) [1]	Level of Service [2]
From	To								
northbound									
Exit 70	Exit 71	Rolling	2	AM	2950	D (26.6)	3	3010	B (17.1)
Exit 71	Exit 72	Rolling	2	AM	3110	D (28.6)	3	3170	C (18.0)
Exit 72	Exit 73	Rolling	2	AM	3160	D (29.2)	3	3220	C (18.3)
Exit 73	Exit 74	Rolling	2	AM	3220	D (30.1)	3	3290	C (18.8)
southbound									
Exit 71	Exit 70	Rolling	2	AM	3400	**E (36.8)**	3	3510	C (21.7)
Exit 72	Exit 71	Rolling	2	AM	3480	**E (37.5)**	3	3590	C (21.9)
Exit 73	Exit 72	Rolling	2	AM	3240	D (33.1)	3	3340	C (20.2)
Exit 74	Exit 73	Rolling	2	AM	3170	D (31.3)	3	3270	C (19.4)

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

Table 8-7B Freeway Section Analysis – Summary of 2045 PM Peak hour No-Build and Build Conditions

Section		Terrain	Number of Lanes	Peak hour	2045 No-Build Volumes (vph) [1]	Level of Service [2]	Number of Lanes	2045 Volumes (vph) [1]	Level of Service [2]
From	To								
northbound									
Exit 70	Exit 71	Rolling	2	PM	3930	**E (42.9)**	3	4010	C (23.4)
Exit 71	Exit 72	Rolling	2	PM	4060	**F (46.1)**	3	4140	C (24.4)
Exit 72	Exit 73	Rolling	2	PM	3960	**E (43.6)**	3	4040	C (23.6)
Exit 73	Exit 74	Rolling	2	PM	3950	**E (43.3)**	3	4030	C (23.6)
southbound									
Exit 71	Exit 70	Rolling	2	PM	4220	**F (61.2)**	3	4350	D (28.5)
Exit 72	Exit 71	Rolling	2	PM	4430	**F (68.9)**	3	4570	D (30.0)
Exit 73	Exit 72	Rolling	2	PM	4170	**F (56.8)**	3	4310	D (27.6)
Exit 74	Exit 73	Rolling	2	PM	4180	**F (55.1)**	3	4310	D (27.1)

Notes:
[1] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[2] Boldface entries denote capacity deficiencies during the peak period

As shown in Tables 8-7A and 8-7B, in the northbound direction, during the AM and PM Peak hour No-Build conditions (2045), the mainline segments between Exit 70 and Exit 74 is anticipated to operate at a LOS D and E/F, respectively. In the southbound direction, the segments are anticipated to operate at LOS D/E and F, in the AM and PM peak hour No-Build scenario. With the planned widening of a third lane, all segments in both directions are anticipated to operate acceptable LOS (LOS D or better), during the AM and PM peak hours.

There were a total of 354 northbound and 276 southbound crashes between Exit 70 and Exit 74. Majority of these crashes were rear end or sideswipe collisions (248 out of 354 in the northbound direction and 191 out of 276 in the southbound direction). The proposed improvement of adding a mainline operational lane is designed to improve safety and improve operations in this area.

Several projects have been completed within the last 10 years along this section of I-95, aimed at improving vehicular safety. Project 104-164, completed in 2017, provided safety improvements to the corridor, which consisted of removal of the existing metal beam rail median barrier, and replacement with precast concrete barrier curb. The concrete median barrier shifts about the centerline of the median, shifting towards either the northbound or southbound travel lanes around horizontal curves, providing maximum sight distance around curves. However, as the barrier shifts, left shoulder widths decrease to 4 ft. in width on the outside of curves, which is below standard for this classification of roadway. Additionally, the right shoulder widths vary from 8 ft. to 12 ft. along this section of I-95 along with roadway grades varying from 4.4% to 5%. Project 44-151 and 172-442 provided pavement and safety improvements between Exit 73 and the Gold Star Memorial Bridge and were completed in 2014 and 2016 respectively. These improvements included metal beam rail and concrete median barrier installation, along with pavement improvements.

The existing geometric deficiencies along this section of I-95 play a significant role in the safety of this corridor. It is recommended that this section be reconstructed to widen the inside and outside shoulders to current design standards, while widening the roadway to add an additional operational lane in each direction. These roadway improvements will increase the safety and improve traffic operations within this section of I-95.

8.7.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with roadway reconstruction of approximately 16.8 miles between Exit 70 and Exit 74 is approximately **$540 million*.**

Within the cost to construct this section of I-95, it is assumed that the following eight (8) structures will need to be completely replaced to accommodate the widening and the third operational lane in the northbound and southbound direction:

- 06173 – Route 156
- 06032 – Lieutenant River
- 00243 – Lyme Street
- 00244 – Whippoorwill Road
- 00246 – Four Mile River Road
- 00247 – SR 449

- 00248 – North Bride Brook Road
- 00250 – Route 161

Structures 00245 (Flat Rock Hill Road) and 00249 (Society Road) were not included in the cost for replacement as these structures have been replaced in 2017 and 2014 respectively and can accommodate the ultimate I-95 typical section.

Additionally, due to the extensive widening required to construct the left and right shoulder widths, as well as widen for the additional northbound and southbound operational lane, it was assumed that the existing concrete base course not be repaired in this section but removed completely and replaced with full depth bituminous pavement. The cost estimate for this section accounts for this assumption.

8.8 I-95 Northbound & Southbound Widening Between Exit 80 and Exit 82A

The widening to the ultimate planned typical section for northbound and southbound I-95 between Exit 82 and Exit 82A in Waterford and was analyzed, and an estimate of construction costs completed.

8.8.1 Conceptual Interchange Design

Table 8-8A Freeway Section Analysis – Summary of 2045 AM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volumes (vph) [3]	Level of Service [4]	Number of Lanes[1,2]	2045 Volumes (vph) [3]	Level of Service [4]
From	To								
northbound									
Exit 80	Exit 81	Rolling	AM	2	2690	C (23.2)	3	2730	B (15.3)
Exit 81	Exit 82	Rolling	AM	2	2780	C (24.1)	3	2830	B (15.9)
Exit 82	Exit 82A	Rolling	AM	2	3180	D (28.9)	3	3260	C (18.3)
southbound									
Exit 81	Exit 80	Rolling	AM	2	2420	C (21.5)	3	2490	B (14.6)
Exit 82	Exit 81	Rolling	AM	2	2670	C (23.8)	3	2750	B (15.9)
Exit 82A	Exit 82	Rolling	AM	2	3060	D (28.5)	3	3170	C (18.3)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

Table 8-8B Freeway Section Analysis – Summary of 2045 PM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volumes (vph)[3]	Level of Service[4]	Number of Lanes[1,2]	2045 Volumes (vph)[3]	Level of Service[4]
From	To								
northbound									
Exit 80	Exit 81	Rolling	PM	2	2840	C (24.8)	3	2880	B (16.2)
Exit 81	Exit 82	Rolling	PM	2	3230	D (29.6)	3	3280	C (18.4)
Exit 82	Exit 82A	Rolling	PM	2	3680	**E (36.6)**	3	3770	C (21.4)
southbound									
Exit 81	Exit 80	Rolling	PM	2	3780	**E (41.9)**	3	3900	C (23.4)
Exit 82	Exit 81	Rolling	PM	2	4130	**F (49.7)**	3	4260	C (25.7)
Exit 82A	Exit 82	Rolling	PM	2	5060	**F (103.2)**	3	5260	**E (35.3)**

Notes:

[1] Number of travel lanes differ from 2004 Feasibility Study Report.

[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.

[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

[4] Boldface entries denote capacity deficiencies during the peak period

As shown in Tables 8-8A and 8-8B, in the northbound direction, during the AM and PM Peak hour No-Build conditions (2045), the mainline segments between Exit 80 and Exit 82A is anticipated to operate at a LOS C/E and C/E, respectively. In the southbound direction, the segments are anticipated to operate at LOS C/D and E/F, in the AM and PM peak hour No-Build scenarios, respectively. With the planned widening of a third lane, all segments in both directions are anticipated to operate acceptable LOS (LOS D or better), during the AM and PM peak hours, except the PM peak hour southbound segment between Exits 82A and 82. Improvements to this and other areas will be addressed in detail in the next phase of the study based i.e. I-95 East Traffic Operations Study using Average Summer Friday and Weekday Traffic Volumes.

There were a total of 93 northbound and 135 southbound crashes between Exit 80 and Exit 82A. Majority of these crashes were rear end or sideswipe collisions (50 out of 93 in the northbound direction and 86 out of 135 in the southbound direction). The proposed improvement of adding a mainline operational lane is designed to improve safety and improve operations in this area.

It is recommended that this section be reconstructed to widen the inside and outside shoulders to current design standards, while widening the roadway to add an additional operational lane in each direction. These roadway improvements will increase the safety and improve traffic operations within this section of I-95. The cost estimate for this section of I-95 is based off the Preliminary Engineering plans presented in the 2004 Feasibility Study. Since additional commercial and retail development has taken place along this segment of the corridor it is recommended that an additional interchange study be performed for this area to ensure the improvements recommended in the 2004 study, which recommended the construction of a collector-distributer road in both the northbound and southbound direction between Exit 81 and Exit 82A, are still applicable.

8.8.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with roadway reconstruction of approximately 7.2 miles between Exit 80 and Exit 82A is approximately **$275 million*.**

Within the cost to construct this section of I-95, it is assumed that the following three (3) structures will need to be completely replaced to accommodate the widening and the third operational lane in the northbound and southbound direction:

- 01767 – Cross Road
- 06130– Route 85
- 00354 – Vauxhall Street Ext.

Additionally, due to the extensive widening required to construct the left and right shoulder widths, as well as widen for the additional northbound and southbound operational lane, it was assumed that the existing concrete base course not be repaired in this section but removed completely and replaced with full depth bituminous pavement. The cost estimate for this section accounts for this assumption.

8.9 I-95 Northbound & Southbound Widening Between Exit 54 and Exit 69

The widening to the ultimate planned typical section for northbound and southbound I-95 between Exit 54 in Branford and Exit 69 in Old Saybrook and was analyzed, and an estimate of construction costs completed.

8.9.1 Conceptual Interchange Design

Table 8-9A Freeway Section Analysis – Summary of 2045 AM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volume	Level of Service [4]	Number of Lanes[1,2]	2045 Volumes (vph) [3]	Level of Service [4]
From	To								
northbound									
Exit 54	Exit 55	Level	AM	2	3690	D (34.7)	3	3840	C (21.1)
Exit 55	Exit 56	Level	AM	2	3520	D (32.1)	3	3630	C (19.8)
Exit 56	Exit 57	Level	AM	2	3240	D (28.5)	3	3330	C (18.2)
Exit 57	Exit 58	Level	AM	2	3190	D (27.9)	3	3280	B (17.9)
Exit 58	Exit 59	Level	AM	2	3100	D (26.8)	3	3180	B (17.3)
Exit 59	Exit 60	Rolling	AM	2	2660	C (23.7)	3	2720	B (15.7)
Exit 60	Exit 61	Rolling	AM	2	2860	C (26.0)	3	2930	B (16.9)
Exit 61	Exit 62	Rolling	AM	2	2600	C (23.0)	3	2660	B (15.3)
Exit 62	Exit 63	Rolling	AM	2	2680	C (23.9)	3	2740	B (15.8)
Exit 63	Exit 64	Rolling	AM	2	2730	C (24.4)	3	2790	B (16.1)
Exit 64	Exit 65	Rolling	AM	2	2800	C (25.3)	3	2860	B (16.5)

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volume	Level of Service [4]	Number of Lanes[1,2]	2045 Volumes (vph) [3]	Level of Service [4]
From	To								
Exit 65	Exit 66	Rolling	AM	2	2540	C (22.4)	3	2600	B (15.0)
Exit 66	Exit 67	Rolling	AM	2	2480	C (21.8)	3	2530	B (14.6)
Exit 67	Exit 68	Rolling	AM	2	2680	C (23.9)	3	2740	B (15.8)
Exit 68	Exit 69	Rolling	AM	3	2560	B (14.8)	3	2620	B (15.1)
southbound									
Exit 55	Exit 54	Level	AM	2	4950	**F (75.2)**	3	5180	D (31.8)
Exit 56	Exit 55	Level	AM	2	4520	**F (55.7)**	3	4680	D (27.4)
Exit 57	Exit 56	Level	AM	2	4170	**F (45.9)**	3	4310	C (24.7)
Exit 58	Exit 57	Level	AM	2	4060	**E (43.3)**	3	4200	C (23.9)
Exit 59	Exit 58	Level	AM	2	3820	**E (38.3)**	3	3940	C (22.2)
Exit 60	Exit 59	Rolling	AM	2	3440	**E (37.6)**	3	3550	C (22.0)
Exit 61	Exit 60	Rolling	AM	2	3630	**E (41.8)**	3	3750	C (23.4)
Exit 62	Exit 61	Rolling	AM	2	3230	D (33.6)	3	3330	C (20.4)
Exit 63	Exit 62	Rolling	AM	2	3030	D (30.4)	3	3130	C (19.1)
Exit 64	Exit 63	Rolling	AM	2	2670	C (25.5)	3	2760	B (16.8)
Exit 65	Exit 64	Rolling	AM	2	2480	C (23.2)	3	2560	B (15.6)
Exit 66	Exit 65	Rolling	AM	2	2400	C (22.3)	3	2480	B (15.1)
Exit 67	Exit 66	Rolling	AM	2	2430	C (22.6)	3	2510	B (15.3)
Exit 67	Exit 67	Rolling	AM	2	2740	D (26.3)	3	2830	B (17.2)
Exit 68	Exit 67 (Saybrook)	Rolling	AM	2	2480	C (23.2)	3	2560	B (15.6)
Exit 69	Exit 68	Rolling	AM	3	2950	B (18.0)	3	3050	C (18.6)

Notes:

[1] Number of travel lanes differ from 2004 Feasibility Study Report.

[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.

[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)

[4] Boldface entries denote capacity deficiencies during the peak period

Table 8-9B Freeway Section Analysis – Summary of 2045 PM Peak hour No-Build and Build Conditions

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volumes (vph) [3]	Level of Service [4]	Number of Lanes[1,2]	2045 Volumes (vph) [3]	Level of Service [4]
From	To								
northbound									
Exit 54	Exit 55	Level	PM	2	4800	**F (63.9)**	3	4970	D (29.2)
Exit 55	Exit 56	Level	PM	2	4570	**F (55.1)**	3	4700	D (27.0)
Exit 56	Exit 57	Level	PM	2	4420	**F (51.1)**	3	4540	C (26.0)
Exit 57	Exit 58	Level	PM	2	4280	**F (47.2)**	3	4390	C (24.9)
Exit 58	Exit 59	Level	PM	2	4050	**E (41.8)**	3	4140	C (23.1)

Section		Terrain	Peak hour	Number of Lanes[1,2]	2045 No-Build Volumes (vph) [3]	Level of Service [4]	Number of Lanes[1,2]	2045 Volumes (vph) [3]	Level of Service [4]
From	To								
Exit 59	Exit 60	Rolling	PM	2	3850	**E (42.3)**	3	3930	C (23.2)
Exit 60	Exit 61	Rolling	PM	2	4060	**F (47.6)**	3	4140	C (24.8)
Exit 61	Exit 62	Rolling	PM	2	3770	**E (40.5)**	3	3850	C (22.7)
Exit 62	Exit 63	Rolling	PM	2	3750	**E (40.1)**	3	3820	C (22.5)
Exit 63	Exit 64	Rolling	PM	2	3550	**E (36.1)**	3	3610	C (21.0)
Exit 64	Exit 65	Rolling	PM	2	3490	**E (35.0)**	3	3550	C (20.7)
Exit 65	Exit 66	Rolling	PM	2	3420	D (33.8)	3	3490	C (20.3)
Exit 66	Exit 67	Rolling	PM	2	3400	D (33.5)	3	3470	C (20.1)
Exit 67	Exit 68	Rolling	PM	2	3790	**E (40.9)**	3	3870	C (22.8)
Exit 68	Exit 69	Rolling	PM	3	3930	C (23.2)	3	4010	C (23.8)
southbound									
Exit 55	Exit 54	Level	PM	2	5060	**F (82.3)**	3	5300	D (33.0)
Exit 56	Exit 55	Level	PM	2	4760	**F (65.3)**	3	4930	D (29.5)
Exit 57	Exit 56	Level	PM	2	4530	**F (56.8)**	3	4680	D (27.6)
Exit 58	Exit 57	Level	PM	2	4520	**F (56.5)**	3	4670	D (27.5)
Exit 59	Exit 58	Level	PM	2	4470	**F (54.7)**	3	4620	D (27.1)
Exit 60	Exit 59	Rolling	PM	2	4010	**F (52.8)**	3	4140	D (26.6)
Exit 61	Exit 60	Rolling	PM	2	4160	**F (58.6)**	3	4300	D (28.0)
Exit 62	Exit 61	Rolling	PM	2	3860	**F (48.0)**	3	3990	C (25.3)
Exit 63	Exit 62	Rolling	PM	2	3920	**F (49.8)**	3	4050	C (25.8)
Exit 64	Exit 63	Rolling	PM	2	4020	**F (53.2)**	3	4150	D (26.7)
Exit 65	Exit 64	Rolling	PM	2	4170	**F (59.0)**	3	4300	D (28.0)
Exit 66	Exit 65	Rolling	PM	2	3850	**F (47.7)**	3	3980	C (25.2)
Exit 67	Exit 66	Rolling	PM	2	3720	**E (44.1)**	3	3850	C (24.2)
Exit 67	Exit 67	Rolling	PM	2	4090	**F (55.8)**	3	4220	D (27.3)
Exit 68	Exit 67 (Saybroo k)	Rolling	PM	2	3620	**E (41.6)**	3	3740	C (23.4)
Exit 69	Exit 68	Rolling	PM	3	4050	C (25.8)	3	4180	D (26.9)

Notes:
[1] Number of travel lanes differ from 2004 Feasibility Study Report.
[2] Due to the cancellation of the Route 11/I-95/I-395 interchange project, the number of mainline travel lanes has been revised to reflect current 2017 conditions.
[3] vph – Vehicles per hour, including all vehicle types (i.e. passenger cars, trucks, motorcycles, etc.)
[4] Boldface entries denote capacity deficiencies during the peak period

As shown in Figures 8-9A and 8-9B, the PM peak hour is the predominant travel condition. In the PM northbound and southbound directions, almost all segments operate at LOS E or worse due to excess demand and congestion. With the planned widening of a third lane, all segments in both directions are anticipated to operate acceptable LOS (LOS D or better).

There were a total of 605 northbound and 656 southbound crashes between Exit 54 and Exit 69. Majority of these crashes were rear end or sideswipe collisions (365 out of 605 in the northbound direction and 392 out of 656 in the southbound direction). Although no fatalities were reported in the southbound direction, there were 5 crashes involving fatalities in the northbound direction. The proposed widening improvement of adding a mainline operational lane is designed to improve safety and improve operations in this area.

The proposed improvements in this section of I-95 are to add an additional third operational lane to both northbound and southbound I-95 between Exit 54 in Branford and the Baldwin Bridge in Old Saybrook. These improvements would require the replacement of 41 structures along this section of I-95, as well as the replacement or extension of 14 culverts. These improvements are considered Long-Term improvements, as there would be extensive environmental and interchange impacts associated with this work.

8.9.2 Construction Cost

The total construction cost in 2018 dollars, including contingency and non-contract items, to construct the improvements associated with roadway reconstruction of approximately 48.4 miles between Exit 54 and Exit 69 is approximately **$1.6 billion*.** In determining the project costs, it was assumed that the widening of the northbound travel lanes between Exit 54 and Exit 55 would already be completed, so the costs to construct that work were not included in the costs to add the additional operational lane within this section of I-95.

Within the cost to construct this section of I-95, it is assumed that the following 41 structures will need to be completely replaced to accommodate the widening and the third operational lane in the northbound and southbound direction:

- 00194 – Mill Plain Road
- 00196 – US Route 1
- 00197 – Featherbed Lane
- 00198 – Branford Steam Railroad
- 00199 – Leetes Island Road
- 00200 – Granite Road
- 00201 – Moose Hill Road
- 00202 – US Route 1
- 00203 – Long Hill Road
- 00205 – Route 77
- 00206 – State Street
- 00207 – SR 718
- 00208 – Tanner Marsh Road
- 00209 – East River Road
- 00210 – East River
- 00211 – Wildwood Avenue #1
- 00212 – Mungertown Road
- 00214 – Copse Road
- 00215 – Route 79
- 00216 – Horsepond Road
- 00217 – New Road
- 00218 – SSR 450
- 00219 – River Road & Hammonassett River

- 00220 – Nod Road
- 00221 - Cow Hill Road
- 00222 – Route 81
- 00224 – Liberty Street
- 00225 – Long Hill Road
- 00226 – Menunketesuck River
- 00227 – Chapman Millpond Road
- 00228 – Route 145
- 00229 – Pond Meadow Road
- 00230 – Willard Avenue
- 00232 – Route 153
- 00233 – Route 166
- 00234 – School House Road
- 00235 – Elm Street
- 00236 – Valley Railroad
- 00237 – Route 154
- 00238 – SR 628 (Spring Brook Road)
- 06172 – Route 9 NB & I-95 TR 816

8.10 I-95 / Route 32 Interchange Reconstruction

As part of the 2004 I-95 Feasibility Study update, the interchange of Route 32 and I-95 in New London was analyzed, and several concepts developed to improve traffic operations, safety, and access at this interchange. Currently, the I-95 and I-395 interchange in Niantic does not provide the movements for motorists traveling southbound on I-395 to travel onto northbound I-95, as well as movements for motorists traveling southbound on I-95 to travel onto northbound I-395. The Route 32 corridor between New London and Uncasville is utilized as the connection between I-95 and I-395, providing the missing connections at the I-95/I-395 interchange.

A Travel demand survey was conducted to analyze the Origin-Destination (O-D) patterns associated with drivers using Route 32 as a connector route between I-95 ad I-395. The survey was designed to determine the potential impacts of traffic diversions on I-95 associated with planned I-95/I-395 Interchange and Route 32 Improvement Studies. Table 8-10A provides a summary of 13-hour O-D volumes and distributions from I-95 SB to I-395 NB/Points along Route 32. Table 8-10B provides a summary of 13-hour O-D volumes and distributions from I-395 SB to I-95 NB/Points along Route 32.

Table 8-10A northbound O-D Traffic Distributions – I-95 SB to I-395 NB and Route 32

From I-95 SB	Volume (6AM – 7PM)		% Distribution	
	To I-395 NB	To Points Along Route 32	To I-395 NB	To Points Along Route 32
Saturday	2566	2185	54%	46%
Sunday	2077	1819	53%	47%
Tuesday	4023	3080	57%	43%
Wednesday	4134	3067	57%	43%
Thursday	4149	3364	55%	45%

Based on Table 8-10A, on a typical weekend (Sat/Sun) approximately 53% to 54% of the traffic originating from I-95 SB is directed towards I-395 NB and approximately 46% to 47% of the traffic is diverted to various locations along Route 32. On a typical weekday (Tue/Wed/Thurs), approximately 55% to 57% of the traffic originating from I-95 SB is directed towards I-395 NB and approximately 43% to 45% of the traffic is diverted to various locations along Route 32.

Table 8-10B southbound O-D Traffic Distributions – I-395 SB to I-95 NB and Route 32

From I-395 SB	Volume (6AM – 7PM)		% Distribution	
	To I-95 NB	To Points Along Route 32	To I-95 NB	To Points Along Route 32
Saturday	2991	4004	43%	57%
Sunday	2028	3458	37%	63%
Tuesday	3992	5651	41%	59%
Wednesday	4002	5881	40%	60%
Thursday	4126	5933	41%	59%

Based on Table 8-10B, on a typical weekend (Sat/Sun) approximately 37% to 43% of the traffic originating from I-395 SB is directed towards I-95 NB and approximately 57% to 63% of the traffic is diverted to various locations along Route 32. On a typical weekday (Tue/Wed/Thurs), approximately 40% to 41% of the traffic originating from I-395 SB is directed towards I-95 NB and approximately 59% to 60% of the traffic is diverted to various locations along Route 32.

Once the I-95/I-395 interchange is reconstructed, the missing movements between southbound I-95 and northbound I-395 as well as the movements between southbound I-395 and northbound I-95 will be added, providing a full access interchange between I-95 and I-395. The Origin-Destination data suggests that approximately 37% to 57% of traffic (northbound/southbound taken together) uses Route 32 as a bypass road to access I-95 and I-395, and that with a full access I-95/I-395, this traffic will be removed from Route 32 and directed to the interchange. The reduction in future traffic changes the purpose of the corridor as it will no longer provide the missing connections between I-95 and I-395. As such, several conceptual improvements plans for the Route 32 & I-95 were developed, taking into account the planned reduction in traffic.

An additional travel demand model and analysis will need to be performed to quantify the impacts to the diversion percentages of constructing a full interchange at the I-95/I-395 junction and when proposing future improvements to the Route 32 corridor.

8.10.1 Conceptual Interchange Design

Three conceptual interchange designs were developed, which aim to improve traffic operations along Route 32, increase safety along the corridor, provide pedestrian connectivity between Connecticut College, the United States Coast Guard Academy, and downtown New London, and to decrease the footprint of the Route 32 interchange with I-95 and create developable land. All alternatives utilize the same alignment for Route 32 but differ in the concepts of the intersections.

The northbound and southbound travel lanes of Route 32, north of Crystal Avenue in New London, have large sweeping ramps over the I-95 travel lanes. These ramps have two travel lanes in each direction, feature large horizontal curves and a super-elevated roadway, which allow for high speed vehicle movements along Route 32. Vehicles heading northbound on Route 32 from New London can easily accelerate up to speed on these ramps in excess of the speed limit, prior to reaching the intersection of Route 32 and Deshon Street. All alternatives show the shifting of northbound Route 32, north of the intersection with Crystal Avenue, onto the existing southbound Route 32 bridge over I-95, through narrowing of the travel lanes to 11 ft. and shoulders to 4 ft. The concept in this area is to provide a traffic calming measure to decrease the travel speeds on northbound and southbound Route 32. By shifting the traffic onto the existing southbound Route 32 bridge over I-95, the existing northbound Route 32 bridge can either be removed to reduce maintenance costs or converted for use by pedestrians and bicyclists to safely cross over the I-95 travel lanes.

All conceptual alternative improvements present an option to remove the Exit 84S-N-E southbound I-95 Off ramp, and direct traffic to the Exit 83 frontage road, where Route 32 can be accessed by the existing Off ramp to Briggs Street. The purpose of removing the Exit 84S-N-E southbound Off ramp is to prevent vehicles traveling from southbound I-95 to connect directly with Route 32. The Exit 84S-N-E Off ramp from I-95 southbound features Off ramps with flat horizontal curves, which allows vehicles to maintain highway speeds (65 mph+) while exiting the highway onto northbound Route 32. The Exit 84 N ramp directs traffic from I-95 directly onto northbound Route 32 at the signalized intersection with Deshon Street (United States Coast Guard Academy entrance). While there are existing signs warning drivers to reduce speed prior to merging with northbound Route 32, the existing roadway characteristics of the Exit 84S-N-E Off ramp allows for vehicles to maintain highway speeds prior to merging with northbound Route 32. The current alignment allows for vehicles to travel above the 35-mph speed limit on Route 32, posing a safety issue to pedestrians at the entrances to the Coast Guard Academy and Connecticut College. In removing the direct connection with Route 32, traffic from southbound I-95 can be re-routed through an intersection prior to connecting with Route 32, lowering speeds reached on mainline Route 32. Additionally, with the removal of the southbound Exit 84S-N-E Off ramp, and the loop ramps connecting to Route 32, an area of approximately 33 acres can be opened for possible future development.

Additionally, the northbound and southbound travel lanes of Route 32, north of the intersection with Deshon Street, form a dived highway with two 12 ft. travel lanes in each direction, wide inside and outside shoulders, and a flat vertical grade. These roadway characteristics allow for vehicles to reach speeds in excess of the signed speed limits along Route 32 in the section of roadway adjacent to the United States Coast Guard Academy and Connecticut College campus entrances. The conceptual alternative improvements present an option of removing the existing concrete median barrier converting Route 32 into a parkway with narrower travel lanes and shoulders (11 ft. and 4 ft. respectively), all constructed within the existing right-of-way of Route 32. By implementing traffic calming features such as narrow travel lanes and shoulders, and introducing roundabouts at previously signalized intersections, travel speeds along Route 32 can be decreased, increasing both pedestrian and vehicular safety through the corridor.

Along with the roadway improvements, each concept alternative includes a shared use path, which will connect both colleges to downtown New London. Currently, pedestrians originating from the colleges would need to travel down Route 32 to Williams Street, and cross several roadways and driveways to cross under I-95 into New London. However, this existing pedestrian access along

Williams Street does not provide direct access to downtown New London along Route 32 and Water Street. The proposed improvement concepts present a shared use path which originates from the pedestrian bridge over Route 32 that connects Connecticut College's main campus and the Connecticut College fitness center. The shared use path would then be constructed adjacent to Route 32, within the existing Route 32 right-of-way, travel over I-95 either by utilizing the existing southbound Route 32 bridge over I-95 or by constructing a new pedestrian bridge over I-95 and terminate at the intersection of Route 32 and Crystal Avenue. Pedestrians would then be able to cross Crystal Avenue at the signalized intersection and access the existing pedestrian bridge over Route 32 in downtown New London.

All improvements presented in the I-95/Route 32 interchange concepts strive to increase safety along the Route 32 corridor by lowering travel speeds, provide direct pedestrian connections between the colleges and downtown New London, and remove the large interchange with multiple ramps to create new developable land at the interchange.

Refer to Appendix E for the I-95/Route 32 conceptual improvement plans.

8.10.2 Construction Cost

The total construction cost in 2018 dollars, including contingency, to construct the improvements associated with the three (3) I-95 and Route 32 interchange improvements concepts ranges between **$40 million and $60 million*.**

Note:
*Future improvement project costs are based on preliminary concepts and are subject to change pending further study and design.