Connecticut I-95 Corridor Congestion Relief Study

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CDM Smith

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Appendix D - Tolling Readiness Report

Appendix E – Tolling Laws Paper

Appendix F – PPP Report

List of Acronyms

ACM	Automatic Coin Machine
ACH	Automated Clearing House
AMS	Account Management System
ADT	Average Daily Traffic
AET	All Electronic Tolling
AETS	All Electronic Tolling System
AVC	Automatic Vehicle Classification
CASI	Computer-Assisted Self-Interview
CCTV	Closed Circuit TV
ConnDOT	Connecticut Department of Transportation
CPS	Central Processing Center
CS	Cambridge Systematics
CSC	Customer Service Center
CSR	Customer Service Representative
COTS	Commercial-off-the-Shelf
CTTDM	Connecticut Travel Demand Model
DMV	Department of Motor Vehicle
DSRC	Dedicated Short Range Communication
EB	Eastbound
E-E	External to External
ETC	Electronic Toll Collection
ETS	Electronic Toll System
FAQ	Frequently Asked Questions
FCC	Federal Communications Commission
FFS	Free Flow Speed
FHI	Fitzgerald & Halliday
FHWA	Federal Highway Administration
GBRC	Greater Bridgeport Regional Council
HCM	Highway Capacity Manual
HOV	High Occupant Vehicle
HTML	Hypertext Markup Language
I-95	Interstate 95
ITS	Intelligent Transportation System
IVR	Interactive Voice Response
LAN	Local Area Network
LOS	Level of Service
M&O	Maintenance and Operations
MD	Midday
MNL	Multinomial Logit
MNRR	Metro-North Railroad
MOMS	Maintenance On-line Management System
MPH	Miles Per Hour

NB	Northbound
NSF	Non-Sufficient Funds
NT	Nighttime
NYBPM	New York Best Practice Model
NYMTC	New York Metropolitan Transportation Council
O-D	Origin-Destination
ODME	Origin-Destination Matrix Estimation
ORT	Open Road Tolling
PC	Personal Computer
PDF	Portable Document Format
RFID	Radio Frequency Identification
RSG	Resource System Group
RTM	Real Time Monitor (RTM)
RTFM	Regional Transit Forecasting Model
RWIS	Road Weather Information System
SAN	Storage Area Network
SB	Southbound
SCRCOG	South Central Regional Council of Governments
SOV	Single Occupant Vehicle
SP	Stated Preference
SWRPA	South Western Regional Planning Agency
TAZ	Traffic Analysis Zone
TF	Toll Free
TMC	Traffic Management Center
TSI	Toll Systems Integrator
UPS	Uninterrupted Power Supply
VES	Violation Enforcement System
VHT	Vehicle Hours Traveled
VMS	Variable Message Signs
VMT	Vehicle Miles Traveled
VOT	Value of Time
VPC	Violation Processing Center
WB	Westbound

Executive Summary

I-95 Corridor Congestion Relief Study

CDM Smith (Project Team) was selected by the Connecticut Department of Transportation (ConnDOT) to perform a corridor congestion relief study of Interstate 95 (I-95) and the Merritt Parkway (Route 15) from New Haven to the New York State Line under the Federal Highway Administration (FHWA) Value Pricing Pilot Program (VPPP). This study included the assembly and collection of traffic and travel time data, a stated preference survey to estimate value of time in the study corridors, and a detailed traffic modeling and toll revenue evaluation for a variety of configuration and pricing alternatives. In addition to the I-95 findings discussed in this executive summary, several other study documents have been submitted covering current Federal tolling laws, the state of tolling readiness in Connecticut, and Public-Private Partnership approaches used for tolling.

Study Objective and Scope

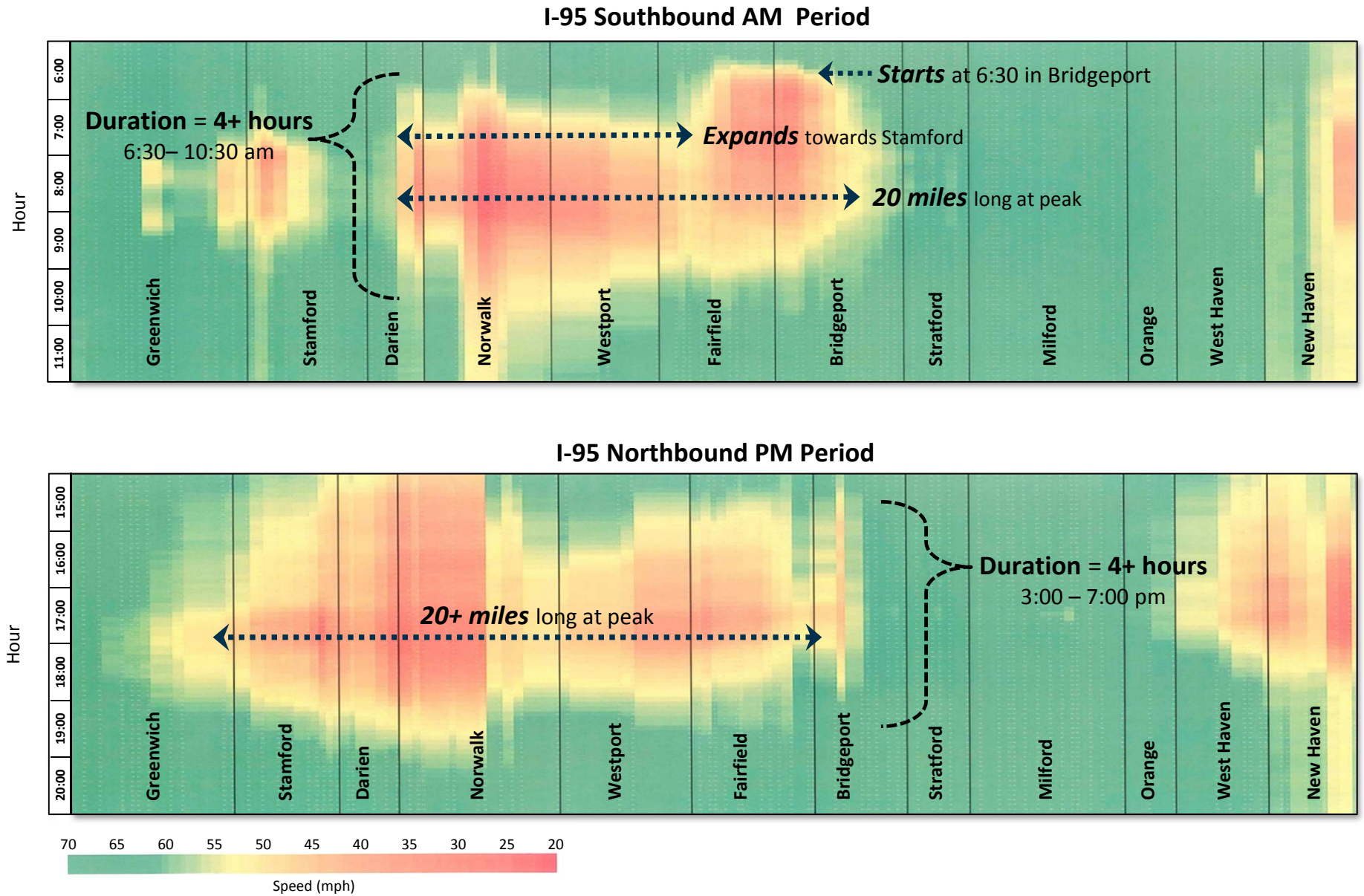
CTDOT submitted a proposal to FHWA in 2011 under the VPPP to study whether congestion pricing on I-95 and Route 15 using All Electronic Tolling (AET) can reduce congestion in the corridor. The I-95 corridor experiences extraordinary amounts of recurring delay over the 47 miles between New Haven and the New York state line. On average, congestion spans over a length of more than 25 miles, lasting for more than 4 hours during both the AM and PM periods **(see Figure ES-1)**. Route 15 experiences similar congestion levels, although these tend to be somewhat shorter in duration. This congestion has been estimated by the Texas Transportation Institute to cost Connecticut close to a billion dollars annually[1].

In addition to the goal of congestion relief, toll revenue was a key factor that was considered across alternatives. The funding of additional highway and transit improvements in the corridor with toll revenue can provide additional congestion relief and choices for travelers. To measure and compare potential congestion relief benefits across alternatives, performance measures such as traffic, vehicle miles travelled, vehicle hours travelled, and travel speeds were summarized for I-95, Route 15, Route 1, separately and as a combined corridor. In addition, a simulation model of I-95 was utilized to quantify and visualize the estimated congestion relief benefits of the various alternatives.

The study was performed in sufficient detail to answer the above objectives and included the following key work efforts:

- Development of a current traffic volume & speed profile for I-95 and Route 15 including detailed analysis by time of day and travel direction; **(see Figure ES-1)**
- Application of a Stated Preference (SP) Survey in the I-95 and Route 15 travel corridors to estimate motorists' value of time and their potential to:
    - reduce trip making,
    - change to transit or other travel modes,

[1] http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/ums/congestion-data/bridgeport.pdf



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2012 I-95 AVERAGE WEEKDAY TRAVEL SPEED

FIGURE ES-1

  - change departure time, or
  - change route when faced with a variable toll on I-95 and Route 15;

- Enhancement of the Statewide Travel Demand Model;
- Development of an I-95 corridor micro-simulation traffic model in order to analyze the operational impacts on I-95 from pricing and capacity improvements;
- Estimation of the traffic diversion that can be anticipated from pricing on I-95 and Route 15;
- Estimation of toll revenues & costs: annual gross toll revenue, tolling capital costs, tolling operating costs, and net toll revenue for final tolling alternatives.

Study Area

The study area was defined as the I-95 corridor from New York State Line to the I-91/I-95/ Rt-34 interchange in New Haven, Connecticut. **Figure ES-2** depicts the regional area, with the highlighting of I-95 and Route 15 (Merritt Parkway / Wilbur Cross Parkway). Route 1 and the Metro North rail line run parallel to I-95, crossing over I-95 at multiple locations throughout the corridor. Due to the interaction and competition between I-95, Route 15, Route 1, and the Metro North line, the Project Team developed a study approach that allows for impacts to be estimated across all of these roadway facilities and modes of transportation within the defined study area.

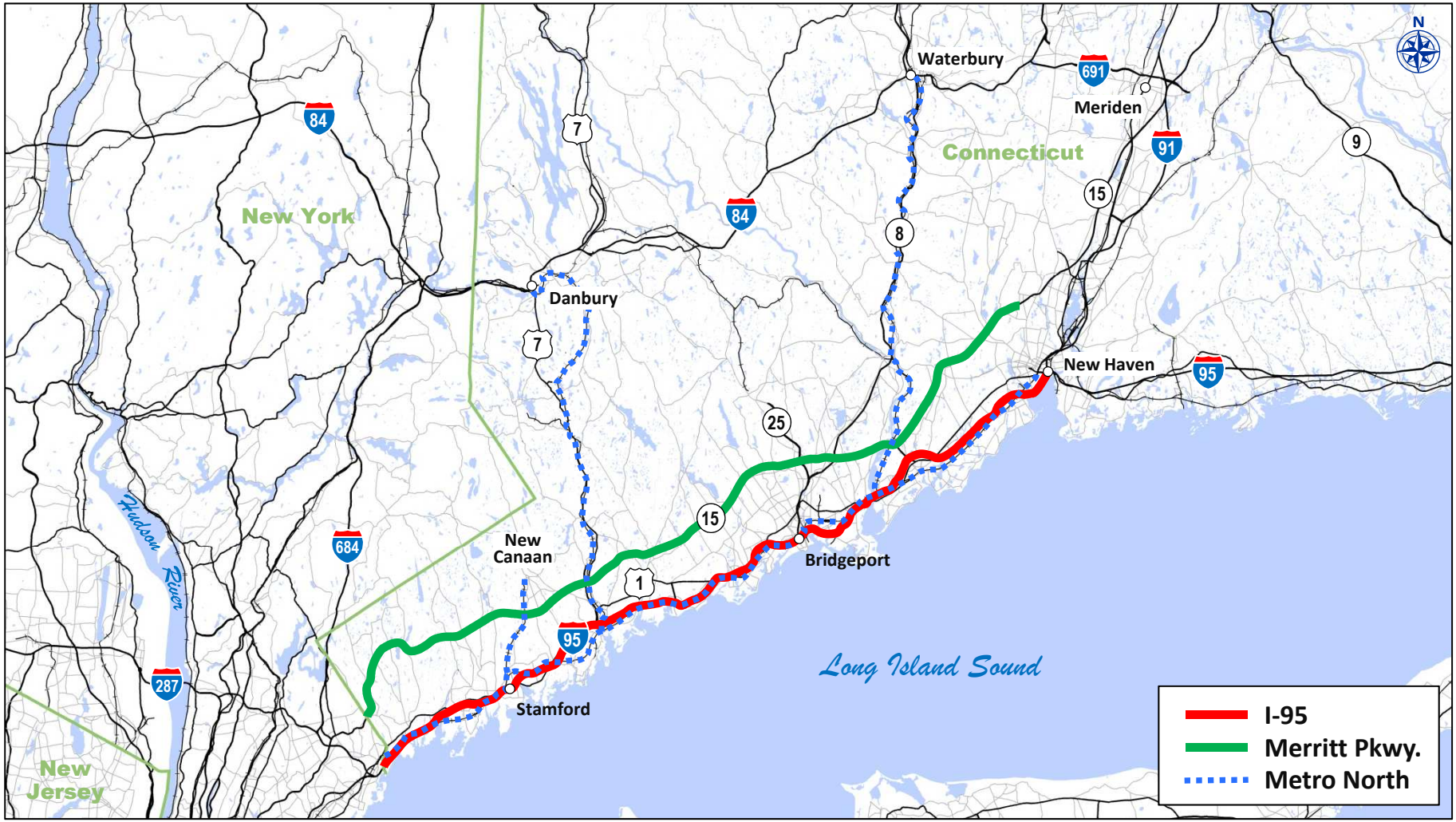
This summary document provides a discussion of the final alternatives evaluated, estimates of traffic and toll revenue, and roadway operational benefits that could be achieved from pricing the I-95 corridor.

Alternatives Description

During the first half of this study and prior to the collection of data from the SP survey, the Project Team conducted preliminary analysis of several tolling alternatives, including tolled managed lanes on I-95 between New Haven and New York. The managed lane alternative consisted of adding additional lanes to I-95 and tolling only this new capacity. The existing lanes on I-95 were assumed to remain toll free. This alternative was found to generate a relatively small amount of revenue compared to the significant capital cost of implementing the unique geometric requirements associated with managed lanes in the corridor. While managed lanes could provide congestion relief to the corridor, the relatively small amount of revenue generation as compared to the cost of construction and as compared to the revenue generated from tolling all the lanes resulted in this alternative being dropped from the final set of alternatives carried forward.

The final set of alternatives considered in this study assumed AET across all lanes on I-95 or on both I-95 and Route 15 between New Haven and the New York border. The final set of alternatives also included a scenario where I-95 would be expanded with an additional general purpose lane in each direction between Bridgeport and Stamford; which is the most congested stretch of I-95. Twelve (12) AET locations were assumed on I-95 and ten (10) AET locations on Route 15.

Figure ES-3 displays the assumed tolling locations on I-95 and Route 15 and the toll rates (2014 dollars) assumed in this study. Under all tolling scenarios within the VPPP, time of day congestion pricing would be required. For this study, off-peak toll rates were assumed to be 30 percent lower than peak period toll rates. A brief description of the Alternatives is provided below.



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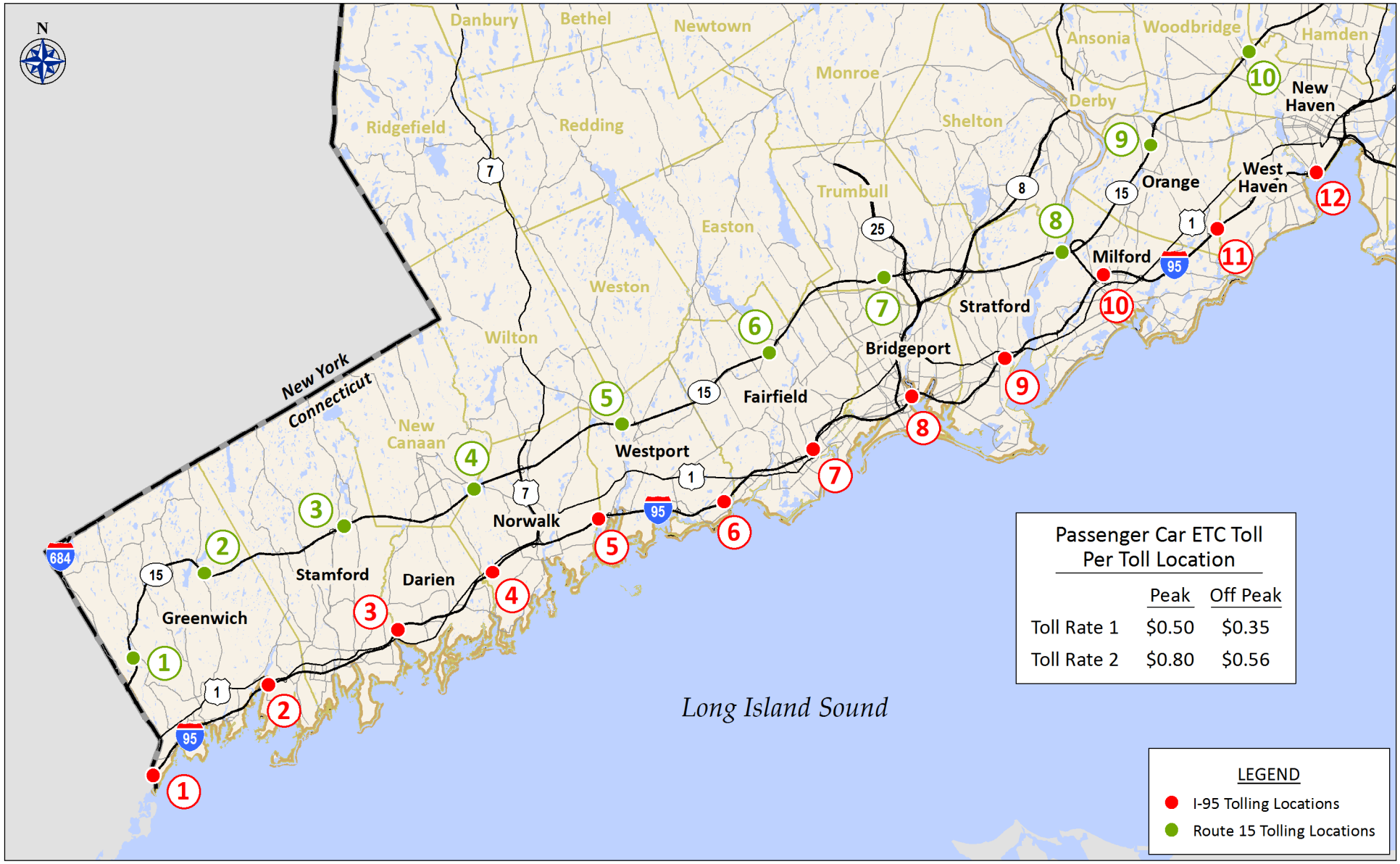
I-95 CORRIDOR: NEW YORK TO NEW HAVEN

FIGURE ES-2



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I-95 AND ROUTE 15 ASSUMED TOLLING LOCATIONS

FIGURE ES-3

- **Alternative 1 (Tolling I-95 only) –** Toll existing lanes with no widening of I-95. Includes 12 AET locations along the existing lanes of I-95 between New Haven and the New York border. Tolls at each tolling location for passenger vehicles equipped with a transponder were assumed to be $0.50 and $0.35 for peak and off peak time periods, respectively. A full length trip between New Haven and New York would be $6.00, or roughly $0.125 per mile during peak periods, and $4.20 (roughly $0.09 per mile) during off peak periods. Assumed toll rates for the study are comparable to other Turnpike facilities. Actual tolling locations and toll rates would need to be refined should it be decided to toll I-95.

- **Alternative 2 (Tolling I-95 only) -** Toll existing lanes with no widening of I-95. Includes 12 AET locations along the existing lanes of I-95 between New Haven and the New York border under a *higher toll rate level than Alternative 1*. Tolls at each tolling location for passenger vehicles equipped with a transponder were assumed to be $0.80 and $0.56 for peak and off peak time periods, respectively. A full length trip between New Haven and New York would be $9.60, or roughly $0.205 per mile during peak periods, and $6.72 (roughly $0.145 per mile) during off peaks.

- **Alternative 3 (Tolling I-95 & Rt. 15)** – Toll existing lanes with no widening of I-95 and Route 15. Includes 12 AET locations along the existing lanes of I-95 and 10 AET locations along Route 15 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 1 and were applied to both I-95 and Route 15. A full length trip between New Haven and New York on Route 15 would be $5.00 during peak periods and $3.00 during off peaks.

- **Alternative 4 (Tolling I-95 only)** – Includes widening of I-95 between Bridgeport and Stamford to accommodate 1 additional general purpose lane in each direction in combination with 12 AET locations along I-95 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 1.

- **Alternative 5 (Tolling I-95 & Rt. 15)** – Includes widening of I-95 only between Bridgeport and Stamford in combination with 12 AET locations along I-95 and 10 AET locations along Route 15 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 3 and were applied to both I-95 and Route 15.

These five alternatives were run utilizing the travel demand toll model specifically enhanced and refined for this study at 2020 and 2040 conditions. In addition, toll free runs were prepared for the current configuration (No Build), as well as for the widened alternative. These toll free runs serve as the baseline to compare the tolled alternatives against in terms of traffic diversion at the specific tolling locations and along the corridor in general. **Table ES-1** provides a summary of the runs conducted, which routes are tolled, and at what toll rate. Output from the travel demand model runs were analyzed and summarized for each of these alternatives.

Table ES-1
I-95 Corridor Congestion Relief Study
Final Alternatives Evaluated

Scenario	Description	Tolled Routes		
		None	I-95	Route 15
No Build Toll Free	No Build - Toll Free	X		
Alt 1	No Build - Toll I-95 only (Toll Rate 1)		X	
Alt 2	No Build - Toll I-95 only (Toll Rate 2)		X	
Alt 3	No Build - Toll Both I-95 and Route 15 (Toll Rate 1)		X	X
Build Toll Free	I-95 Widening (Brgpt-Stmfd) - Toll Free	X		
Alt 4	I-95 Widening (Brgpt-Stmfd) - Toll I-95 only (Toll Rate 1)		X	
Alt 5	I-95 Widening (Brgpt-Stmfd) - Toll I-95 and Route 15 (Toll Rate 1)		X	X

Note:
Toll Rate 1: Assumes $0.50 peak / $0.35 off peak toll per tolling location
Toll Rate 2: Assumes $0.80 peak / $0.56 off peak toll per tolling location
All tolling scenarios assume tolling from NY State Line to New Haven

Summary of Traffic Estimates

Table ES-2 presents 2020 estimated average weekday mainline traffic volumes (in thousands) on I-95 and Route 15 in the southbound direction during the AM Peak Period, the northbound direction during the PM Peak Period, and for the total average weekday. These traffic volumes represent the average of all segments between New Haven and the New York border.

The summary table below shows seven scenarios in the left column. This includes the 5 tolling alternatives discussed earlier, as well as No Build Toll Free (TF) and Build TF scenarios. The next column of numbers summarizes the AM Peak Period traffic estimates in the southbound direction for I-95 and Route 15, as well as the sum total of both corridors. The traffic estimates for the PM Peak Period in the northbound direction are shown next. Finally, the daily traffic total is shown on the right side. The middle portion of the table shows the average net traffic impacts when compared to the No Build TF condition. The bottom portion of the tables presents the percent change when compare against the No Build TF condition.

For Alternative 1, a significant amount of traffic reduction is estimated on I-95 in the southbound direction during the AM peak period (-12.1 percent) and in the northbound direction during the PM peak period (-11.4 percent). On Route 15, traffic during the same periods and travel directions is estimated to increase by 4.5 percent and 3.3 percent, respectively. The reduction of traffic on I-95 is a combination of some traffic shifting to off-peak time periods, a shift to alternative modes (transit), trip suppression, and diversion.

Between the tolling alternatives, Alternative 2 results in the largest loss of traffic from I-95 and the largest increase in traffic to Route 15. Alternative 2 assumed a much higher toll rate. Based on a review of the findings between Alternative 1 and Alternative 2, all other alternatives were analyzed with the Alternative 1 toll rates.

Alternative 4 is estimated to have the least overall impact, particularly during the AM and PM peak period major travel directions. The widening of I-95 attracts more volume as displayed by the results of the Build TF run. However, the volume is then "managed" back down to roughly No Build TF volumes, resulting in an improved I-95 condition, while also not overburdening Route 15 in the peak travel direction.

Alternative 5 also shows promising results, where the tolling of Route 15 diverts some traffic back to I-95, resulting in I-95 traffic levels that are closest to the No Build TF numbers. Tolling both corridors can also ensure a "balancing" of traffic between the two facilities while also providing congestion relief for Route 15 as well.

Table ES-2
Summary Comparison of 2020 Estimated Average Segment Traffic Volumes

	Average Weekday Segment Traffic Volumes (000's) - New Haven to NY								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	19.9	11.1	31.0	21.9	12.3	34.2	159.7	72.3	232.0
1	17.5	11.6	29.1	19.4	12.7	32.1	133.8	82.6	216.4
2	15.4	12.0	27.4	17.4	13.0	30.4	116.9	87.7	204.6
3	17.9	9.0	26.9	19.9	10.2	30.1	145.1	57.9	203.0
Build TF	21.8	10.3	32.1	24.4	11.3	35.7	169.7	65.7	235.4
4	18.6	11.2	29.8	21.2	11.9	33.1	140.0	78.7	218.7
5	19.7	8.0	27.7	22.5	8.4	30.9	153.4	51.4	204.8

	Traffic Volume Difference as Compared to No Build Toll Free Traffic (000's)								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	-2.4	0.5	-1.9	-2.5	0.4	-2.1	-25.9	10.3	-15.6
2	-4.5	0.9	-3.6	-4.5	0.7	-3.8	-42.8	15.4	-27.4
3	-2.0	-2.1	-4.1	-2.0	-2.1	-4.1	-14.6	-14.4	-29.0
Build TF	1.9	-0.8	1.1	2.5	-1.0	1.5	10.0	-6.6	3.4
4	-1.3	0.1	-1.2	-0.7	-0.4	-1.1	-19.7	6.4	-13.3
5	-0.2	-3.1	-3.3	0.6	-3.9	-3.3	-6.3	-20.9	-27.2

	Percent Change in Traffic Volume as Compared to No Build Toll Free Traffic								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	-12.1%	4.5%	-6.1%	-11.4%	3.3%	-6.1%	-16.2%	14.2%	-6.7%
2	-22.6%	8.1%	-11.6%	-20.5%	5.7%	-11.1%	-26.8%	21.3%	-11.8%
3	-10.1%	-18.9%	-13.2%	-9.1%	-17.1%	-12.0%	-9.1%	-19.9%	-12.5%
Build TF	9.5%	-7.2%	3.5%	11.4%	-8.1%	4.4%	6.3%	-9.1%	1.5%
4	-6.5%	0.9%	-3.9%	-3.2%	-3.3%	-3.2%	-12.3%	8.9%	-5.7%
5	-1.0%	-27.9%	-10.6%	2.7%	-31.7%	-9.6%	-3.9%	-28.9%	-11.7%

Traffic Operations Findings

A special operations model was created for I-95 from New Haven to New York to provide the most realistic assessment of how pricing and widening would likely impact traffic operations on I-95. This microsimulation model was calibrated to the AM and PM peak period conditions to reflect existing bottlenecks, queuing, travel speeds, and volumes by direction. The simulation model was exercised at 2040 levels for the various alternatives.

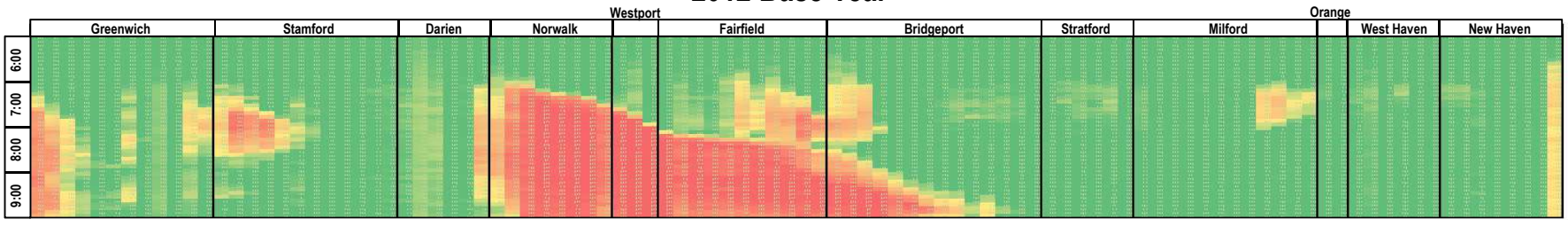
Figure ES-4 and ES-5 display heat maps of estimated travel speeds between New Haven and New York during the AM peak period in the southbound direction and during the PM peak period in the northbound direction, respectively. The 2012 base year heat map is included on the top, followed by the 2040 No Build to represent a baseline for 2040 results. The four graphics underneath present results of analysis of scenarios run and analyzed in the simulation model.

Overall, the addition of an extra travel lane in each direction between the most congested portions of I-95 between Stamford and Bridgeport showed additional benefits when combined with localized selective interchange improvements. Simulation results showed there would be even more substantial benefits if the selective widening was continued further south to meet the I-287 interchange near the New York Stateline, particularly in the southbound direction. The addition of an extra lane with tolling on I-95 showed potential for dramatic improvements in the future year operations of I-95 when compared to the No Build scenario.

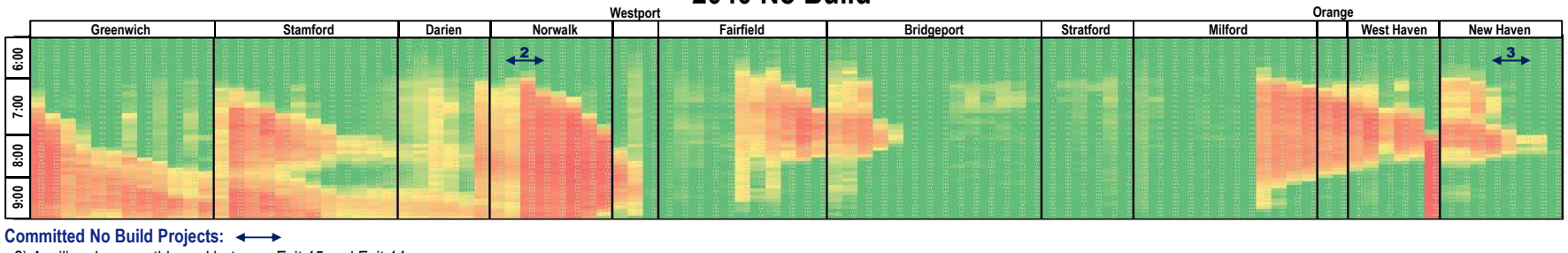
In addition to the travel speeds, travel times were pulled out of the AM and PM peak period simulation models for a Bridgeport to Stamford movement and for a full length movement between New Haven and New York. **Table ES-3** shows the estimated 2040 I-95 southbound AM travel times. The top portion of the table shows travel times between Bridgeport and Stamford. The left portion of the table shows the No Build (No Toll) travel times. The next column shows the estimated travel times for the tolling alternatives and the net difference in travel times versus the No Build No Toll. For example, tolling I-95 under No Build conditions will result in a time savings of 0 to 10 minutes depending on time period. A full length trip would save anywhere from 1 to 19 minutes. It should be noted, that a planned widening between Exits 14 and 15 is estimated to have a significant positive impact on the current congestion levels in the southbound direction. There is a significant influx of demand from Route 7 along the existing I-95 segment between Exits 14 and Exit 15. The southbound entrance ramp from Exit 15 carries Route 7 traffic (15,000 vehicles on an average weekday and 1,400 during the AM peak hour) onto I-95. The exit ramp to Boston Post Road at Exit 14 in the southbound direction carries 11,000 vehicles on an average weekday is roughly just 0.5 miles from the Exit 15 on ramp. This combination of heavy entering traffic from Route 7 and exiting traffic to Boston Post Road currently causes major friction and operational issues along this segment.

In addition, the widening assumption of I-95 between Bridgeport and Stamford would need considerable further refinement, particularly at the southern terminus of the widening. The findings from the Build Toll Free, as well as the Build tolling alternatives indicate that the widening should be extended southward to the NY border, at least in the southbound direction. The assumed current terminus of the widening is itself creating a bottleneck location, thereby reducing the benefit achieved from pricing and widening.

2012 Base Year



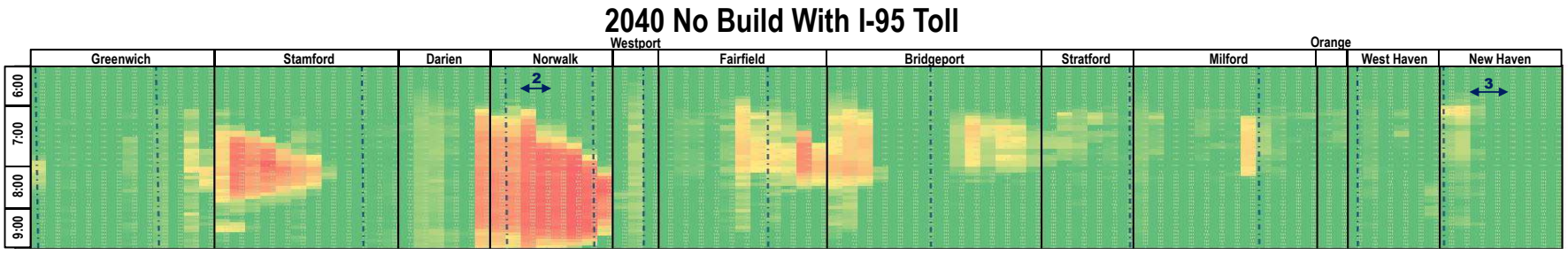
2040 No Build



Committed No Build Projects: ⟷

2) Auxiliary lane southbound between Exit 15 and Exit 14.
3) Redesigned I-91 and I-95 interchange at New Haven.

2040 No Build With I-95 Toll

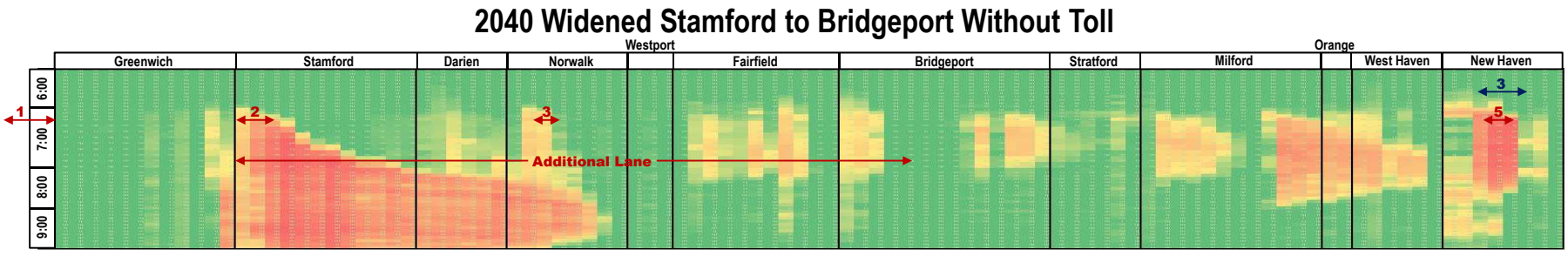


Committed No Build Projects: ⟷

2) Auxiliary lane southbound between Exit 15 and Exit 14.
3) Redesigned I-91 and I-95 interchange at New Haven.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport Without Toll



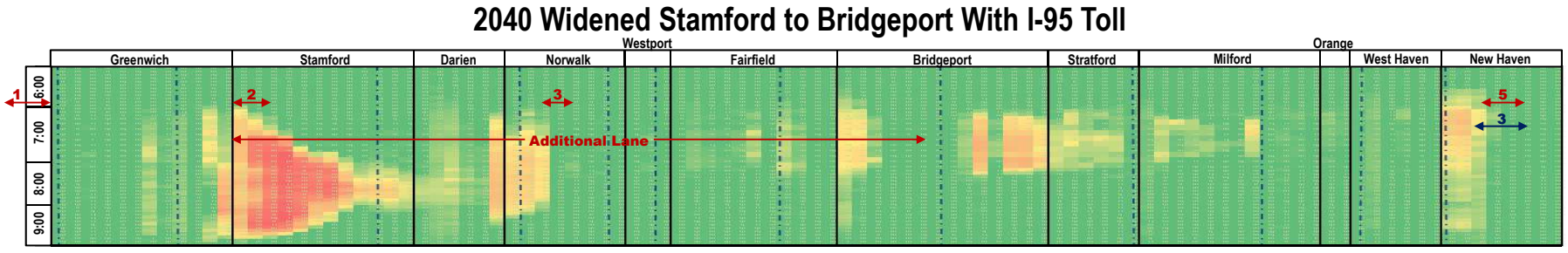
Committed No Build Projects: ⟷

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ⟷

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.
2) Auxiliary lane southbound between Exits 7 and 6.
3) Auxiliary lane southbound between Exits 15 and 14.
5) Additional 5th lane southbound between Exits 48 and 47.

2040 Widened Stamford to Bridgeport With I-95 Toll



Committed No Build Projects: ⟷

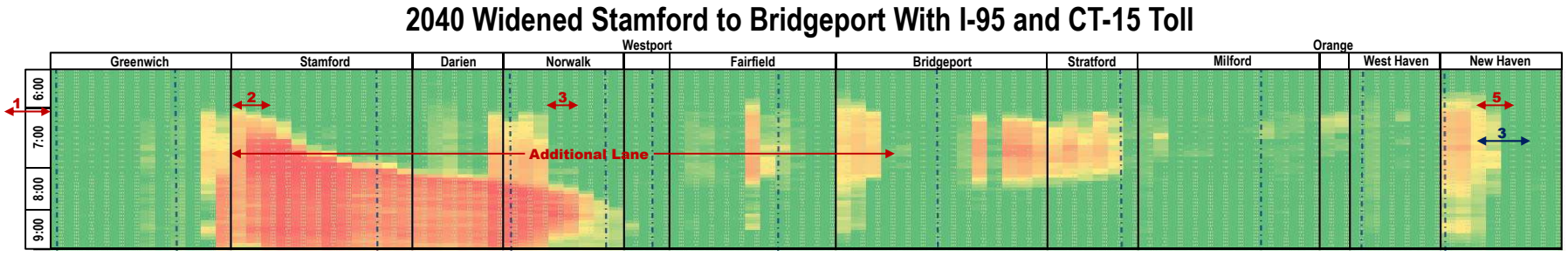
3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ⟷

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.
2) Auxiliary lane southbound between Exits 7 and 6.
3) Auxiliary lane southbound between Exits 15 and 14.
5) Additional 5th lane southbound between Exits 48 and 47.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport With I-95 and CT-15 Toll



Committed No Build Projects: ⟷

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ⟷

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.
2) Auxiliary lane southbound between Exits 7 and 6.
3) Auxiliary lane southbound between Exits 15 and 14.
5) Additional 5th lane southbound between Exits 48 and 47.

Approximate Toll Gantry Locations

5 20 40 60

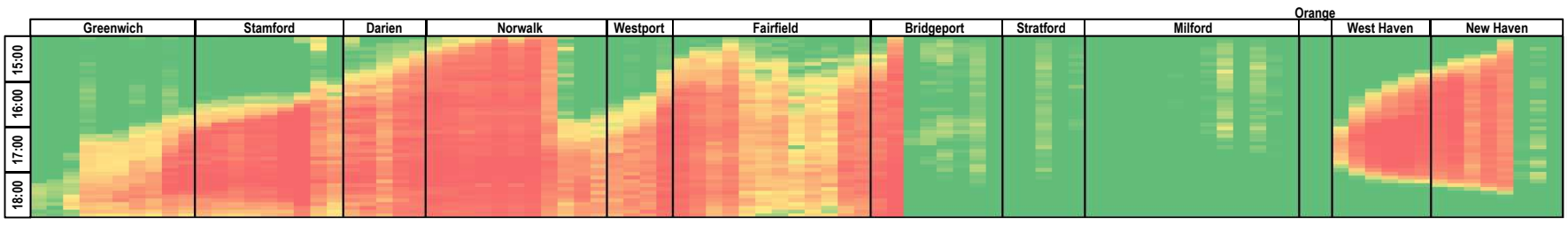
Speed (MPH)

CDM Smith

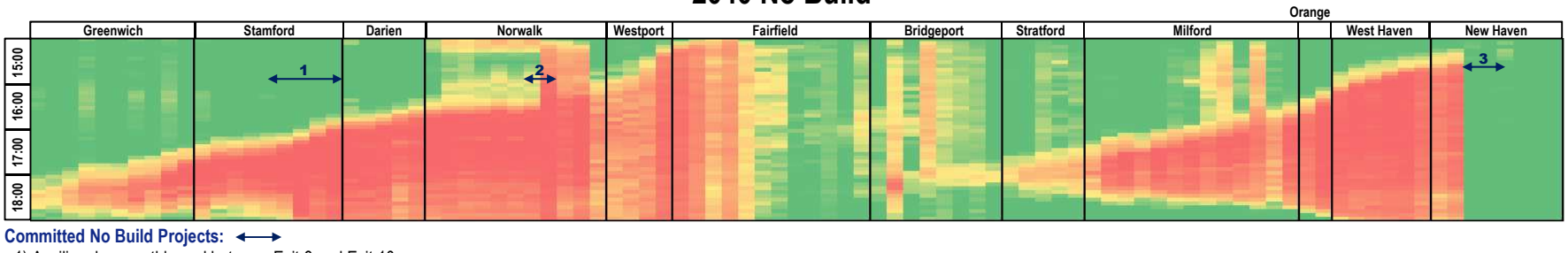
AM PEAK SOUTHBOUND SPEED CONTOURS

FIGURE ES-4

2012 Base Year



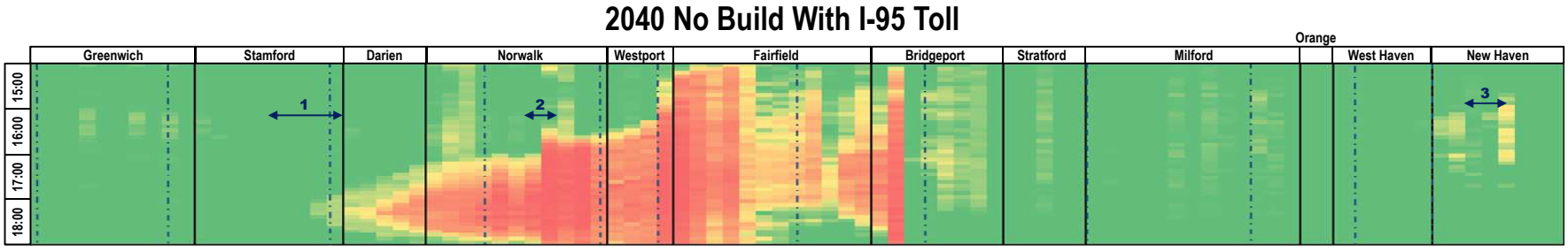
2040 No Build



Committed No Build Projects: ←→

1) Auxiliary lane northbound between Exit 8 and Exit 10.
2) Auxiliary lane northbound between Exit 14 and Exit 15.
3) Redesigned I-91 and I-95 interchange at New Haven.

2040 No Build With I-95 Toll

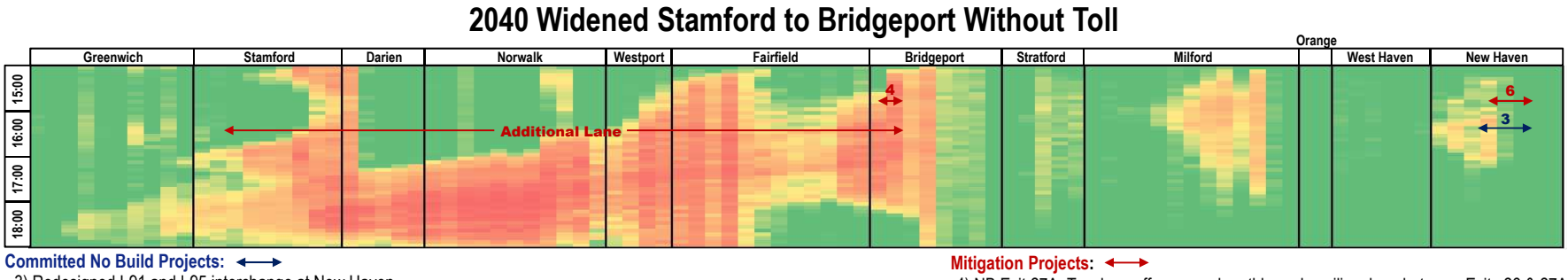


Committed No Build Projects: ←→

1) Auxiliary lane northbound between Exit 8 and Exit 10.
2) Auxiliary lane northbound between Exit 14 and Exit 15.
3) Redesigned I-91 and I-95 interchange at New Haven.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport Without Toll



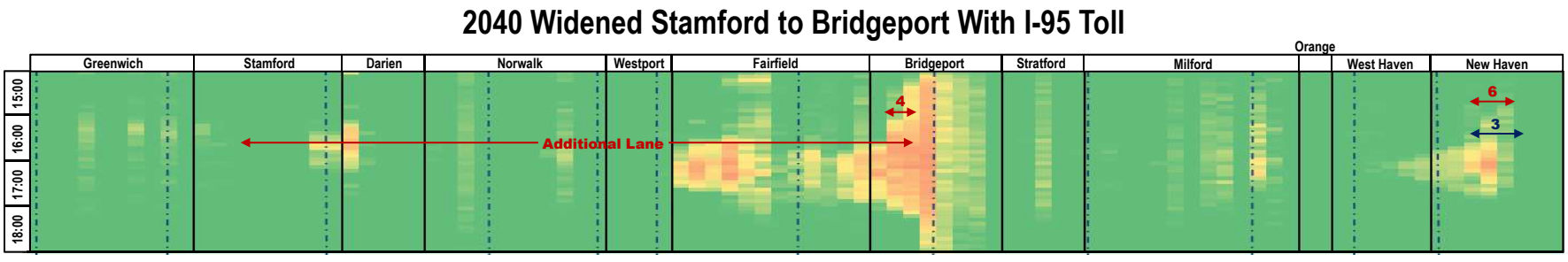
Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

2040 Widened Stamford to Bridgeport With I-95 Toll



Committed No Build Projects: ←→

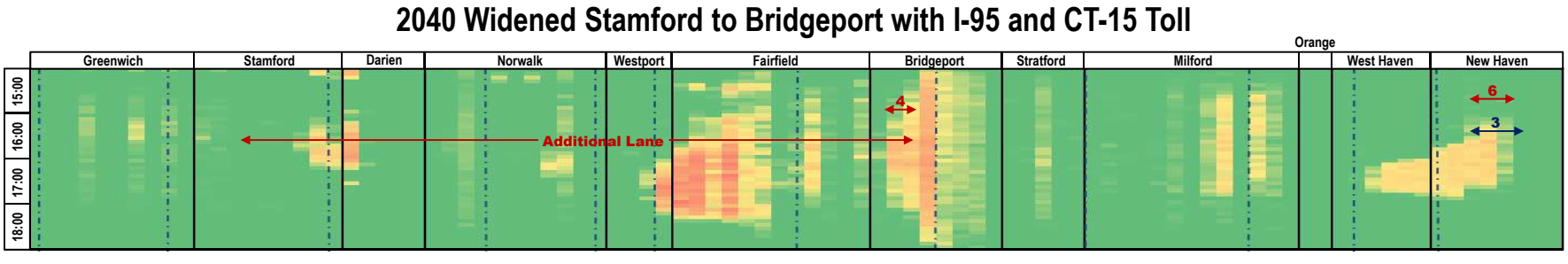
3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport with I-95 and CT-15 Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

Approximate Toll Gantry Locations

5 20 40 60

Speed (MPH)

CDM Smith

PM PEAK NORTHBOUND SPEED CONTOURS

FIGURE ES-5

Table ES-3
2040 I-95 Southbound AM Travel Times

	Bridgeport to Stamford (Exit 27A to Exit 7) 22 Miles								
Hour	No Build (No Toll)	No Build (I-95 Tolled)		Widen Brgpt-Stmfd (No Toll)		Widen Brgpt-Stmfd (I-95 Tolled)		Widen Brgpt-Stmfd (I-95 & CT-15 Tolled)	
AM	(H:MM)	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference
6-7 AM	0:21	0:21	0	0:21	0	0:21	0	0:21	0
7-8 AM	0:28	0:25	-3	0:25	-3	0:23	-5	0:25	-3
8-9 AM	0:37	0:31	-6	0:32	-5	0:27	-10	0:37	0
9-10 AM	0:36	0:26	-10	0:34	-2	0:23	-13	0:28	-8
	New Haven to New York (I-91 to I-287 Interchange) 48 Miles								
Hour	No Build (No Toll)	No Build (I-95 Tolled)		Widen Brgpt-Stmfd (No Toll)		Widen Brgpt-Stmfd (I-95 Tolled)		Widen Brgpt-Stmfd (I-95 & CT-15 Tolled)	
AM	(H:MM)	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference
6-7 AM	0:48	0:47	-1	0:48	0	0:47	-1	0:48	0
7-8 AM	1:04	0:53	-11	1:00	-4	0:52	-12	0:55	-9
8-9 AM	1:16	0:58	-18	1:05	-11	0:55	-21	1:06	-15
9-10 AM	1:12	0:53	-19	1:02	-10	0:51	-21	1:03	-9

Table ES-4 shows the estimated 2040 I-95 northbound PM travel times in the same format as discussed above. Tolling I-95 under No Build conditions will result in an estimated time savings of 8 to 23 minutes depending on time period. A full length trip would save anywhere from 11 to 61 minutes depending on time period. Widening, plus tolling of I-95 shows the highest gains, where time savings between Stamford and Bridgeport are estimated to be 9 to 48 minutes, depending on the time period of travel.

Table ES-4
2040 I-95 Northbound PM Travel Times

	Stamford to Bridgeport (Exit 7 to Exit 27A) 22 Miles								
Hour	No Build (No Toll)	No Build (I-95 Tolled)		Widen Brgpt-Stmfd (No Toll)		Widen Brgpt-Stmfd (I-95 Tolled)		Widen Brgpt-Stmfd (I-95 & CT-15 Tolled)	
PM	(H:MM)	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference
3-4 PM	0:30	0:22	-8	0:26	-4	0:21	-9	0:22	-8
4-5 PM	0:46	0:32	-14	0:36	-10	0:23	-23	0:23	-23
5-6 PM	1:11	0:48	-23	0:53	-18	0:23	-48	0:26	-45
6-7 PM	0:55	0:44	-11	0:46	-11	0:21	-32	0:21	-32
	New York to New Haven (Exit I-287 to I-91 Interchange) 48 Miles								
Hour	No Build (No Toll)	No Build (I-95 Tolled)		Widen Brgpt-Stmfd (No Toll)		Widen Brgpt-Stmfd (I-95 Tolled)		Widen Brgpt-Stmfd (I-95 & CT-15 Tolled)	
PM	(H:MM)	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference	(H:MM)	Difference
3-4 PM	0:59	0:48	-11	0:55	-4	0:48	-11	0:49	-10
4-5 PM	1:26	0:58	-28	1:07	-19	0:51	-35	0:52	-34
5-6 PM	2:15	1:14	-61	1:21	-53	0:51	-84	0:55	-80
6-7 PM	1:51	1:10	-41	1:14	-37	0:47	-64	0:48	-63

Figure ES-6 depicts the estimated average annual net time savings accumulated over I-95, Route 15, and Route 1 between New Haven and NY as compared to the No Build Alternative. The first bar shows the estimated annual time savings from tolling I-95 under the existing configuration. About 8 million hours are estimated to be saved annually. The largest amount of hours saved are estimated to occur under a widening of I-95 and a tolling of both I-95 and Route 15. More than 12 million hours of time savings annually are estimated under this alternative.

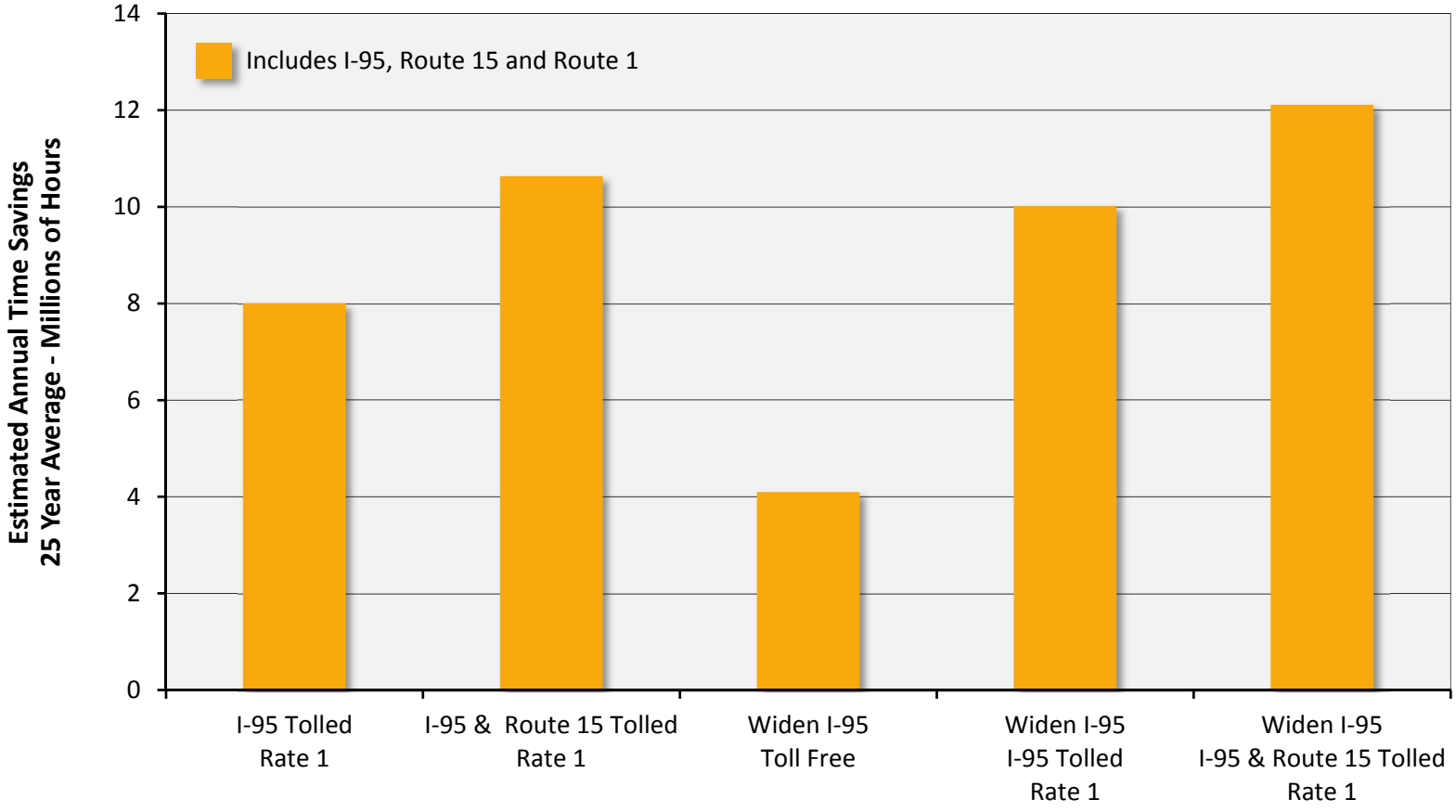
Estimated Annual Gross and Net Toll Revenue

Average weekday toll revenue was summarized for each alternative and expanded to reflect an annual estimate for modeled years 2020 and 2040. A 25-year stream of revenue was created by interpolating between the forecast years and extrapolating through 2044. **Figure ES-7** displays the estimated average annual gross toll revenue over a 25-year span (2020 through 2044) for each alternative. Average annual gross toll revenue is estimated to fall between $275M from tolling the existing I-95 configuration and $380M when I-95 is widened and both I-95 and Route 15 are tolled.

In addition to estimating toll revenue, preliminary tolling capital costs and tolling operations and maintenance costs were estimated for the five tolling alternatives. Tolling operations and maintenance costs were estimated for both a Connecticut self-operated tolling operation and an outsourced tolling operation.

Table ES-5 shows the average annual net toll revenue that could be expected for each tolling alternative. Tolling operations and maintenance costs, as well as tolling capital costs amortized over ten years, are subtracted from the gross toll revenue estimates to produce the net annual toll revenue estimates. The last column shows the cumulative net toll revenue that could be produced over a 25-year period (2020 thru 2044). The net toll calculations were conducted for both the State managed and outsourced toll operations. Depending on the Alternative, cumulative net toll revenue over a 25-year period is estimated to range between $6.2 Billion to $9.2 Billon.

I-95 CORRIDOR POTENTIAL ANNUAL TRAVEL TIME SAVINGS MILLIONS OF HOURS PER YEAR (25 YEAR AVERAGE: 2020 - 2044)



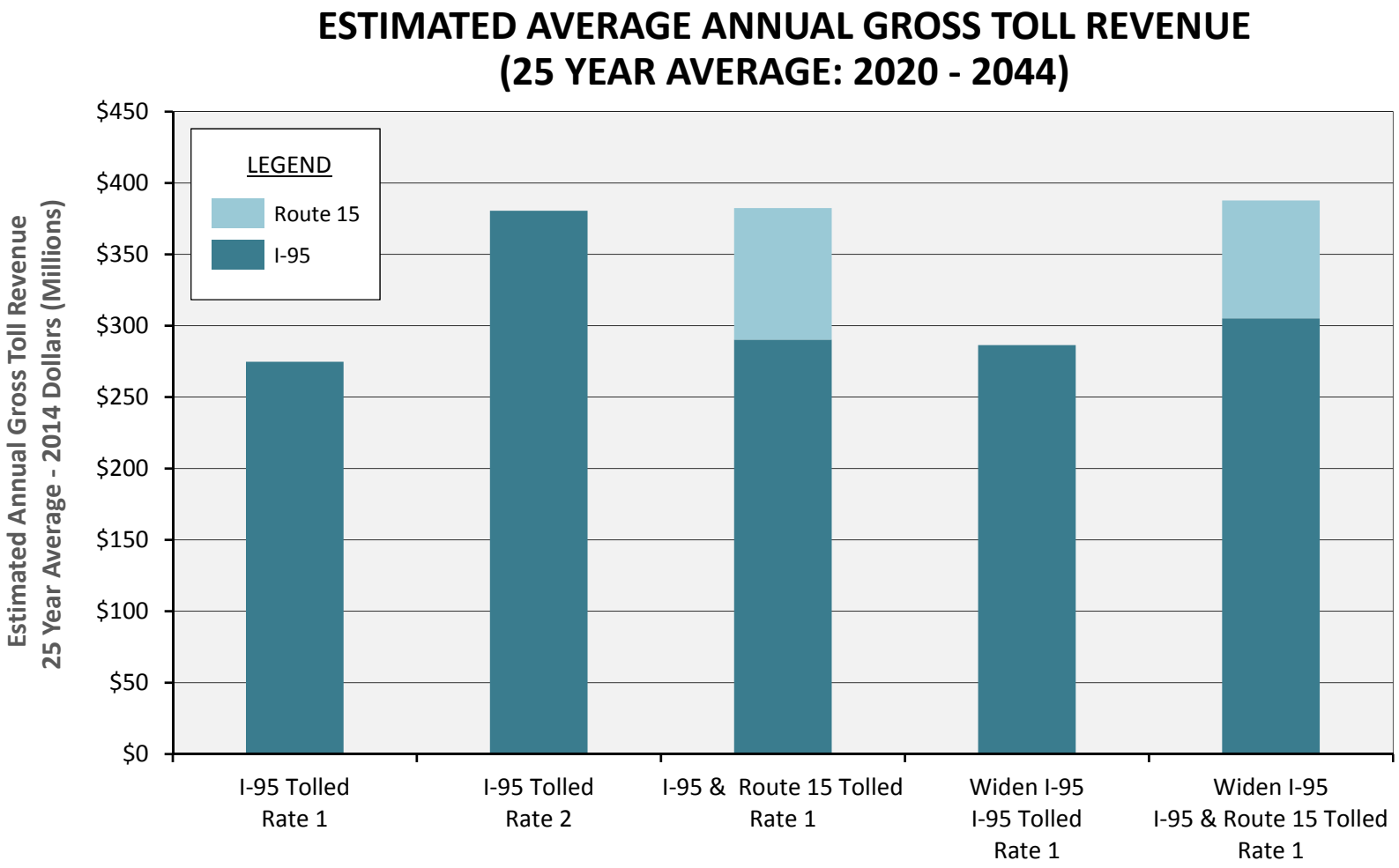

ESTIMATED AVERAGE ANNUAL GROSS TOLL REVENUE
(25 YEAR AVERAGE: 2020 - 2044)
Estimated Annual Gross Toll Revenue
25 Year Average - 2014 Dollars (Millions)
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
LEGEND
Route 15
I-95
I-95 Tolled Rate 1
I-95 Tolled Rate 2
I-95 & Route 15 Tolled Rate 1
Widen I-95 I-95 Tolled Rate 1
Widen I-95 I-95 & Route 15 Tolled Rate 1

Table ES-5
Estimated Net Toll Revenue - 2014 Dollars

Self Operating Toll Operations and Maintenance

	25 Year Annual Average (2020 thru 2044)				25 Year Total
Alternative	**Gross Toll Revenue**	**O&M Cost**	**Cap Cost Amortized (1)**	**Net Toll Revenue (2)**	**Net Toll Revenue**
1	$274,760,000	$10,700,000	$3,557,870	$260,502,130	$6,512,553,000
2	$380,529,000	$9,835,900	$3,557,870	$367,135,230	$9,178,381,000
3	$382,426,000	$16,136,400	$4,973,140	$361,316,460	$9,032,912,000
4	$286,408,000	$10,829,800	$3,682,370	$271,895,830	$6,797,396,000
5	$387,764,000	$16,197,500	$5,069,040	$366,497,460	$9,162,437,000

Outsourced Toll Operations and Maintenance

	25 Year Annual Average (2020 thru 2044)				25 Year Total
Alternative	**Gross Toll Revenue**	**O&M Cost**	**Cap Cost Amortized (1)**	**Net Toll Revenue (2)**	**Net Toll Revenue**
1	$274,760,000	$23,289,500	$3,557,870	$247,912,630	$6,197,816,000
2	$380,529,000	$19,963,300	$3,557,870	$357,007,830	$8,925,196,000
3	$382,426,000	$36,302,800	$4,973,140	$341,150,060	$8,528,752,000
4	$286,408,000	$23,788,800	$3,682,370	$258,936,830	$6,473,421,000
5	$387,764,000	$36,537,700	$5,069,040	$346,157,260	$8,653,932,000

Notes:
(1) Tolling capital cost spread over a 10 year period.
(2) Net toll revenue = gross toll revenue minus O&M and capital cost amortized.

Conclusions

The primary objective of this study was to determine whether congestion pricing on I-95 and Route 15 using All Electronic Tolling could reduce congestion along the I-95 corridor. A robust data collection plan and detailed modeling exercise was performed for a number of alternatives to assess their congestion relief potential for I-95. During the study, it also became clear that toll revenue would also be a critical component to the feasibility of a solution, given the transportation funding challenges and deteriorating buying power of the gas tax facing most states in the U.S., including Connecticut. The two primary performance metrics utilized across alternatives for this study were:

1. Congestion reduction (speed improvements) for I-95 drivers; and
2. Net toll revenue.

As discussed in this Executive Summary and throughout the Report, the findings from this study demonstrate the potential for a significant reduction in the severe congestion levels being experienced along I-95 between New Haven and New York through the use of congestion pricing. The substantial revenue that could be generated through tolling could also be used to support most (if not all) of the cost of widening I-95, depending on the actual magnitude and extent of the widening. It should be noted that early on in the initial screening and testing of study alternatives, managed lanes was found to be an effective tool in providing congestion relief to the corridor. Unfortunately, the high construction cost of the managed lanes alternative largely outweighed the revenue potential and was dismissed from more detailed analysis. Adding capacity and tolling all lanes not only provided

congestion relief, but also provided for substantially higher revenue at a lower cost to construct and implement.

Table ES-6 summarizes the estimated time savings potential and net toll revenue of the most viable alternatives evaluated. The alternatives shown in Table ES-6 are limited to those that were evaluated with the detailed traffic operations model. The estimated time savings shown for each alternative was calculated by comparing each alternative to the estimated No Build condition travel times at 2040 levels. As was supported by the findings throughout the Executive Summary and the report, Alternative 4 and 5 demonstrated the most potential to provide substantial congestion reductions over the No Build condition. While Alternative 1 would provide substantial travel time improvements on I-95 and generate significant toll revenue, it would likely be a tough sell given that no new capacity would be added to the corridor. However, the toll revenue might be used to increase alternative travel modes such as express bus service along I-95 and investment in the Metro North line.

Table ES-6
I-95 Corridor Congestion Relief Study
Summary Comparison of Alternatives Relative to Time Savings and Toll Revenue

		2040 Potential Time Savings (minutes) Versus No Build No Toll Condition I-95 New Haven to New York				Net Toll Revenue ($Billions) 25 Year Cumulative Total	
Scenario	**Description**	**8-9 AM SB**	**Rank**	**5-6 PM NB**	**Rank**	**Net Revenue**	**Rank**
Alt 1	No Build - Toll I-95 only	18	2	61	3	$6.5	3
Build Toll Free	I-95 Widening (Brgpt-Stmfd) - Toll Free	11	4	53	4	N/A	N/A
Alt 4	I-95 Widening (Brgpt-Stmfd) - Toll I-95 only	21	1	84	1	$6.8	2
Alt 5	I-95 Widening (Brgpt-Stmfd) - Toll I-95 and Route 15	15	3	80	2	$9.2	1

Note:
Toll Rate 1: Assumes $0.50 peak / $0.35 off peak toll per tolling location
All tolling scenarios assume tolling from NY State Line to New Haven

A widening of I-95 with no tolling (Build Toll Free) provides some congestion relief to the corridor. However, significant in-fill volume is estimated to be added along the most congested sections between Bridgeport and Stamford with the widening. It was found that this additional volume at interchanges causes increased weaving and merging friction near already heavily used interchanges along the corridor, as traffic would now have to weave over 4 lanes, rather than 3. This finding illustrates the relative inability to build your way out of congestion in a corridor that is heavily saturated throughout the day and has many operational issues due to closely spaced interchanges with very high demand.

Alternative 4 provides the most potential for congestion relief as it provides an extra lane in each direction on I-95 between Bridgeport and Stamford, while tolling only I-95. While a widening of the I-95 corridor would pull in demand from heavily used Route 15 and Route 1 under a toll free condition, the selected toll rates are estimated to manage the demand during peak hours to levels that are slightly lower than No Build volumes during the peak periods. This has a tremendous positive impact on travel speeds as it provides the much needed extra lane of capacity on the same or lower No Build demand. It should be noted that based on the operational analysis, the southbound terminus of the extra lane should be extended southward to the New York border, as its assumed termini in Stamford results in a lane drop and a potential bottleneck. This is one of the contributing factors as to why the AM operational benefits from widening and tolling is much less than the PM benefits.

Similarly, Alternative 5 is estimated to provide substantial time savings over the No Build condition. Alternative 5 assumes a widening of I-95 between Bridgeport and Stamford and a tolling of both I-95

and Route 15. The congestion relief benefits to I-95 are estimated to be a little lower than Alternative 4 as some additional traffic would choose to use the widened I-95 and pay a toll, rather than continue to use Route 15 and pay a toll. Alternative 5 is also estimated to generate 35 percent more revenue as compared to Alternative 4 since both the I-95 and Route 15 corridors would be tolled. The additional benefit of tolling both corridors is the ability to balance traffic between the two corridors through price differentials between the two corridors, if necessary. The additional revenue might help to provide additional funding toward Route 15 improvements and/or transit and Metro North investment.

While any of the tolling alternatives could provide for significant reductions in congestion and new revenue streams for transportation, Alternatives 4 and 5 were found to be the best options for the entire corridor. It should be noted that if tolling of the I-95 corridor is ultimately selected, additional technical analysis should be conducted around the specific location of tolling points, the toll rates during the peak and off peak time periods by travel direction, any toll discount policies, and revised tolling capital and operational cost estimates under a refined tolling configuration. In addition, the geographic limits and potential sequencing of the I-95 widening would need to be studied.

Chapter 1
Introduction

CDM Smith was selected by the Connecticut Department of Transportation (CTDOT) to perform a congestion relief study of Interstate 95 (I-95) and the Merritt Parkway (Route 15) from New Haven to the New York State Line under the Federal Highway Administration (FHWA) Value Pricing Pilot Program (VPPP). This study included the assembly and collection of traffic and travel time data, a stated preference survey to estimate value of time in the study corridors, and a detailed traffic modeling and toll revenue evaluation for a variety of configuration and pricing alternatives. In addition to the technical study and findings discussed in this report, several other study documents have been submitted covering Federal tolling laws, the state of tolling readiness in Connecticut, and P3 models used for tolling. This chapter provides a summary of the study objectives, study area, project team, and report structure.

Study Objective and Scope

The CTDOT submitted a proposal to FHWA in 2011 under the VPPP to study whether congestion pricing on I-95 and Route 15 using all electronic tolling (AET) can reduce congestion in the corridor. The I-95 corridor experiences extraordinary amounts of recurring delay over the 47 miles between New Haven and the New York state line. Congestion typically spans over more than 25 miles with duration of more than 4 hours during the AM and PM periods. Route 15 experiences similar congestion levels, although these tend to be somewhat less in duration.

In addition to the goal of congestion relief, toll revenue was a key factor that was considered across alternatives. The funding of additional highway and transit improvements in the corridor with toll revenue can provide additional congestion relief and choices for travelers. To measure and compare potential congestion relief benefits across alternatives, performance measures such as traffic, vehicle miles travelled, vehicle hours travelled, and travel speeds were summarized for I-95, Route 15, Route 1, separately and as a combined corridor. In addition, a simulation model of I-95 was utilized to quantify and visualize the estimated congestion relief benefits of the various alternatives.

The study was performed in sufficient detail to answer the above objective and included the following key work efforts:

- Development of a current traffic volume and speed profile for I-95 and Route 15, including detailed analysis by time of day and travel direction;
- Application of a Stated Preference (SP) Survey in the I-95 and Route 15 travel corridors to estimate motorists value of time and their potential to:
    - Reduce trip making,
    - Change to transit or other travel mode,
    - Change departure time, or
    - Change route when faced with a variable toll on I-95 and Route 15.
- Enhancement of the Statewide Travel Demand Model;

- Development of an I-95 micro-simulation traffic model in order to analyze the operational impacts on I-95 from pricing and capacity improvements;
- Estimation of the traffic diversion that can be anticipated from pricing I-95 and Route 15; and
- Estimation of annual gross toll revenue, tolling capital costs, tolling operating costs, and net toll revenue for final tolling alternatives;

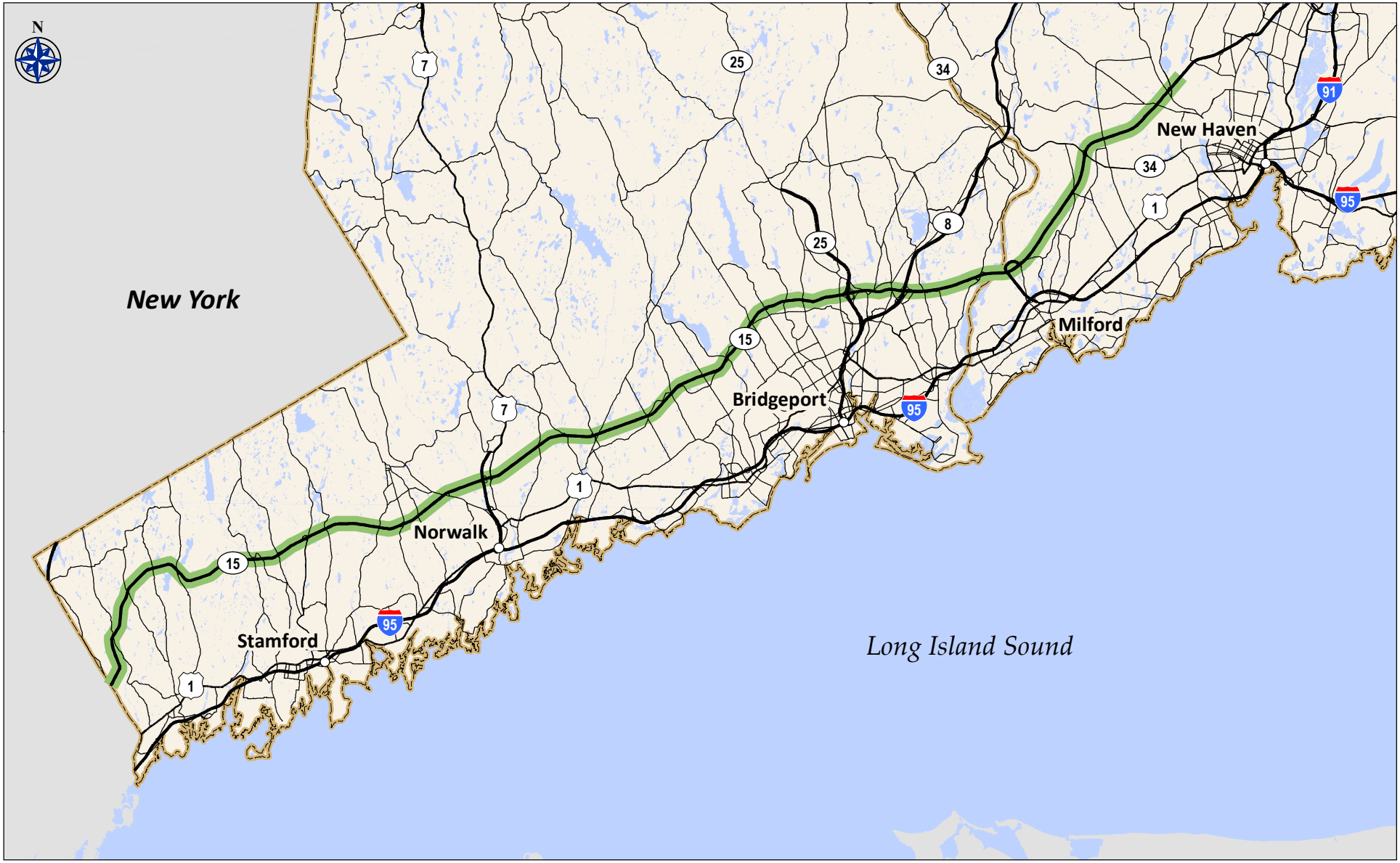
Study Area

The study area is defined as the I-95 corridor from the New York State Line to the I-91/I-95/ Rt-34 interchange in New Haven, Connecticut. **Figure 1-1** depicts the study area, with the highlighting of I-95 and Route 15 (Merritt Parkway / Wilbur Cross Parkway.) Route 1 and the Metro North rail line run parallel to I-95, crossing over I-95 at multiple locations throughout the corridor. Because of the interaction and competition between I-95, Route 15, Route 1, and the Metro North line, CDM Smith developed a study approach that allows for impacts to be estimated across all these roadway facilities and modes of transportation within the defined study area.

Study Team

CDM Smith was the prime consultant with overall responsibility for successful completion of the congestion pricing study. In addition to overall project management and Study Team coordination responsibilities, CDM Smith personnel were responsible for coordinating data collection activities, enhancement of the statewide travel demand model, traffic and toll revenue analysis, public involvement and outreach activities, and the preparation of study documentation. CDM Smith was assisted by eight sub-consultants during the study. These study team members included:

- **Resource Systems Group (RSG)** – RSG was responsible for conducting and analyzing the results of the Stated Preference Survey administered in the I-95 and Route 15 travel corridors. The survey provided estimates of value of time, and other expected travel behavior responses to pricing such as trip suppression and time of day shifting. RSG also worked with CDM Smith in estimating the potential mode shift of I-95 drivers to the New Haven Line of the Metro North Railroad under I-95 and Route 15 pricing alternatives.
- **Cambridge Systematics Inc. (CS)** – CS developed a micro simulation traffic model of I-95 between New Haven and New York to support operational analysis of the various pricing and physical alternatives for I-95. Since congestion reduction in the I-95 corridor is the key objective of the study, this model provides the best tool to evaluate the potential travel speed improvements from pricing and widening alternatives.
- **Emil Frankel** – Emil Frankel was responsible for preparing a Tolling Laws white paper that looked at the current federal laws around tolling, the current tolling exemption programs, and how these may specifically apply to Connecticut.
- **Clary Consulting, LLC** – Clary Consulting was responsible for preparing a Tolling Readiness Report focused on the various organizational approaches that the CTDOT might take if tolling was reinstituted in Connecticut. The report also looks at how other States have setup a tolling operation.



CDM Smith

I-95 AND ROUTE 15 STUDY CORRIDORS

FIGURE 1-1

- **Fitzgerald & Halliday (FHI)** – FHI was responsible for supporting the public outreach effort, including the two major toll briefings that occurred in the I-95 and Hartford areas. FHI also prepared and maintains the project website.
- **VN Engineers, Inc.** – VN Engineers was responsible for supporting field work, including vehicle occupancy and license plate surveys, and the commercial vehicle origin and destination survey.
- **Connecticut Counts** – Connecticut Counts was responsible for conducting new traffic counts in the I-95 and Route 15 study corridors.
- **SkyComp, Inc.** – SkyComp conducted aerial surveys of I-95 and Route 15 to prepare an analysis and documentation of traffic densities, bottlenecks, and queue lengths along I-95 and Route 15.

Report Structure

Chapter 2, **Existing Traffic Conditions**, provides a traffic profile of both I-95 and Route 15, including details on travel speeds and traffic density levels. Additional information is provided on in-state/out-of state percentages, occupancy data, and truck percentages. An additional report documenting an aerial survey conducted by SkyComp to measure traffic density and identify bottlenecks and locations of queuing is included as **Appendix A** of this report.

Chapter 3, **Model Development**, provides a summary of the Connecticut Statewide Model and the methodology used to expand the model into New York and split the model into a four time period traffic assignment. Tables and figures displaying calibration summaries are provided.

Chapter 4, **Stated Preference Survey**, provides a summary of the methodology, procedures, administration and results of the stated preference survey. A copy of the technical details of the surveys, additional tabulations and comments is included as **Appendix B** of this report.

Chapter 5, **Model Refinement for Pricing Analysis**, provides a summary of the methodology and modifications to the demand model to incorporate findings from the Stated Preference survey. This includes value of time estimates by trip purpose, trip suppression factors, time of travel shifts from peak to off peak, and mode shift to Metro North.

Chapter 6, **Final Alternatives and Traffic and Revenue Analysis**, provides a summary of the final alternatives considered and the underlying base assumptions used in the modeling process. The latter parts of the chapter provide documentation of the traffic and revenue estimates for the final alternatives.

Chapter 7, **Tolling Capital Costs, Tolling Operations and Maintenance Costs, and Net Toll Revenue,** provides a summary of how tolling in the corridor might be operated, tolling capital costs, annual operational cost estimates, and net toll revenue.

Chapter 8, **Operations Analysis**, provides the results of the micro simulation modeling and operational analysis of I-95 for the final set of alternatives.

Appendix A - **SkyComp Aerial Survey Report**

Appendix B - **Stated Preference Survey Report**

Appendix C - **I-95 Traffic Operations Reports**

Appendix D - **Tolling Readiness Report**

Appendix E - **Tolling Laws Paper**

Appendix F - **PPP Report**

Chapter 2

Existing Traffic Conditions

To support the technical analysis for this congestion relief study, CDM Smith constructed a data collection plan which included new traffic counts, analysis of INRIX speed data, and collection of information on travel patterns, vehicle occupancy levels, and out of state traffic percentages. This chapter discusses the data collection efforts and presents summaries of the data analysis performed on both the I-95 and Route 15 corridors.

Project Area Description

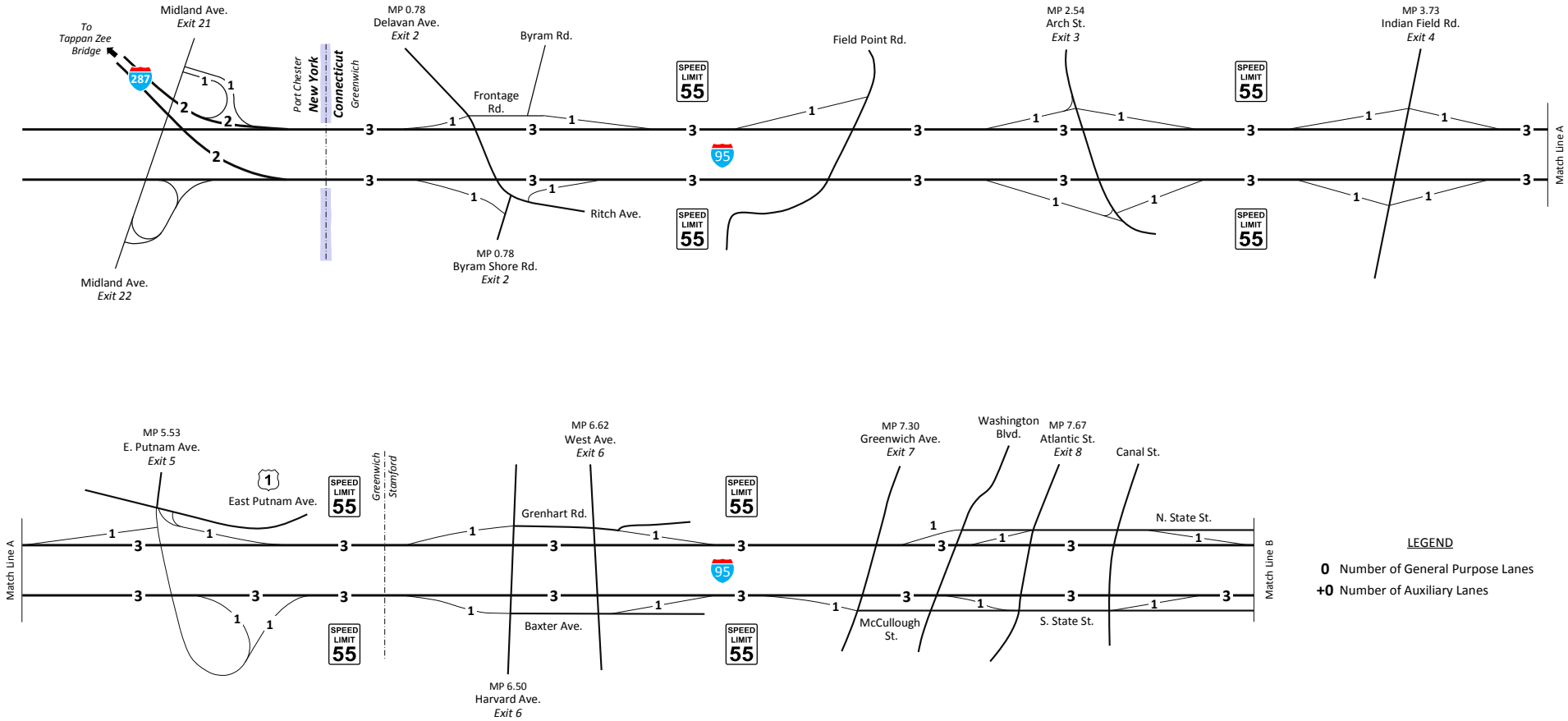
As discussed in Chapter 1, the general area for this study can be defined as the I-95 corridor from the New York State border to the I-91/I-95/ Rt-34 interchange in New Haven, Connecticut. **Figures 2-1 through 2-7** depict I-95 schematically from the I-287 interchange in Port Chester, New York to just north of the I-91/I-95/ Rt-34 interchange in New Haven, Connecticut. Interchange numbers, mileposts, the number of lanes, and posted speed limits are displayed. In general, I-95 has three general purpose lanes in each direction, with sections containing additional auxiliary lanes or in some instances addition general purpose lanes. The posted speeds along I-95 vary through the study corridor between 45 and 55 mph due to construction zones in New Haven, Stratford and Norwalk.

Similarly, **Figures 2-8 through 2-12** depict schematically Route 15 from the I-287/ I-684 interchange in Harrison, New York to the West Rock Tunnel in New Haven, Connecticut. Note that the Wilbur Cross Parkway starts at the Igor I. Sikorsky Memorial Bridge over the Housatonic River and continues northbound to the Berlin Turnpike north of Meriden. Continuing southbound across the Sikorsky Bridge, Route 15 is named the Merritt Parkway, heading toward New York. Both Parkways bear the designation Connecticut Route 15. Route 15 is continuously two lanes in each direction with posted speed limit of 55 mph and 50 mph in Greenwich, Connecticut. Only on the Igor I. Sikorsky Memorial Bridge south of the Milford connector in Stratford do the two general purpose lanes widen to three in each direction.

Data Collection

CDM Smith developed a data collection plan to serve several purposes, including obtaining information on current levels of:

- Traffic;
- Travel speeds;
- Regional and commercial vehicle travel movements;
- Out-of-state traffic percentages;
- Vehicle occupancy levels; and
- Parking utilization at rail stations.



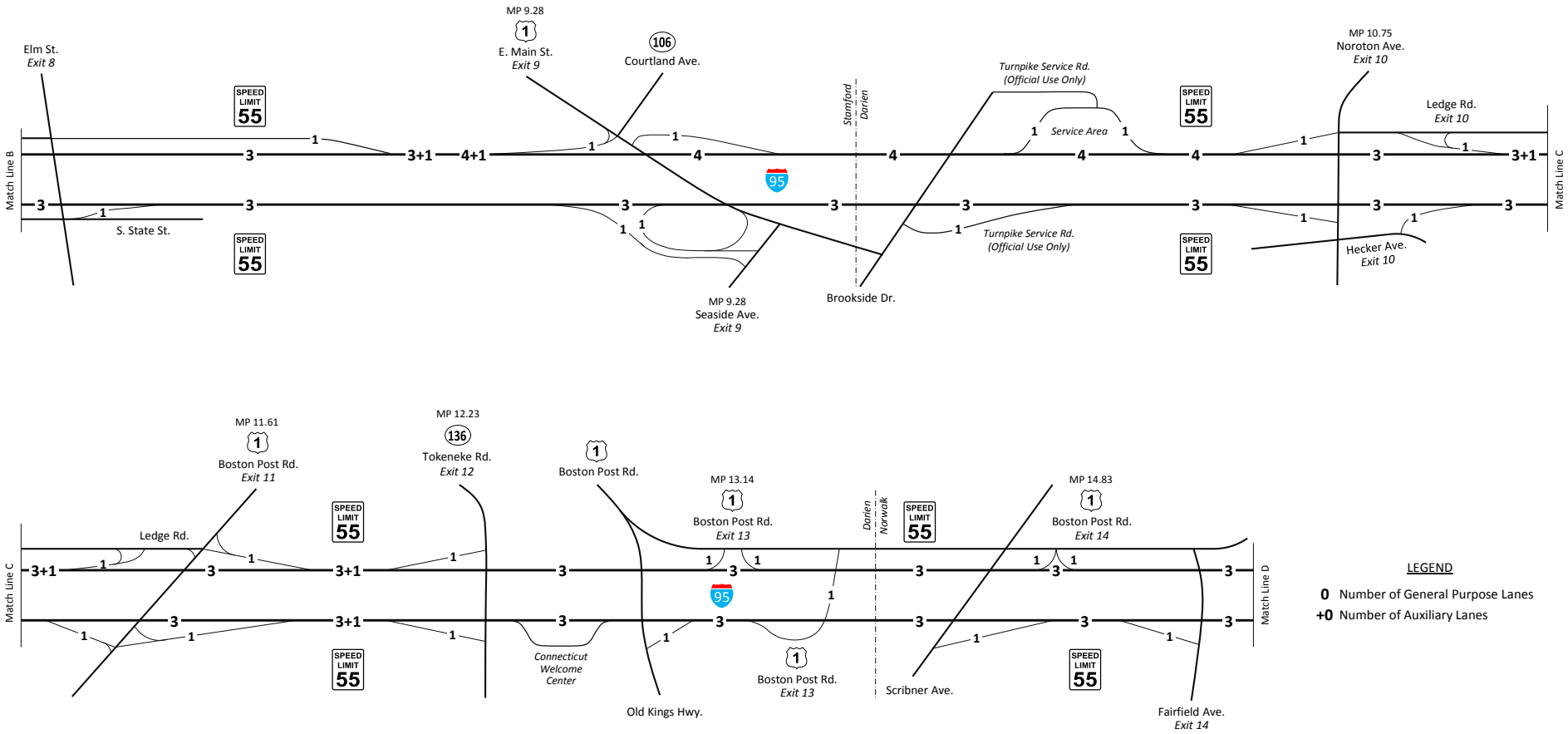
LEGEND

0 Number of General Purpose Lanes

+0 Number of Auxiliary Lanes

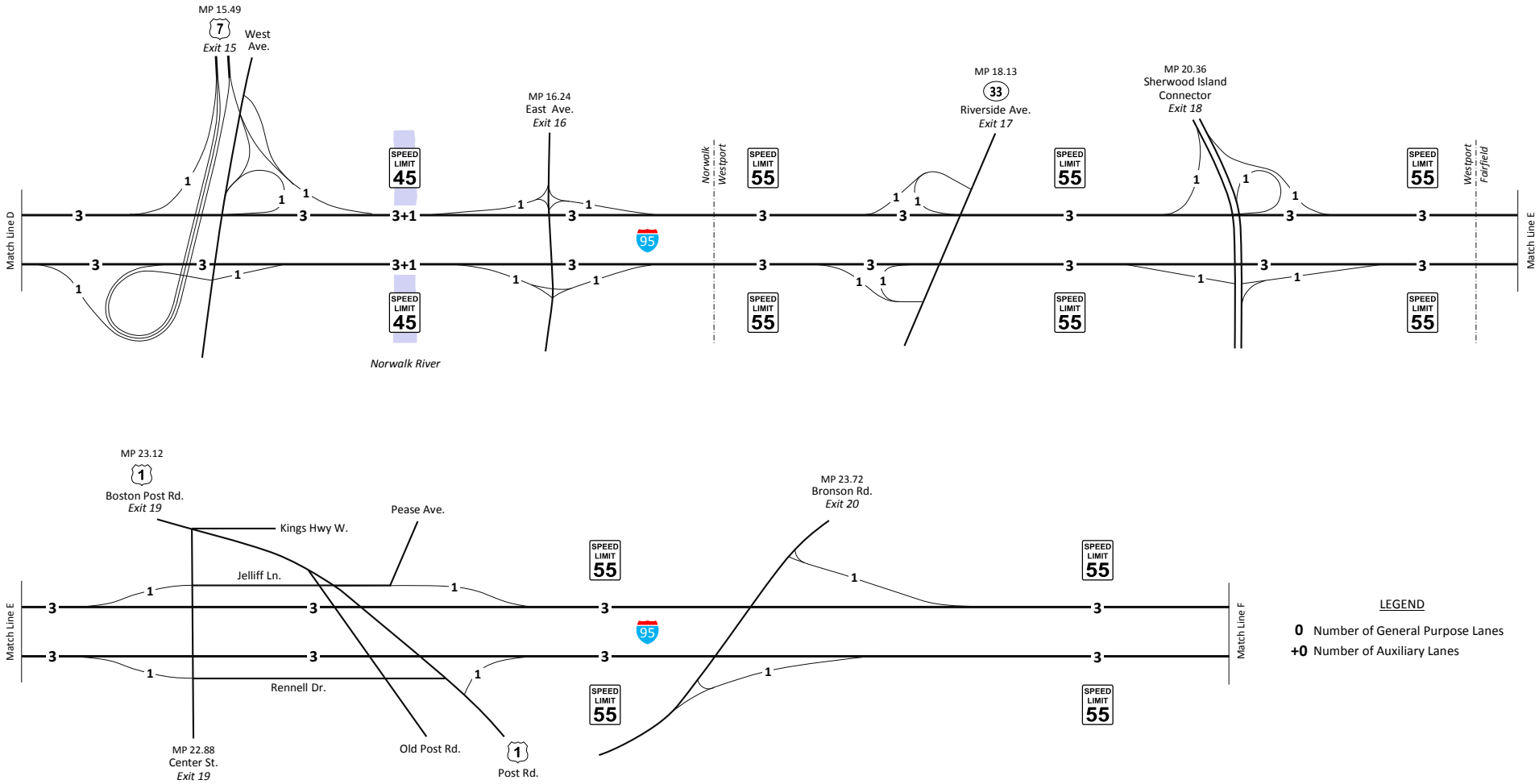
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-1



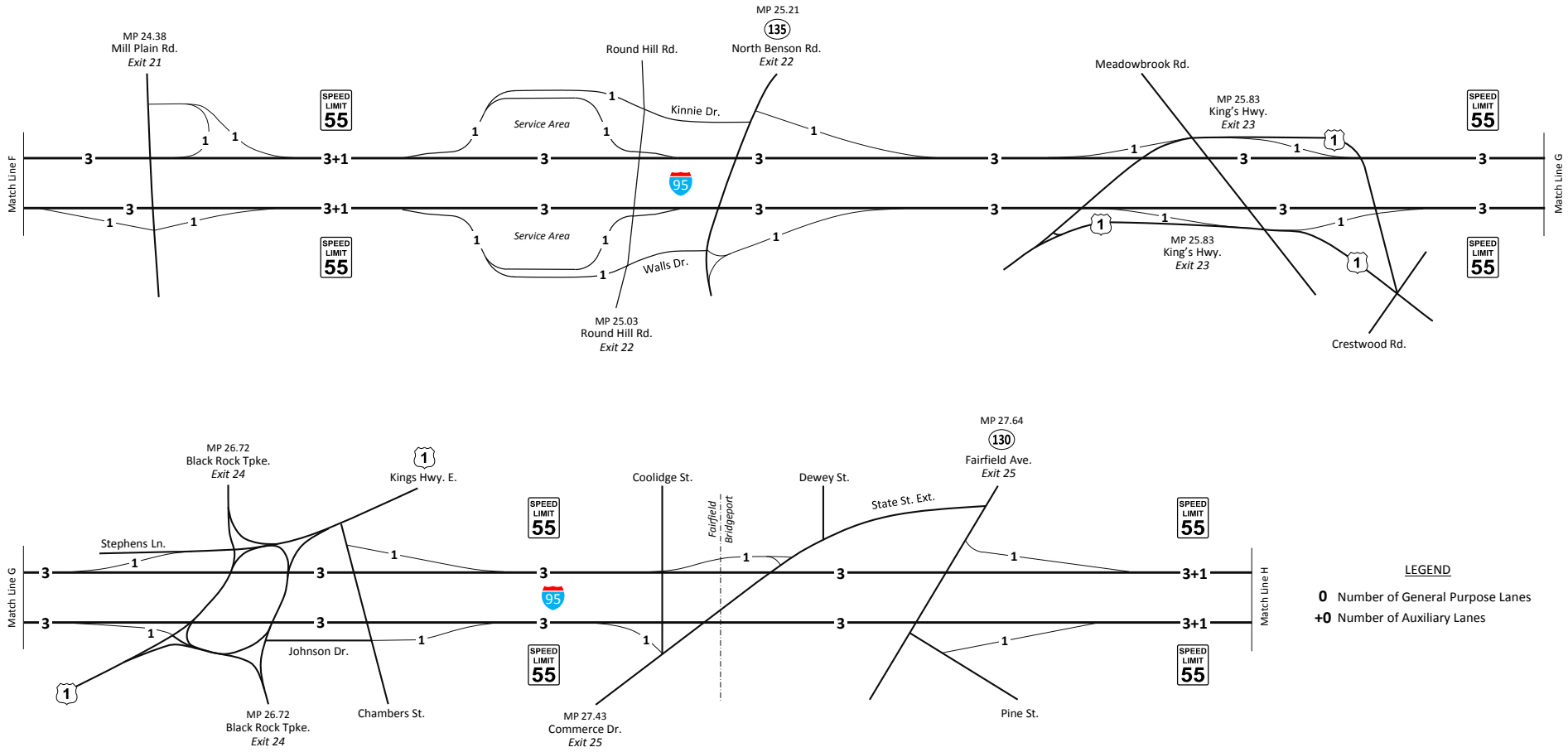
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-2



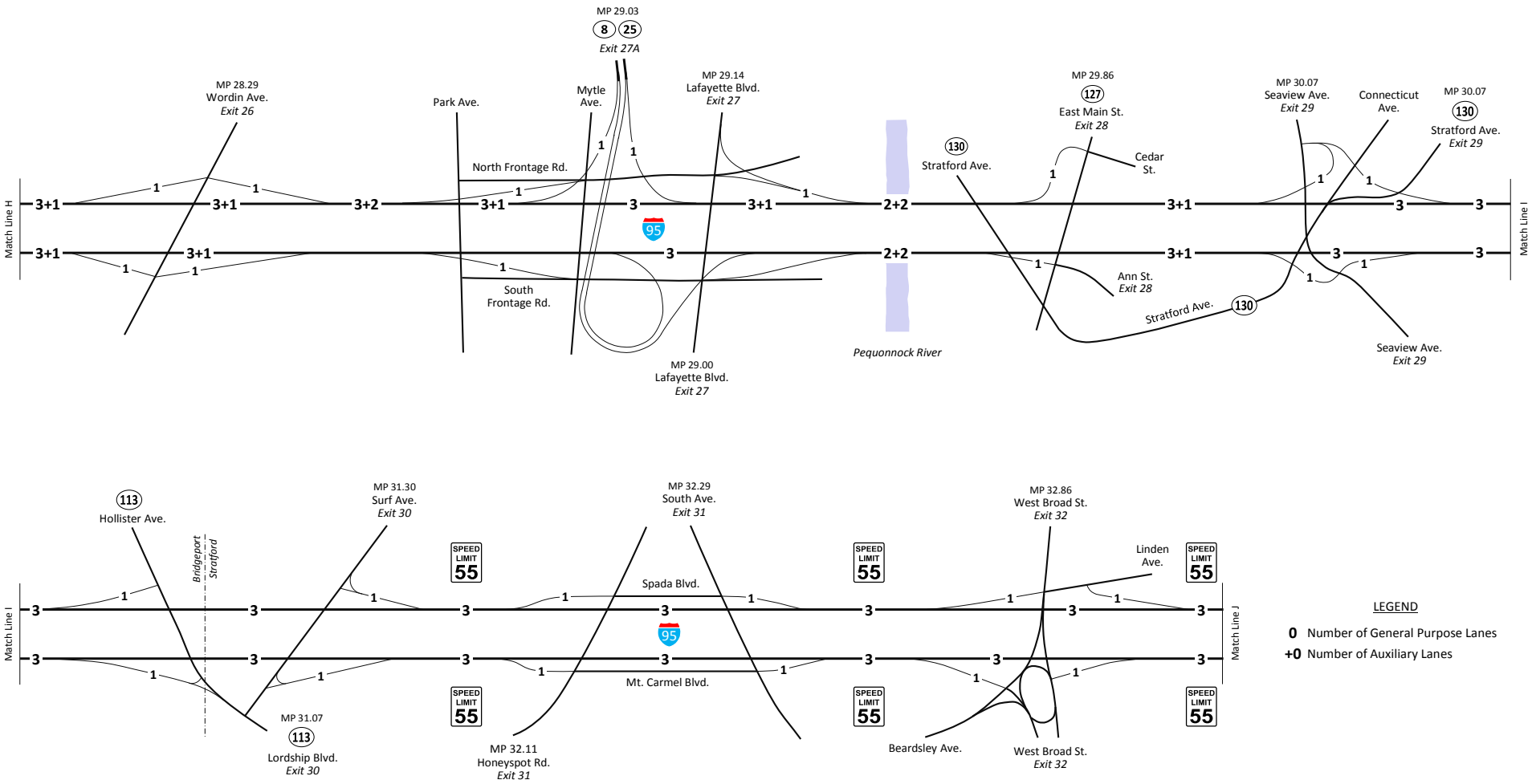
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-3



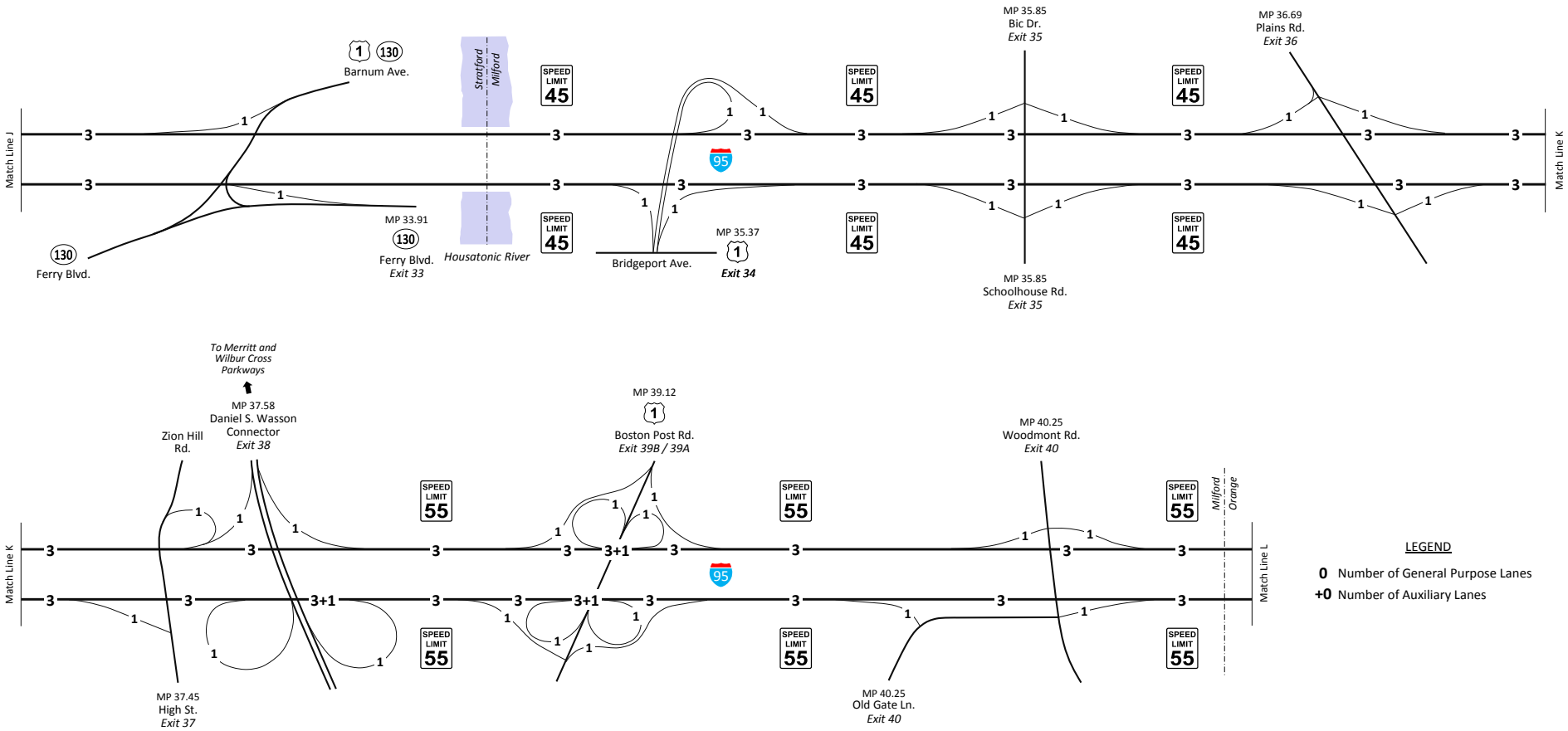
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-4



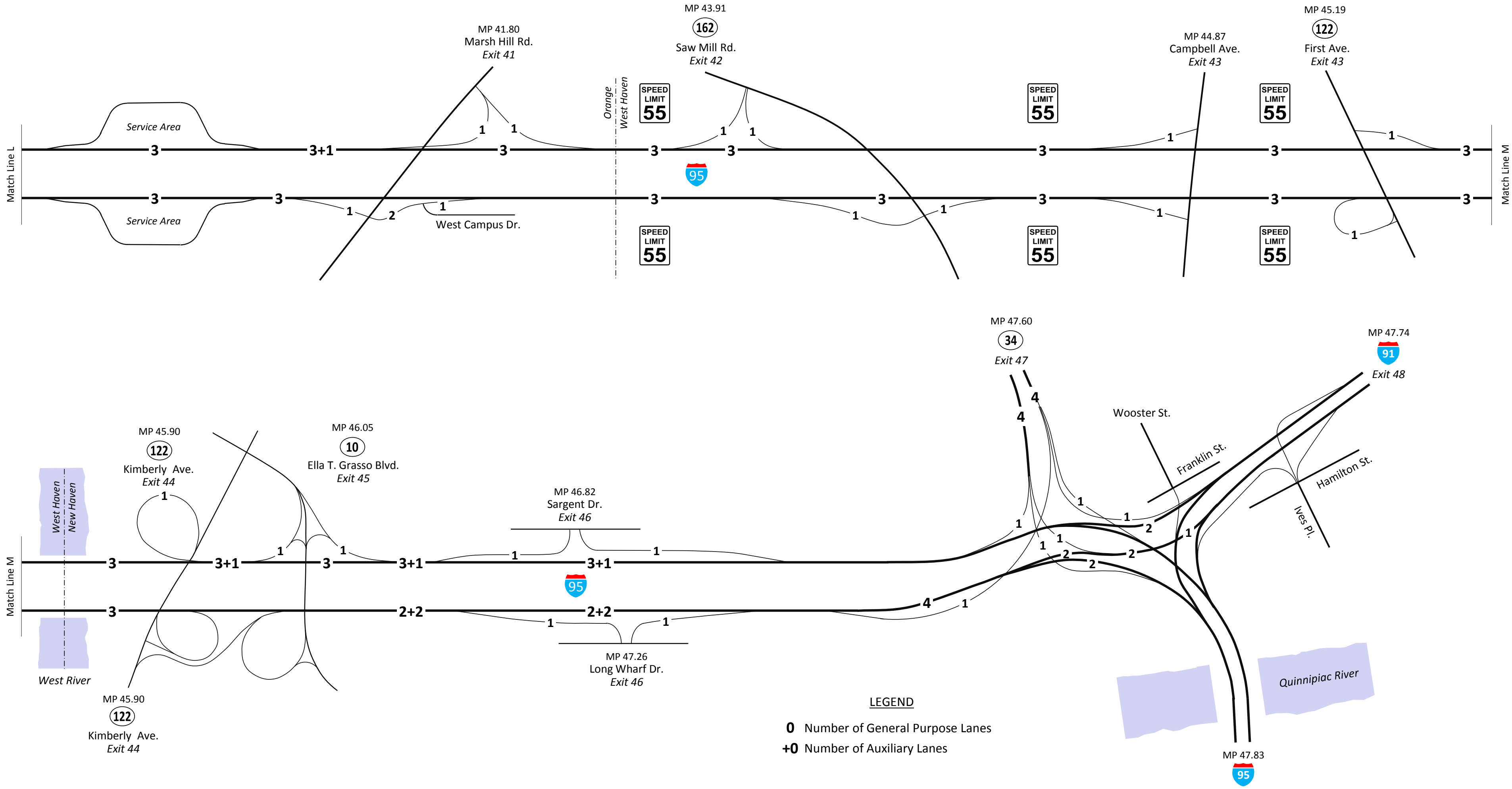
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-5



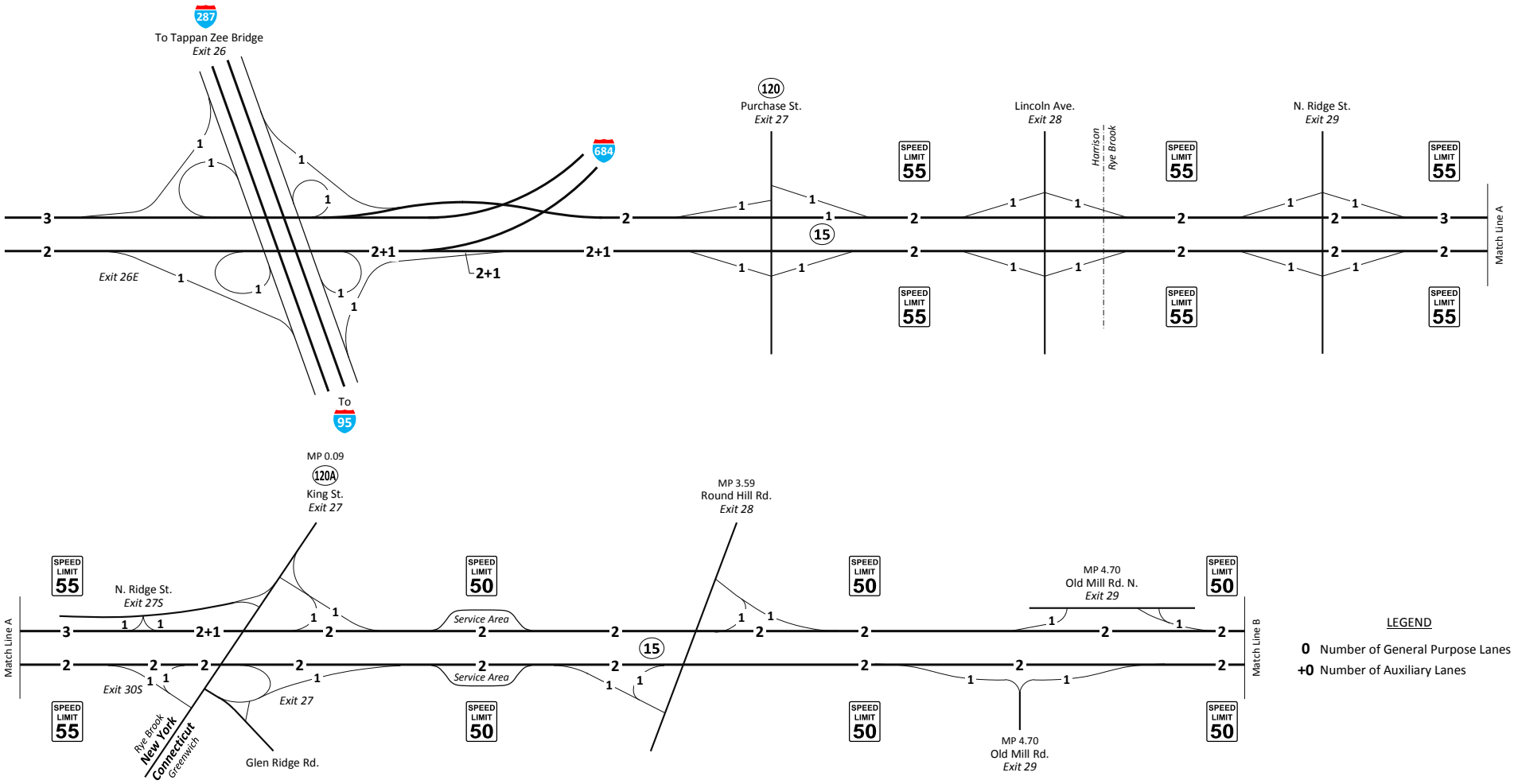
NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

FIGURE 2-6



NUMBER OF LANES AND POSTED SPEED LIMITS - I-95

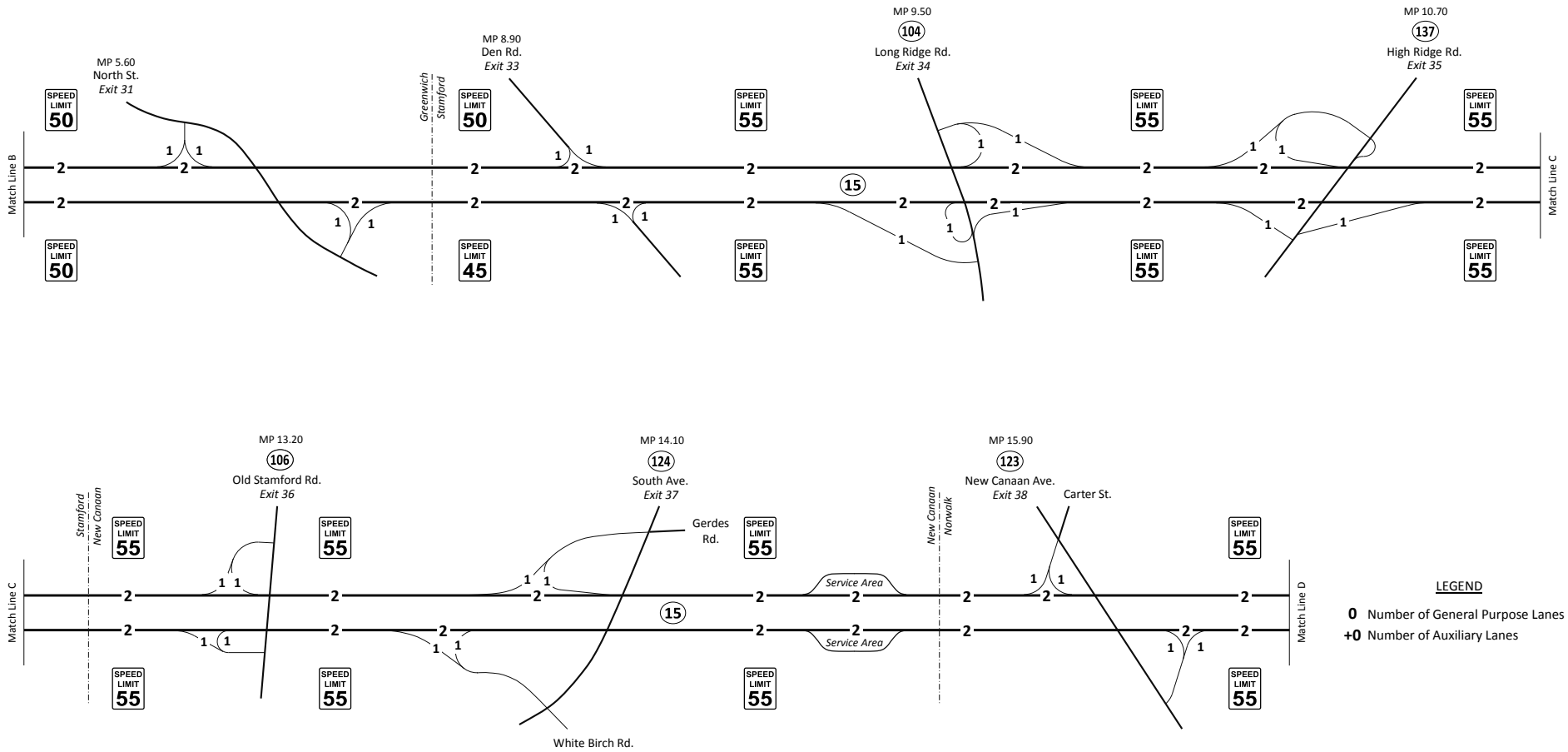
FIGURE 2-7



CDM Smith

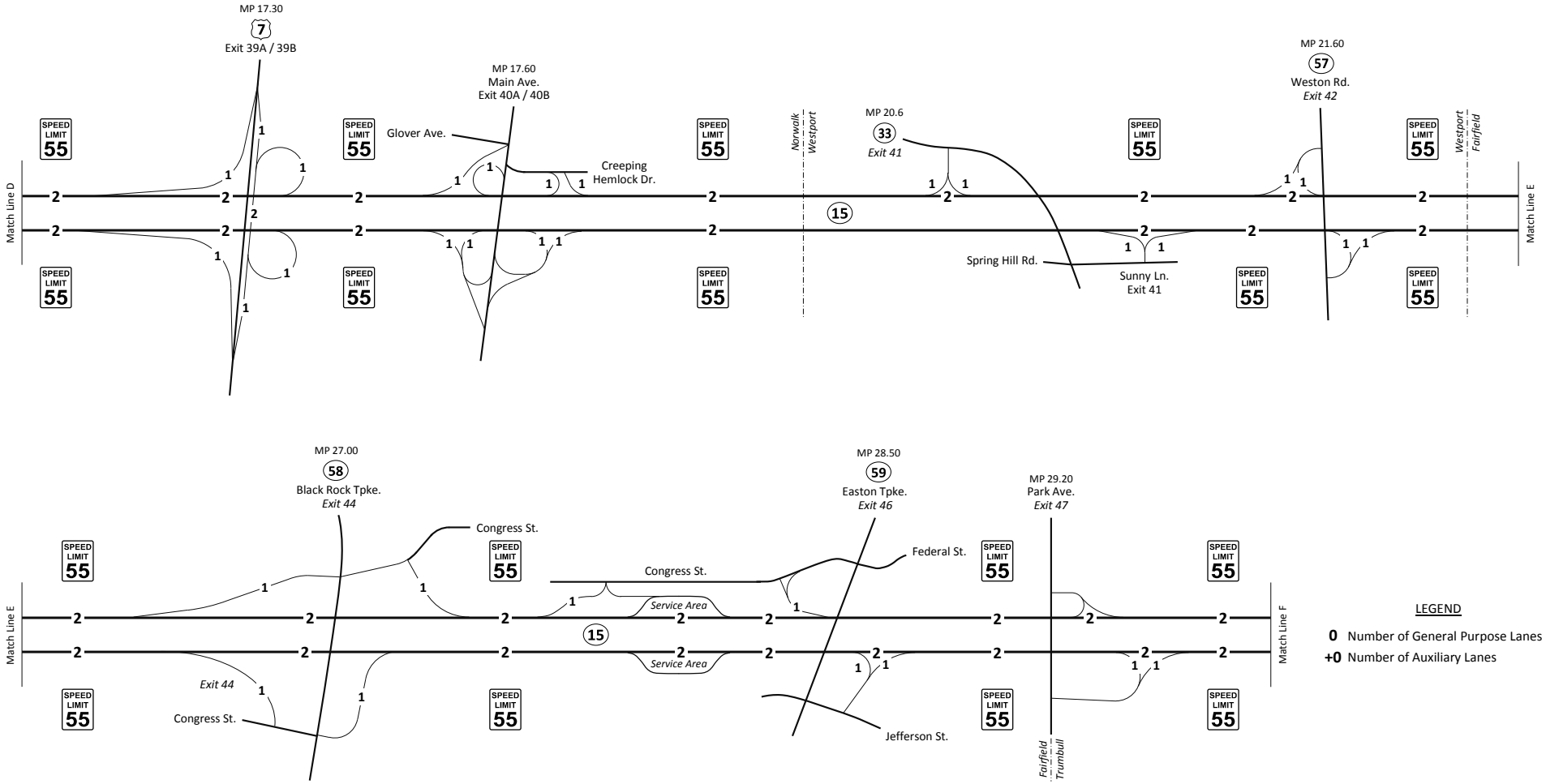
NUMBER OF LANES AND POSTED SPEED LIMITS - ROUTE 15

FIGURE 2-8



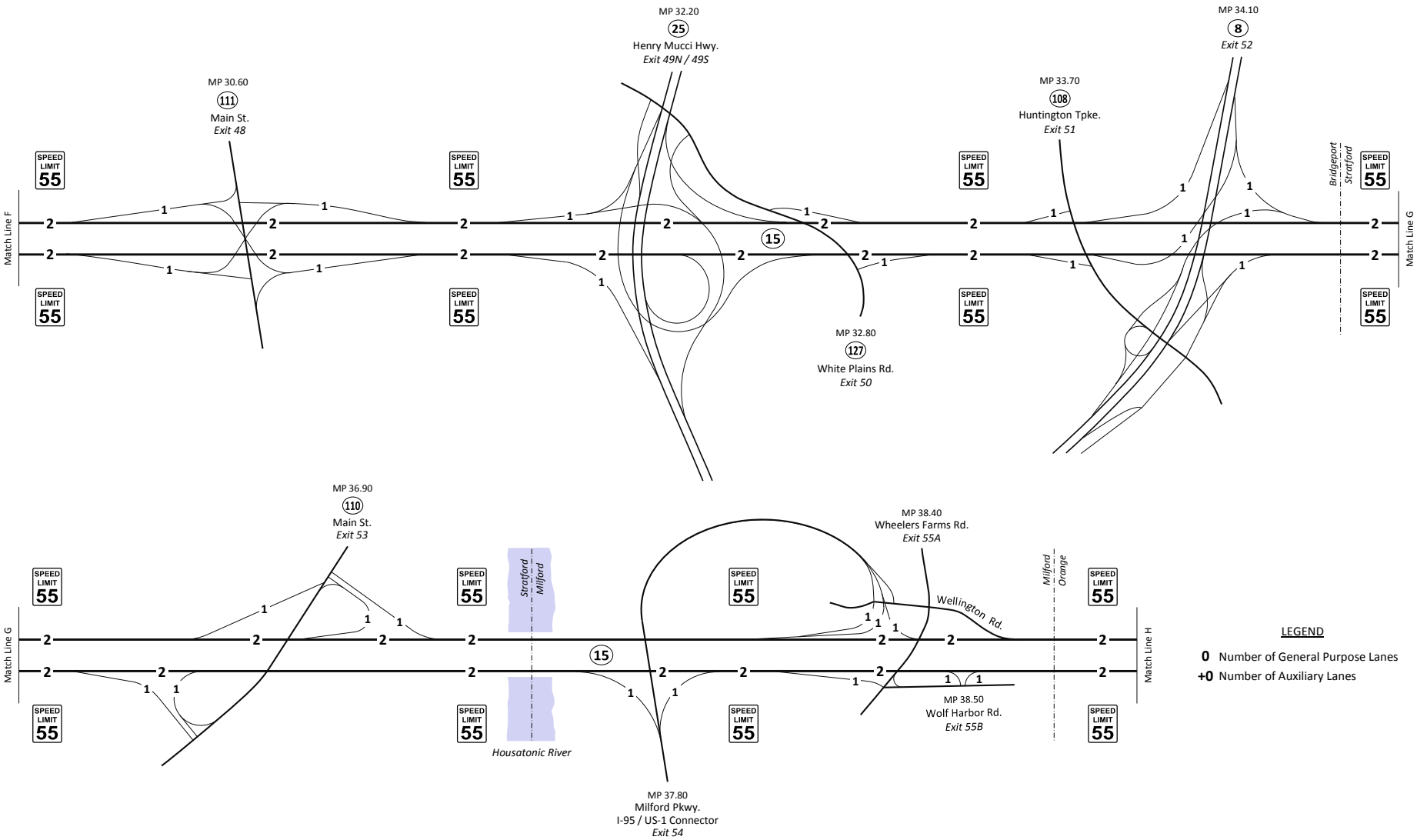
NUMBER OF LANES AND POSTED SPEED LIMITS - ROUTE 15

FIGURE 2-9



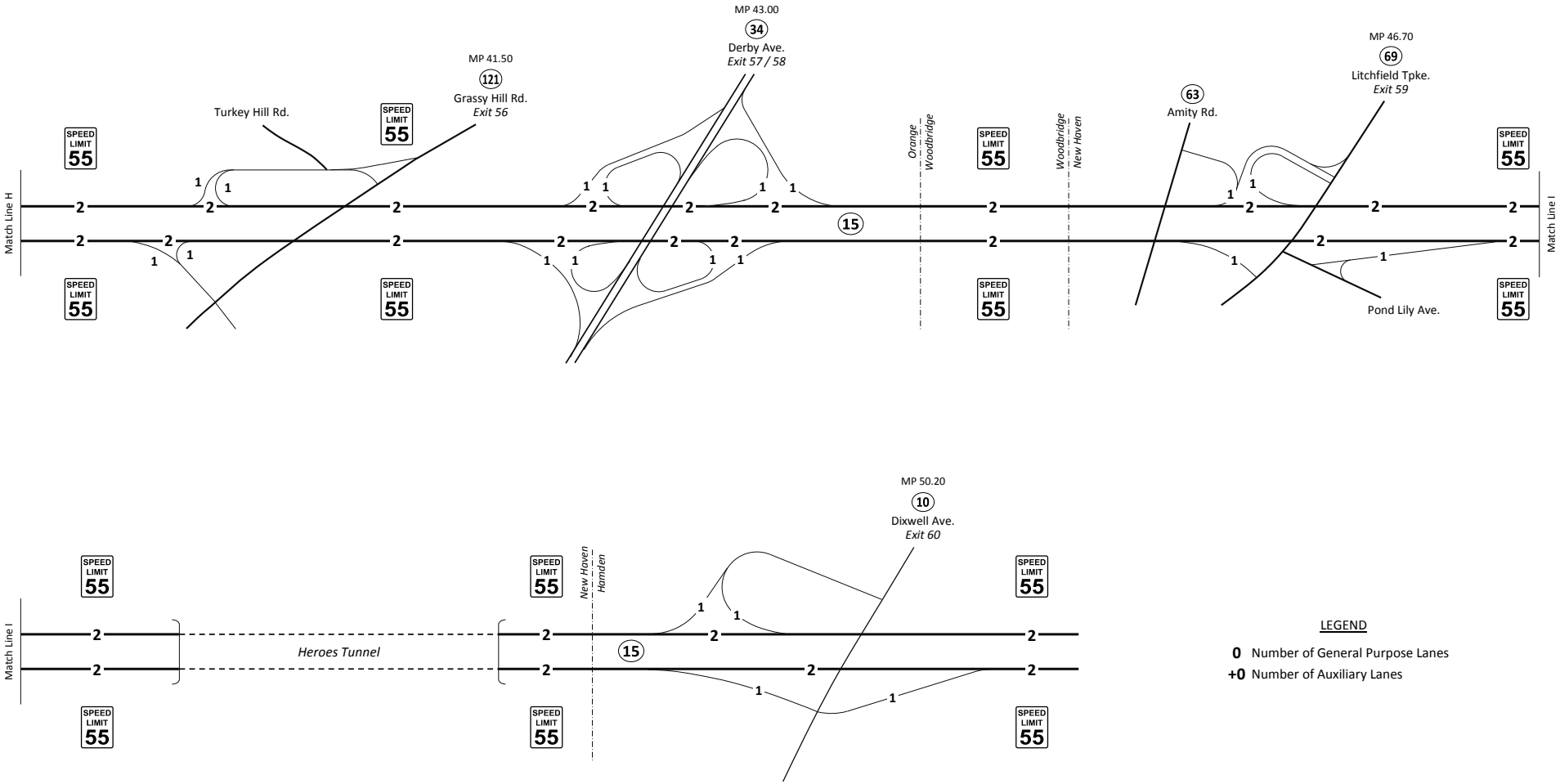
NUMBER OF LANES AND POSTED SPEED LIMITS - ROUTE 15

FIGURE 2-10



NUMBER OF LANES AND POSTED SPEED LIMITS - ROUTE 15

FIGURE 2-11



LEGEND

0 Number of General Purpose Lanes

+0 Number of Auxiliary Lanes

NUMBER OF LANES AND POSTED SPEED LIMITS - ROUTE 15

FIGURE 2-12

All of this data was used to support the detailed traffic and revenue study along I-95 and Route 15. The data allowed for the calibration of a base year travel demand model for the I-95 and Route 15 study corridors which was used to evaluate the potential congestion relief, revenue generation, and diversion impacts of various pricing alternatives.

Traffic Counts

CDM Smith developed a comprehensive list of count locations from which the CT DOT provided available hourly count data. Those locations not covered by existing data, were counted in November and December of 2013, and January and February of 2014. Traffic volumes in the study area are discussed in the following sections.

Historical Traffic Growth

Available historical average daily traffic (ADT) for I-95 and Route 15 was assembled from the CT DOT's Traffic Monitoring Volume Information Traffic Count Data. **Tables 2-1** and **Table 2-2** display historical ADTs spanning nearly two decades for I-95 and Route 15, respectively. To assess the historical growth in traffic and the potential to accommodate future traffic growth (without capacity increases), it is useful to examine past trends and to identify those events that may have caused significant increases or decreases in traffic growth. In the case of I-95, **Table 2-1** illustrates that over the 20 years shown, traffic levels has seen modest gains. The mainline volumes between Exist 9 and Exit 10 in Darien have increased by 0.8% per year over this time period. The ramp volumes at Route 7 in Norwalk and Route 8/25 in Bridgeport, and the Milford Parkway in Milford have shown higher growth, while the ramp volumes shown for Stamford and New Haven have seen lower growth. The period from 1990 to 1999 showed much higher growth rates, followed by a mix of negative and slightly positive growth between 1999 and 2011 due to the mature built-out nature of the local area, the significant capacity constraints of the corridor, the recessions experienced during this time frame, and the multi-modal nature of the corridor.

Table 2-2 illustrates the historical trends on Route 15. The two mainline data points, North of US-7 and at the Housatonic River Bridge (Igor I. Sikorsky Memorial Bridge) show steady volume increases averaging around 1 percent per year over the last 20 years (1992-2012). The largest percent increase in the volumes shown occurred at the Milford Parkway interchange. The majority of the locations shown for Route 15 had decreases in volumes since 2003, which can be attributed to the maturity of the corridor in combination with the impacts of the recession, peak period capacity constraints, and the use of transit by some commuters along the corridor.

Significant long term future growth in traffic volume would not be expected without a physical expansion of the roadways due to the mature nature of the region and the fact that the current configuration in the peak direction of travel is operating at capacity for approximately 4 hours during both the AM peak and PM peak. The capacity constraints of I-95 and Route 15 will be made further evident by discussion of hourly volumes, travel speeds, and traffic densities (Level of Service) in the following sections.

Table 2-1
Historical Average Daily Volumes on I-95 Corridor

	Stamford		Darien	Norwalk	Bridgeport	Milford	New Haven	
	NB Off Ramp to Atlantic St (Exit 8)	SB On Ramp from US 1 (Main St) (Exit 9)	I-95 Between Exit 9 and Exit 10	NB Off ramp to US 7 NB (Exit 15)	Off Ramp to Route 8 & 25 (NB & SB) (Exit 27A)	On Ramp from Milford Parkway (NB & SB)(Exit 38)	On Ramp from I-91 SB to I-95 NB (Exit 48)	Off Ramp to I-91 NB from I-95 SB (Exit 48)
Year								
1990	12,100	7,600	125,750	11,200	16400 SB only	17,400	16,900	17,300
1991	-	-	125,700	-	-	-	-	-
1992	-	-	134,522	-	-	-	-	-
1993	13,200	9,000	136,700	13,300	34,500	18,600	15,100	18,200
1994	-	-	135,600	-	-	-	-	-
1995	-	-	138,600	-	-	-	-	-
1996	14,500	9,100	69,200 NB only	14,100	37,100	19,000	16,000	17,700
1997	-	-	71,400 NB only	-	-	-	-	-
1998	-	-	70,900 NB only	-	-	-	-	-
1999	15,200	9,500	148,300	14,800	38,400	18,900	16,900	18,100
2000	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-
2002	14,700	8,000	148,300	12,900	38,400	19,600	16,800	19,600
2003	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-
2005	14,200	8,500	77,800 SB only	14,900	39,700	20,500	17,800	24,600
2006	-	-	-	-	-	-	-	-
2007	-	-	72,700 NB only	-	-	-	-	-
2008	14,800	9,300	72,200 NB only	14,900	44,800	21,400	16,600	19,800
2009	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-
2011	13,100	8,600	-	14,500	42,500	21,300	16,700	18,900
AAPC								
90-11	0.38%	0.59%	0.77% (1),(2)	1.24%	1.24% (2)	0.97%	-0.06%	0.42%
90-99	2.57%	2.51%	1.85%	3.15%	1.77% (2)	0.92%	0.00%	0.50%
99-11	-1.23%	-0.83%	-0.30% (1),(2)	-0.17%	0.85%	1.00%	-0.10%	0.36%

Source: CT DOT
(1) Calculated with latest year data available.
(2) One directional volume assumed to be half of total.

Table 2-2
Historical Average Daily Volumes on Route 15 Corridor

	Stamford	Norwalk		Westport	Stratford	Milford	New Haven
	NB/SB On/Off Ramps to Route 137 (Exit 35)	NB/SB On/Off Ramps to US 7 (Exit 39A & B)	Route 15 South of US 7	NB/SB On/Off Ramps to Route 33 (Exit 41)	Rtoue 15 at Housatonic River Bridge	SB Off & NB On Ramp to/from Milford Pkwy	NB/SB On/Off Ramps to Route 69 (Exit 59)
Year		Ramps Change					
1992	26,300	17,900	47,900	14,500	63,800	11,400	22,200
1993	-	-	-	-	-	-	-
1994	26,750	18,100	48,600	15,100	64,800	10,300	23,300
1995	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-
1997	29,800	18,700	52,100	15,800	66,800	11,200	21,700
1998	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-
2000	29,600	18,200	54,000	16,200	72,100	12,900	22,600
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-
2003	29,800	21,300	61,800	17,200	76,800	13,500	23,700
2004	-	-	-	-	-	-	-
2005	-	-	-	-	-	-	-
2006	27,700	20,800	57,800	17,100	78,800	14,100	22,900
2007	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-
2009	26,600	22,000	59,300	17,400	81,400	14,400	24,300
2010	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-
2012	26,800	21,200	59,700	16,700	80,400	16,100	-
AAPC							
92-12	0.09%	0.85%	1.11%	0.71%	1.16%	1.74%	0.53%
92-00	1.49%	0.21%	1.51%	1.40%	1.54%	1.56%	0.22%
00-12	-0.82%	1.28%	0.84%	0.25%	0.91%	1.86%	0.81%

Source: CT DOT

(1) Calculated with latest year data available.

Hourly Traffic

Figures 2-13 and 2-14 illustrate the historical hourly traffic profile on I-95 between Exits 23 and 24 in Fairfield. Over this time horizon, the capacity of this section has remained 3 lanes in each direction. **Figure 2-13** displays the southbound direction of travel clearly showing the AM peaking pattern. The Southbound AM Peak is shown to start around 6:00AM and ends between 9:00 and 10:00 AM. Significant conclusions can be drawn from this figure. Only in 1992 and 1993 does the peak reach an excess of six thousand vehicles per hour at 7:00AM, reflecting the typical capacity of a 3 lane Interstate facility. In 2008 and 2009, the volume during the peak hour is actually lower than peak shoulder periods. This phenomenon occurs when breakdown conditions are present, where stop and go conditions and reduced travel speeds are restricting throughput. Typically, traffic volume determines travel speed conditions. Under breakdown conditions, this relationship is flipped and travel speeds dictate throughput. This illustrates that travel demand for the facility is greater than capacity and/or reflects a downstream bottleneck. Furthermore, years 2008 and 2009 show a peak spreading phenomenon in the AM period, where the magnitude in volume is similar between 6:00AM and 10:00AM.

In addition to the temporal spreading of traffic during peak hours due to breakdown conditions, the spreading of traffic can also be attributed to a behavioral response of motorists' where they shift their departure time to just outside the peak, thus either traveling earlier or later to their destination to avoid unacceptable levels of congestion or to ensure they reach their destination in time given the unreliable nature of the I-95 corridor.

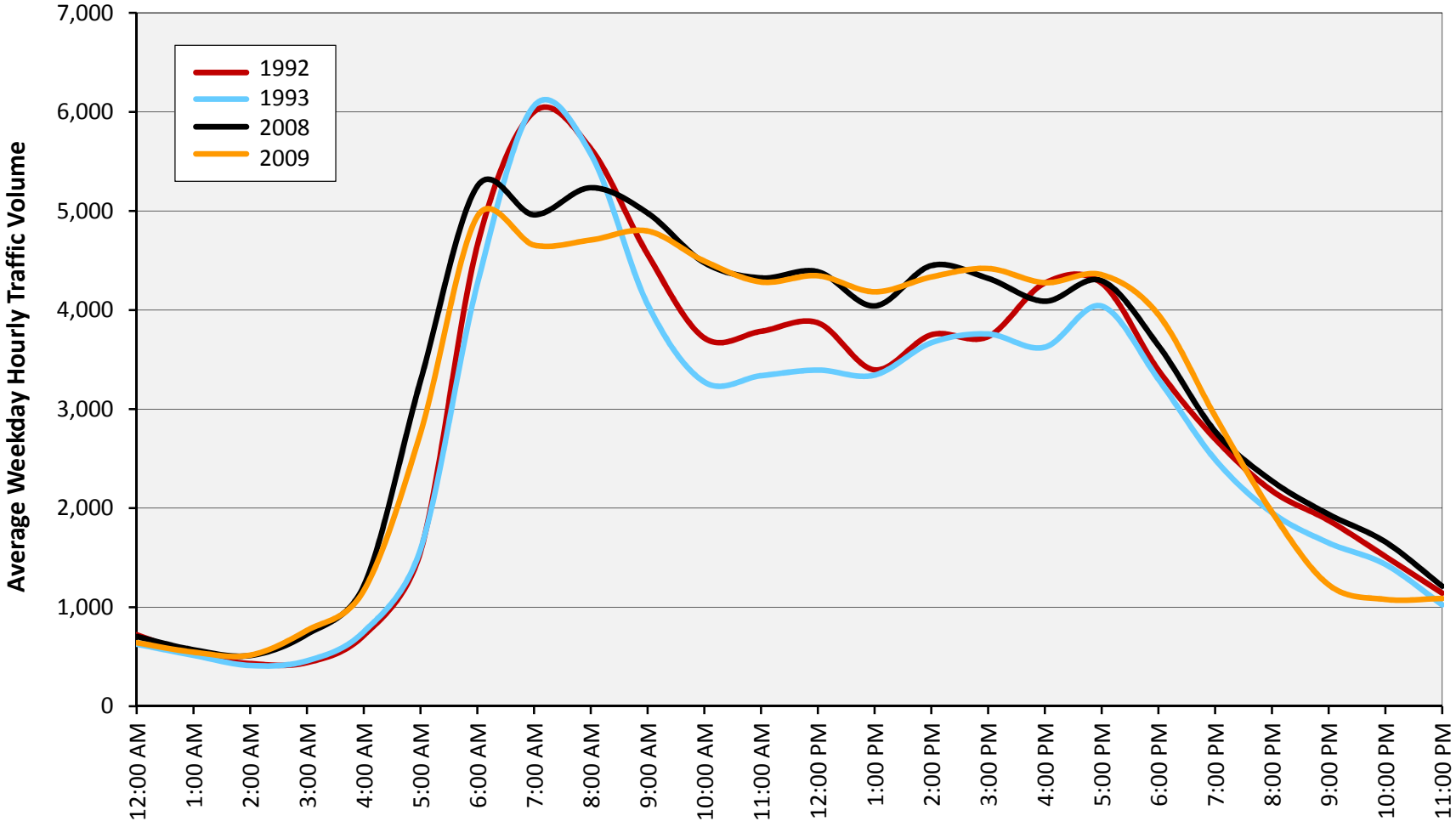
In **Figure 2-14**, the northbound direction displays that in the early years (1991 through 1994) evening peaking occurred between 4:00PM and 6:00PM. Unlike the southbound direction, the northbound direction volumes never exceed volumes higher than 1,900 vehicles per lane (highest recorded volume of 5,833 in 2009 across all three lanes). Since 2007, the traffic data shows a characteristic "V" peak pattern between 4:00PM and 6:00PM, illustrating a clear pattern of oversaturation in the northbound direction, where the traffic demand for the facility was greater than its capacity and breakdown conditions were present. The volume profile in 2008, 2009, and 2010 show higher volumes than previous years, but also reflect significant peak spreading where the peak period volume is effectively flat between 3:00PM and 7:00PM.

Monthly Traffic Variations

Monthly traffic variations on I-95, Route 15, and major arterial routes were assembled and are shown in **Figure 2-15.** As with most heavily travelled Interstates in the northeast, traffic is highest during the summer months with the lowest traffic occurring during the winter months. Overall, monthly traffic levels throughout the year are fairly consistent, ranging between 5 to 10 percent around the average. In addition to the locations on I-95 and Route 15, monthly traffic variations are shown at four other locations on major arterials in the study area. In general, monthly variations are with +-5 percent around the average for the arterials shown. Route 134 is the outlier with a range of +-10 percent due to the significant spike in volumes during May and June.

Daily Traffic Variations

Figure 2-16 displays the daily traffic variation at the same I-95, Route 15, and major arterial locations as presented in the monthly variation figures. Traffic levels increase on I-95 and Route 15 throughout the week to the highest level on Friday, which is roughly 10 percent higher than the average daily traffic. Weekend traffic on Route 15 is less than 90 percent of average daily traffic, while on I-95 it is within 5 percent of average daily traffic. Sunday carries the lowest amount of traffic. The state routes



AVERAGE WEEKDAY HOURLY TRAFFIC VOLUME
I-95 SOUTHBOUND BETWEEN EXIT 23 AND EXIT 24 (FAIRFIELD)

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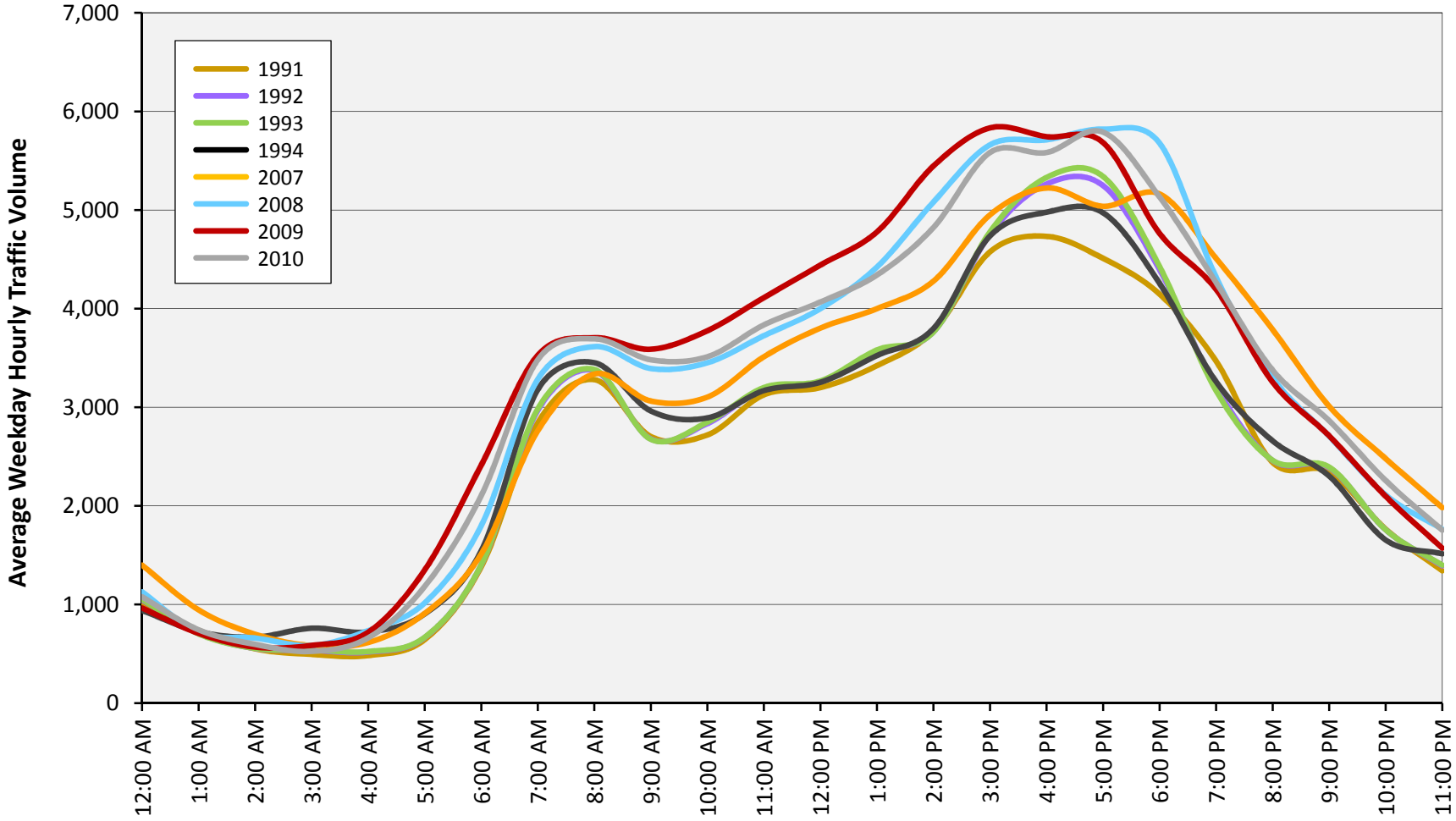
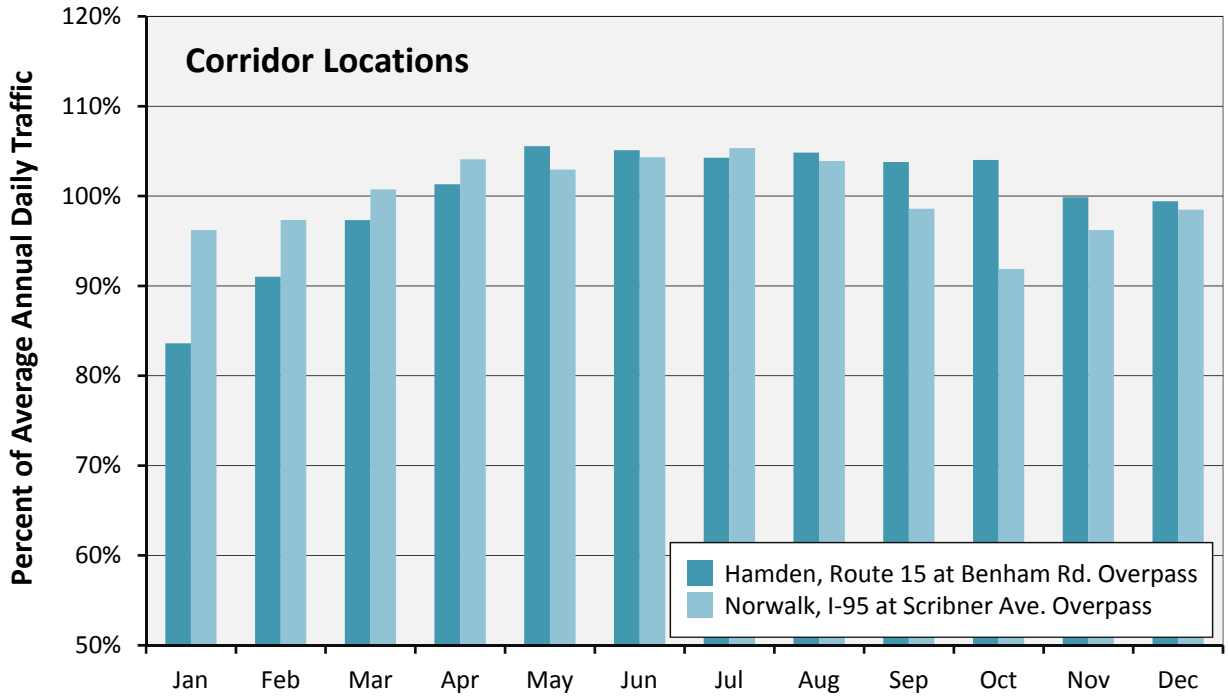
FIGURE 2-13



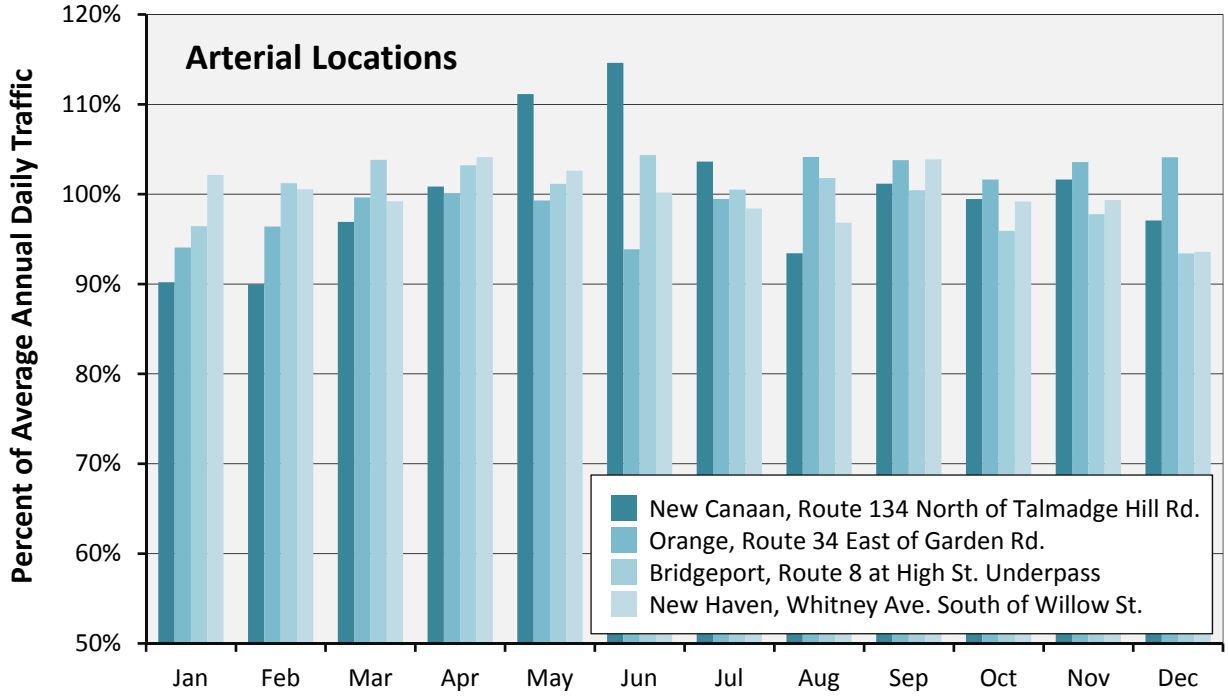
AVERAGE WEEKDAY HOURLY TRAFFIC VOLUME
I-95 NORTHBOUND BETWEEN EXIT 23 AND EXIT 24 (FAIRFIELD)

CDM Smith

FIGURE 2-14



Note: Route 15 based on 2011-2013 data.



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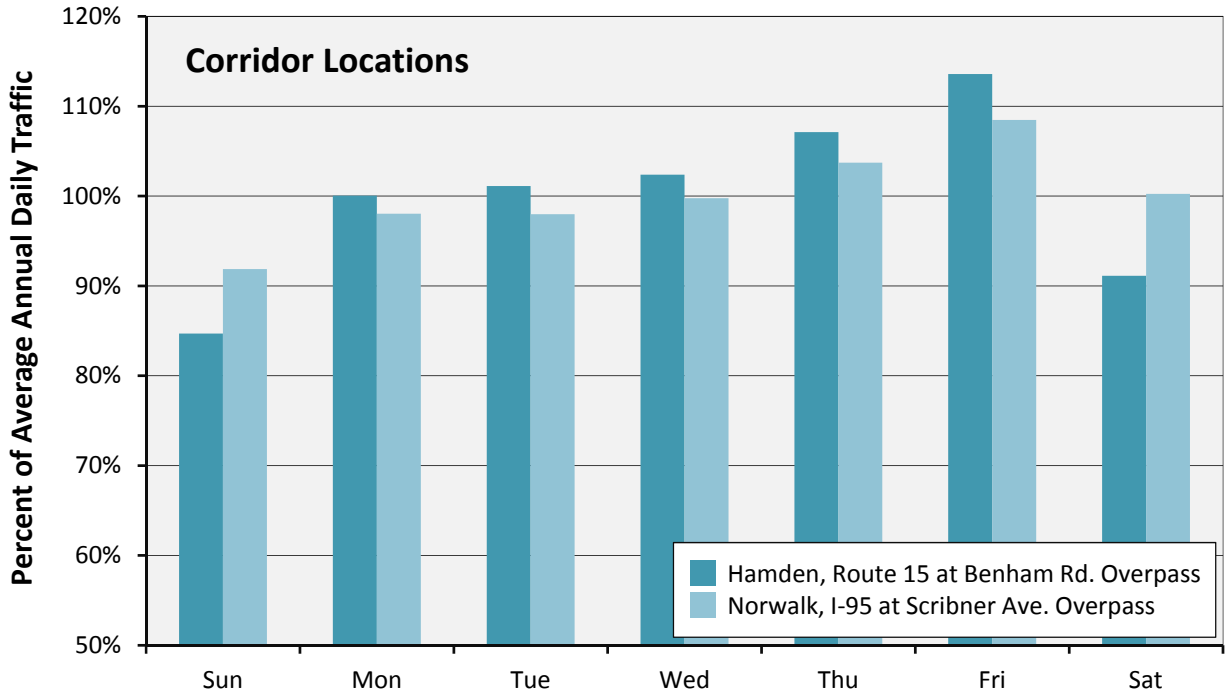
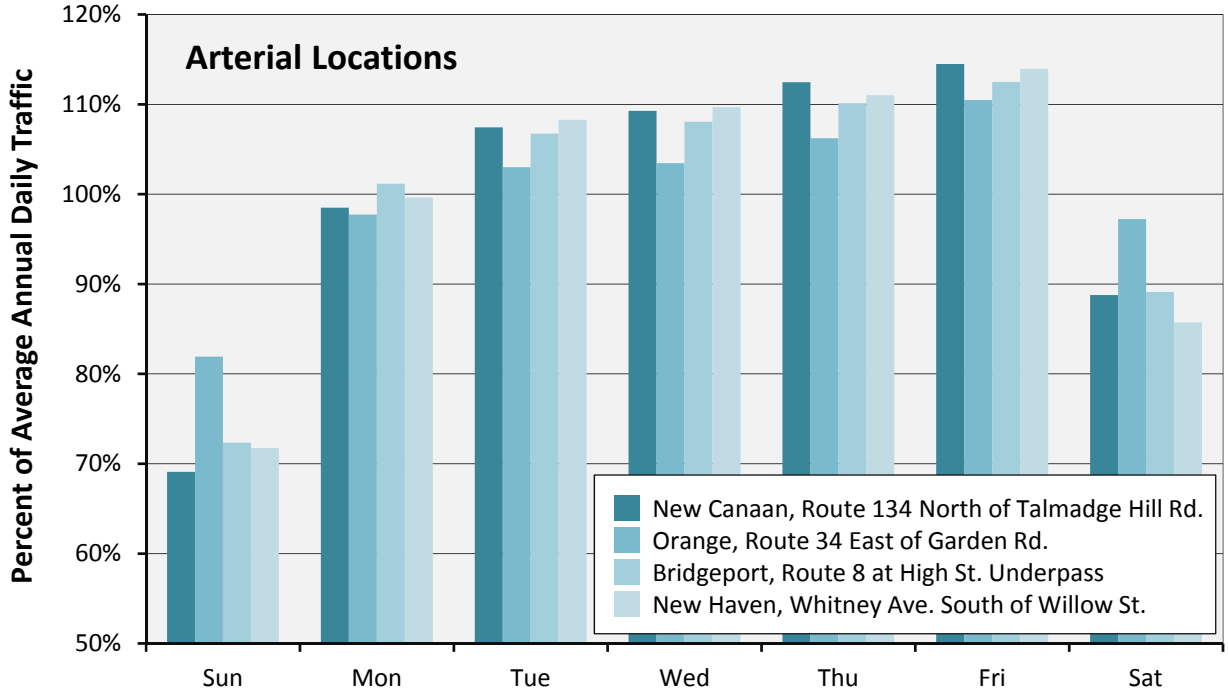
MONTHLY HISTORICAL TRAFFIC COUNTS

FIGURE 2-15



Note: CT-15 based on 2011-2013 data.



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DAILY HISTORICAL TRAFFIC COUNTS

FIGURE 2-16

display a larger variation between weekday and weekend day usage as compared to I-95 and Route 15. On Sundays, traffic is roughly 70 percent of average daily traffic with the exception of Route 34, which carries (82 percent of average). Like I-95 and Route 15, travel demand increases throughout the work week to its highest level on Friday.

Truck Percentages

Table 2-3 displays truck percentages on I-95 in Greenwich, Connecticut between Exits 4 and 5. On an average weekday, passenger vehicles, motorcycles, and buses (FHWA vehicle classification 1 through 4) account for roughly 87 percent of the traffic. Single Unit Trucks (FHWA classification 5 through 7) account for approximately 4% of the traffic. The Simple Trailer Trucks (FHWA vehicle class 8 through 10) account for roughly 8.5 percent of traffic and Double or More Trailer Trucks (FHWA vehicle class 11 through 13) account for about 0.5 percent of traffic. Truck shares are lowest during the AM peak period at roughly 6 to 7 percent of total traffic, with slightly higher shares during the PM peak period. As expected, truck shares are at their highest during the night period at approximately 18 percent, with simple trailer trucks accounting for about 14 percent of total traffic. During the midday time period truck shares are also significant at 13 to 15 percent of total traffic, with simple trailer trucks accounting for 7 to 9 percent of traffic. It should be noted that vehicles over eight feet in height, weighing more than four tons, towing a trailer, or containing more than four wheels are not allowed on Route 15.

Table 2-3
I-95 Truck Percentages (north of Exit 4)

	AM (7AM-9AM)	MD (9AM-3PM)	PM (3PM-6PM)	NT (6PM-7AM)	Total Day
Northbound					
Car, Motorcycle & Bus	93.6%	87.1%	92.8%	81.5%	87.4%
Single Unit Trucks	3.2%	5.2%	3.0%	2.9%	3.7%
Simple Trailer Trucks	3.0%	7.4%	4.0%	14.5%	8.4%
Double or More Trailer Trucks	0.2%	0.2%	0.2%	1.1%	0.5%
Southbound					
Car, Motorcycle & Bus	92.9%	85.2%	92.0%	82.4%	86.8%
Single Unit Trucks	3.7%	5.0%	2.6%	3.4%	3.8%
Simple Trailer Trucks	3.1%	9.1%	5.1%	13.1%	8.7%
Double or More Trailer Trucks	0.4%	0.7%	0.2%	1.1%	0.7%

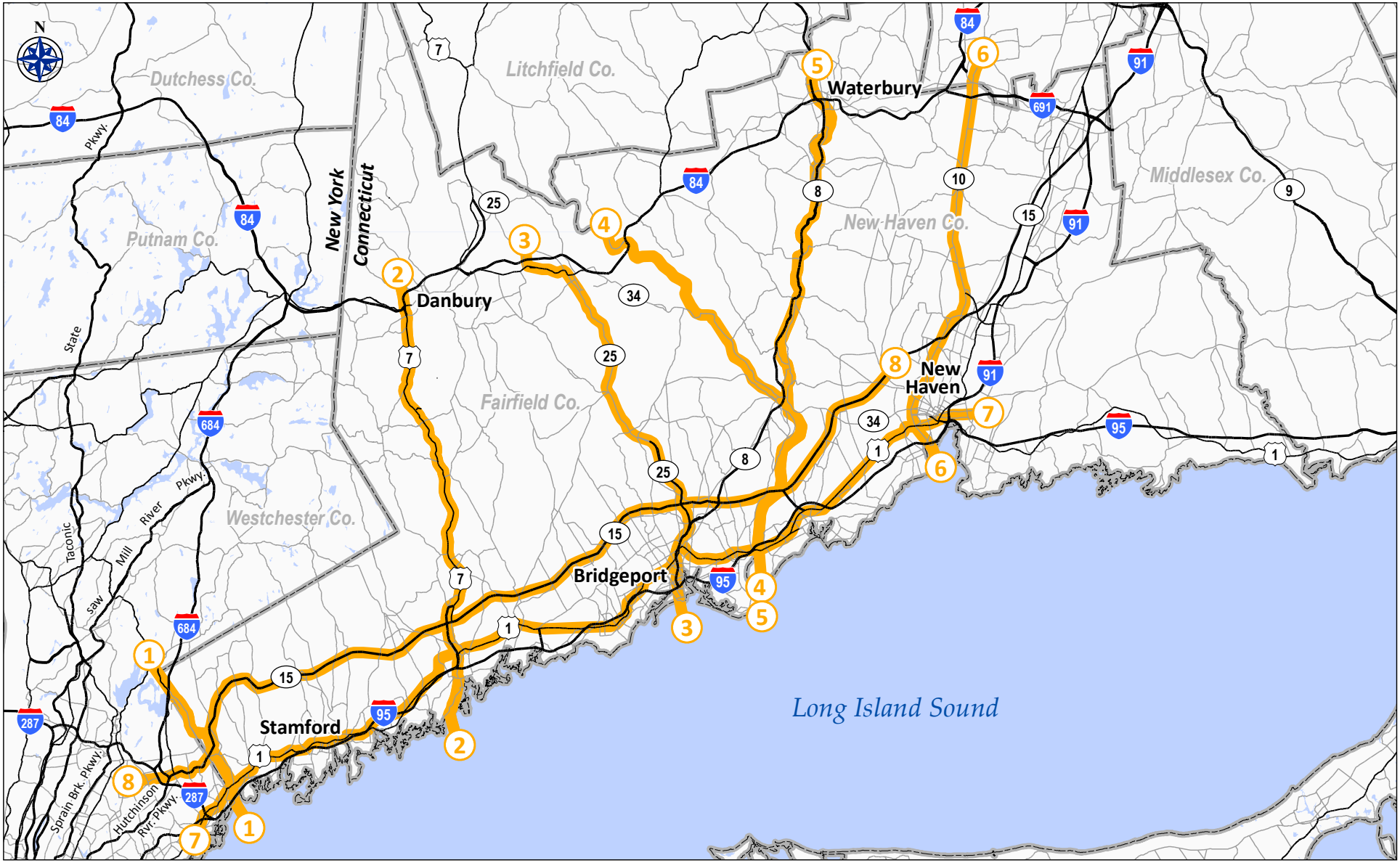
Source: CT DOT

Screenline Counts

A series of north-south and east-west "screenlines" (**Figure 2-17**) were developed and a corresponding list of count locations was identified (**Table 2-4**). Traffic counts were collected through existing sources and where not available, new counts were conducted and summarized into tabular format. These screenlines are used to demonstrate the levels of travel demand moving east-west and north-south on the major roadways in the study area. The screenlines are also used in evaluating the travel demand model by comparing the total traffic assigned across the screenlines versus the count data. Calibration adjustments to the traffic model are then made to improve the fit to the overall traffic demand across the screenlines and at the individual count locations.

Balanced Traffic Profiles

Traffic count data at each on and off ramp and several mainlines along I-95 and Route 15 was assembled from existing CT DOT count data and imported into a database for processing. This existing data was used to prepare a balanced hourly traffic profile representative of an average weekday for



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PROJECT SCREENLINE LOCATION MAP

FIGURE 2-17

Table 2-4
2013 Average Weekday Traffic - Screenlines

Screenline	Roadway	Location	Cross Street	% of Total Screenline	2013 AWDT Counts
Screenline 1: CT / NY Border					
1	I-95 NB	at	CT / NY Border	30.4%	71,800
1	I-95 SB	at	CT / NY Border	31.7%	75,000
1	Mill St	at	CT / NY Border	5.5%	13,100
1	US 1 / Putnam Ave	at	CT / NY Border	5.7%	13,400
1	US 1 / Hillside Ave	at	CT / NY Border	5.6%	13,200
1	Route 15 / Merritt Pkwy NB	E of	Int 27 / King St	9.5%	22,500
1	Route 15 / Merrit Pkwy SB	E of	Int 27 / King St	11.6%	27,400
1	**Total**			**100.0%**	**236,400**
Screenline 2: West of US 7					
2	Route 136 / Wilson Ave	S of	Witch Ln	1.0%	4,800
2	Washington St	W of	Martin Luther King Dr	2.1%	10,000
2	Reed St EB	W of	West Ave	1.0%	4,500
2	Reed St WB	W of	West Ave	0.4%	1,800
2	I-95 NB	W of	Exit 15	17.2%	80,700
2	I-95 SB	W of	Exit 15	18.2%	85,400
2	US 1 / Connecticut Ave NB	W of	Clinton Ave	1.7%	8,200
2	US 1 / Connecticut Ave SB	W of	Clinton Ave	2.9%	13,400
2	Spring Hill Ave	W of	US 1 / Van Buren Ave	0.6%	2,800
2	Riverside Ave	N of	US 1 / Belden Ave	1.2%	5,700
2	Route 123 / New Canaan Ave EB	W of	Riverside Ave	1.6%	7,300
2	Route 123 / New Canaan Ave WB	W of	Riverside Ave	2.2%	10,200
2	Broad St	W of	US 7	1.3%	5,900
2	Perry Ave EB	W of	US 7	0.4%	2,000
2	Perry Ave WB	W of	US 7	0.4%	1,900
2	Route 15 / Merrit Pkwy NB	W of	Int 39 / US 7	7.4%	34,700
2	Route 15 / Merrit Pkwy SB	W of	Int 39 / US 7	7.2%	33,700
2	Grist Mill Rd	W of	US 7 Expy Ramps	2.3%	10,900
2	Route 106 / Wolfpit Rd	W of	US 7 / Danbury Rd	2.0%	9,300
2	Route 33 / Ridgefield Rd	W of	US 7 / Danbury Rd	2.5%	11,500
2	Route 102 / Branchville Rd	W of	US 7 / Danbury Rd	1.4%	6,500
2	Cairns Hill Rd	W of	US 7 / Ethan Allen Hwy	0.6%	2,700
2	Route 35 / Danbury Rd EB	W of	US 7 / Ethan Allen Hwy	2.0%	9,200
2	Route 35 / Danbury Rd WB	W of	US 7 / Ethan Allen Hwy	1.4%	6,600
2	Miry Brook Rd EB	W of	US 7 Ramps	0.7%	3,100
2	Miry Brook Rd WB	W of	US 7 Ramps	0.7%	3,100
2	Backus Ave EB	W of	US 7 Ramps	1.7%	7,800
2	Backus Ave WB	W of	US 7 Ramps	1.4%	6,600
2	I-84 EB	W of	Int 3 / US 7	8.2%	38,500
2	I-84 WB	W of	Int 3 / US 7	8.5%	39,900
2	**Total**			**100.0%**	**468,700**

(continued)

Table 2-4
2013 Average Weekday Traffic – Screenlines (continued)

Screenline 3: W of Route 25

3	I-95 NB	W of	Int 27 / Route 25	16.6%	89,900
3	I-95 SB	W of	Int 27 / Route 25	15.0%	81,300
3	Route 130 / State St	W of	Route 25	1.6%	8,700
3	Route 130 / Fairfield Ave	W of	Route 25	1.4%	7,700
3	Pequonnock St	W of	Route 25	1.8%	9,700
3	James St	W of	Route 25	0.7%	3,700
3	Grand St	W of	Main St	0.8%	4,500
3	US 1 / North Ave	W of	Main St	2.9%	15,700
3	Main St	N of	US 1 / North Ave	2.5%	13,600
3	Lindley St	W of	Rotue 25	3.1%	16,900
3	Capitol Ave EB	W of	Route 25	1.5%	8,200
3	Capitol Ave WB	W of	Route 25	1.4%	7,500
3	Chopsey Hill Rd	W of	Route 25	4.5%	24,500
3	Trumbull Ave	W of	Reservoir Ave	0.9%	5,100
3	Old Town Rd EB	W of	Reservoir Ave	0.5%	2,700
3	Old Town Rd WB	W of	Reservoir Ave	0.5%	2,700
3	Route 15 / Meritt Pkwy NB	W of	Exit 49S / Route 25	7.3%	39,700
3	Route 15 / Meritt Pkwy SB	W of	Exit 49S / Route 25	6.9%	37,200
3	Reservoir Ave	N of	Route 15 / Merritt Pkwy	1.4%	7,800
3	Route 127 / White Plains Rd EB	W of	Route 25	2.1%	11,500
3	Route 127 / White Plains Rd WB	W of	Route 25	1.9%	10,300
3	Daniels Farm Rd	S of	Park St	2.2%	11,700
3	Whitney Ave EB	W of	Route 25	0.3%	1,600
3	Whitney Ave WB	W of	Route 25	0.3%	1,700
3	Route 111 / Main St NB	S of	Route 25	1.2%	6,600
3	Route 111 / Main St SB	S of	Route 25	1.1%	6,200
3	Tashua Rd	W of	Route 25 / Main St	0.5%	2,500
3	Hattertown Rd EB	W of	Route 59 / Easton Rd	1.0%	5,200
3	Hattertown Rd WB	W of	Route 59 / Easton Rd	0.7%	3,700
3	Meadow Brook Rd EB	W of	Route 25 / Main St	0.2%	900
3	Meadow Brook Rd WB	W of	Route 25 / Main St	0.1%	800
3	Huntingtown Rd	S of	Orchard Hill Rd	0.2%	900
3	Route 302 / Sugar St	W of	Route 25 / Main St	1.6%	8,900
3	West St	W of	Route 25 / Main St	0.2%	1,200
3	US 6 / Mt Pleasant Rd	W of	Route 25 / Hawleyville Rd	2.3%	12,300
3	I-84 EB	W of	Int 9 / Route 25	5.5%	29,700
3	I-84 WB	W of	Int 9 / Route 25	7.2%	39,100
3	**Total**			**100.0%**	**541,900**

Screenline 4: Housatonic River

4	US 1 NB	at	Housatonic River	3.0%	12,200
4	US 1 SB	at	Housatonic River	3.0%	12,300
4	I-95 NB	at	Housatonic River	14.8%	59,600
4	I-95 SB	at	Housatonic River	14.5%	58,600
4	Route 15 / Merritt Pkwy NB	at	Housatonic River	11.3%	45,500
4	Route 15 / Merritt Pkwy SB	at	Housatonic River	11.2%	45,100
4	Route 8 NB	at	Housatonic River	10.3%	41,500
4	Route 8 SB	at	Housatonic River	10.1%	40,800
4	Bridge St	at	Housatonic River	3.0%	12,100
4	Route 34 / Roosevelt Dr	at	Housatonic River	2.3%	9,200
4	I-84 EB	at	Housatonic River	7.7%	31,200
4	I-84 WB	at	Housatonic River	8.8%	35,500
4	**Total**			**100.0%**	**403,600**

(continued)

Table 2-4
2013 Average Weekday Traffic – Screenlines (continued)

Screenline 5: Naugatuck River

5	Route 34 / Main St EB	at	Naugatuck River	5.1%	22,800
5	Route 34 / Main St WB	at	Naugatuck River	4.8%	21,400
5	Division St EB	at	Naugatuck River	1.9%	8,600
5	Division St WB	at	Naugatuck River	1.8%	8,000
5	Bridge St	at	Naugatuck River	2.1%	9,600
5	Route 334 / Maple St	at	Naugatuck River	2.1%	9,300
5	Broad St	at	Naugatuck River	2.0%	8,900
5	Route 8 NB	at	Naugatuck River (Seymour)	5.4%	24,300
5	Route 8 SB	at	Naugatuck River (Seymour)	5.8%	25,900
5	Route 67 / Bank St EB	at	Naugatuck River	2.2%	10,000
5	Route 67 / Bank St WB	at	Naugatuck River	1.9%	8,700
5	Route 42 / Pines Bridge Rd EB	at	Naugatuck River	0.7%	3,300
5	Route 42 / Pines Bridge Rd WB	at	Naugatuck River	0.8%	3,400
5	Depot St	W of	Main St	0.4%	1,600
5	Route 63 / Cherry St EB	at	Naugatuck River	1.9%	8,400
5	Route 63 / Cherry St WB	at	Naugatuck River	1.7%	7,500
5	Maple St EB	at	Naugatuck River	1.7%	7,500
5	Maple St WB	at	Naugatuck River	2.4%	10,600
5	Route 68 / Prospect St	at	Naugatuck River	3.3%	14,700
5	Bristol St EB	at	Naugatuck River	0.4%	1,800
5	Bristol St WB	at	Naugatuck River	0.4%	1,800
5	Route 8 NB	at	Naugatuck River (Waterbury)	5.8%	26,300
5	Route 8 SB	at	Naugatuck River (Waterbury)	5.8%	26,000
5	S Leonard St EB	at	Naugatruck River	0.5%	2,400
5	S Leonard St WB	at	Naugatruck River	0.5%	2,400
5	Washington Ave	W of	Railroad Hill St	1.4%	6,200
5	Bank St	at	Naugatuck River	1.6%	7,400
5	I-84 EB	Between	Int 19 / 20 and 21 / 22	14.1%	63,500
5	I-84 WB	Between	Int 19 / 20 and 21 / 23	14.1%	63,400
5	Freight St	E of	Riverside St	2.2%	10,100
5	SR 846 / W Main St EB	E of	Riverside St	2.6%	11,700
5	SR 846 / W Main St WB	E of	Riverside St	2.8%	12,700
5	**Total**			**100.0%**	**450,200**

Screenline 6: E of Route 10

6	I-95 NB	Between	Kimberly Ave and 1st Ave	11.6%	71,100
6	I-95 SB	Between	Kimberly Ave and 1st Ave	12.5%	76,600
6	Washington Ave	SW of	Route 10	1.1%	6,500
6	US 1 / Columbus Ave NB	W of	Route 10	1.7%	10,700
6	US 1 / Columbus Ave SB	W of	Route 10	1.5%	9,500
6	Route 34 EB	W of	Route 10	1.7%	10,300
6	Route 34 WB	W of	Route 10	1.7%	10,500
6	Edgewood Ave	SE of	Yale Ave	0.7%	4,400
6	Route 10 NB	SE of	Jewell St	2.1%	12,800
6	Route 10 SB	SE of	Jewell St	1.9%	11,400
6	Blake St	NW of	Osborn Ave	0.9%	5,500
6	Crescent St	E of	Route 10	1.5%	9,000
6	Bowen St / Sherman Ave	S of	Route 10 / Arch St	0.8%	4,800
6	Dixwell Ave NB	S of	Route 10 / Arch St	1.6%	9,600
6	Dixwell Ave SB	S of	Route 10 / Arch St	1.0%	6,100
6	Putnam Ave EB	E of	Route 10 / Dixwell Ave	1.0%	6,000
6	Putnam Ave WB	E of	Route 10 / Dixwell Ave	1.2%	7,600
6	Route 15 / Wilbur Cross Pkwy NB	Between	Int 60 and Int 61	5.1%	31,500
6	Route 15 / Wilbur Cross Pkwy SB	Between	Int 60 and Int 61	4.7%	29,000
6	Connolly Pkwy	E of	Route 10 / Dixwell Ave	1.4%	8,500
6	Skiff St	E of	Route 10 / Dixwell Ave	3.7%	22,800
6	Whitney Ave NB	S of	Route 10 / Dixwell Ave	1.4%	8,600
6	Whitney Ave SB	S of	Route 10 / Dixwell Ave	1.6%	9,700
6	Dixwell Ave EB	E of	Route 10 / Whitney Ave	1.4%	8,700
6	Dixwell Ave WB	E of	Route 10 / Whitney Ave	1.4%	8,600
6	Route 40 / Mt Carmel Connector	E of	Route 10 / Whitney Ave	0.3%	1,900
6	Route 22 / Ives St	E of	Route 10 / Whitney Ave	1.1%	6,800
6	Mt Carmel Ave	E of	Route 10 / Whitney Ave	1.4%	8,900
6	Tuttle Ave EB	E of	Route 10 / Whitney Ave	0.0%	300
6	Tuttle Ave WB	E of	Route 10 / Whitney Ave	0.0%	300
6	Cook Hill Rd	E of	Route 10 / Main St	0.7%	4,100
6	Wallingford Rd	E of	Route 10 / Main St	0.4%	2,300
6	Route 68 / Route 70 / Academy Rd	E of	Route 10 / Main St	1.8%	11,000
6	Creamery Rd	E of	Route 10 / Highland Ave	0.3%	2,100
6	Blacks Rd	E of	Route 10 / Highland Ave	0.2%	1,200
6	E Johnson Ave	E of	Route 10 / Highland Ave	0.7%	4,400
6	I-691 EB	Between	Int 3 and Int 4	4.7%	29,200
6	I-691 WB	Between	Int 3 and Int 4	4.7%	29,100
6	Route 10 / Highland Ave	N of	I-691 Ramps	2.0%	12,400
6	Peck Ln	N of	I-691	0.2%	1,500
6	Route 322 / Meriden-Waterbury Tpke EB	E of	I-84 Ramps	1.4%	8,700
6	Route 322 / Meriden-Waterbury Tpke W	E of	I-84 Ramps	1.5%	9,300
6	I-84 EB	Between	Int 27 / 28 and 29 / 30	6.9%	42,200
6	I-84 WB	Between	Int 27 / 28 and 29 / 30	6.4%	39,300
6	**Total**			**100.0%**	**614,800**

(continued)

Table 2-4
2013 Average Weekday Traffic – Screenlines (continued)

Screenline 7: N of Route 1 / I-95

7	Pemberwick Rd NB	N of	US 1 / W Putnam Ave	0.2%	1,900
7	Pemberwick Rd SB	N of	US 1 / W Putnam Ave	0.1%	1,400
7	E Weaver St NB	N of	US 1 / W Putnam Ave	0.3%	3,100
7	E Weaver St SB	N of	US 1 / W Putnam Ave	0.3%	3,600
7	Brookside Dr	N of	US 1 / W Putnam Ave	0.3%	4,000
7	Dearfield Dr	N of	US 1 / W Putnam Ave	1.1%	12,400
7	Maple Ave	N of	US 1 / E Putnam Ave	0.9%	10,300
7	Stanwich Rd	N of	Old Post Rd 6	0.3%	3,900
7	Orchard St	N of	Valley Rd	0.6%	6,500
7	Valley Rd	N of	Orchard St	0.8%	8,700
7	Sheep Hill Rd	N of	US 1 / E Putnam Ave	0.5%	5,700
7	Havemeyer Ln	N of	US 1 / E Putnam Ave	0.9%	9,900
7	West Ave	N of	US 1 / W Main St	0.6%	7,400
7	Stillwater Ave NB	NW of	US 1 / W Main St	0.2%	2,800
7	Stillwater Ave SB	NW of	US 1 / W Main St	0.3%	3,400
7	W Main St NB	N of	US 1 / Tresser Blvd	0.6%	7,400
7	Route 137 / Washington Blvd NB	N of	US 1 / Tresser Blvd	1.1%	12,800
7	Route 137 / Washington Blvd SB	N of	US 1 / Tresser Blvd	1.4%	15,800
7	Atlantic St NB	N of	US 1 / Tresser Blvd	0.8%	8,800
7	Atlantic St SB	N of	US 1 / Tresser Blvd	0.2%	2,600
7	Grove St NB	N of	US 1 / E Main St	1.0%	11,900
7	Grove St SB	N of	US 1 / E Main St	0.9%	9,800
7	Broad St EB	N of	US 1 / E Main St	0.7%	8,100
7	Broad St WB	N of	US 1 / E Main St	0.8%	9,100
7	Glenbrook Rd	N of	US 1 / E Main St	1.1%	12,800
7	Route 106 / Courtland Ave NB	N of	US 1 / E Main St	0.7%	8,500
7	Route 106 / Courtland Ave SB	N of	US 1 / E Main St	0.7%	8,100
7	Noroton Ave NB	N of	Ledge Rd	0.7%	8,600
7	Noroton Ave SB	N of	Ledge Rd	0.7%	8,400
7	Route 124 / Mansfield Ave NB	N of	US 1 / Boston Post Rd	0.3%	3,300
7	Route 124 / Mansfield Ave SB	N of	US 1 / Boston Post Rd	0.2%	2,600
7	Brookside Rd	N of	US 1 / Boston Post Rd	0.5%	5,400
7	Richards Ave NB	N of	US 1 / Connecticut Ave	0.4%	4,900
7	Richards Ave SB	N of	US 1 / Connecticut Ave	0.5%	5,700
7	Scribner Ave EB	N of	US 1 / Connecticut Ave	0.4%	4,600
7	Scribner Ave WB	N of	US 1 / Connecticut Ave	0.3%	3,400
7	Fillow St	NW of	Taylor Ave	0.4%	4,100
7	Spring Hill Ave	W of	US 1 / Van Buren Ave	0.2%	2,800
7	Riverside Ave	N of	Spring Hill Ave	0.5%	5,700
7	US 7 NB	Between	Int 1 and Int 2	2.8%	31,700
7	US 7 SB	Between	Int 1 and Int 2	2.8%	32,600
7	Route 123 / Main St	N of	US 1 / North Ave	1.0%	11,800
7	France St	N of	US 1 / North Ave	0.6%	7,200
7	Route 53 / East Ave	N of	US 1 / North Ave	0.9%	10,900
7	Route 33 / Wilton Rd	N of	US 1 / Post Rd	0.9%	10,100
7	Main St	N of	US 1 / Post Rd E	0.3%	2,900
7	Route 136 / Compo Rd N	N of	US 1 / Post Rd E	0.7%	8,000
7	Long Lots Rd	N of	US 1 / Post Rd E	0.4%	5,100
7	Bronson Rd NB	N of	I-95 Ramps	0.1%	1,700
7	Bronson Rd SB	N of	I-95 Ramps	0.2%	1,800
7	Sturges Rd	N of	Unquowa Rd	0.4%	4,100
7	Mill Plain Rd	N of	I-95 Ramps	0.6%	6,400
7	Unquowa Rd NB	N of	I-95	0.3%	3,300
7	Unquowa Rd SB	N of	I-95	0.4%	4,200
7	Round Hill Rd NB	N of	I-95 Ramps	0.3%	3,200
7	Round Hill Rd SB	N of	I-95 Ramps	0.3%	3,000
7	Route 135 / N Benson Rd	N of	I-95 Ramps	1.0%	11,800
7	Crestwood Dr NB	Over	I-95	0.1%	1,400
7	Crestwood Dr SB	Over	I-95	0.1%	1,300
7	Black Rock Turnpike NB	N of	US 1 / Kings Hwy E	0.6%	6,700
7	Black Rock Turnpike SB	N of	US 1 / Kings Hwy E	0.5%	5,600
7	Villa Ave	N of	US 1 / Kings Hwy E	0.5%	6,000
7	Route 58 / Tenxis Hill Cut Off	N of	US 1 / Kings Hwy E	0.5%	6,000
7	Route 59 / Brooklawn Ave NB	N of	Briarwood Ave	0.3%	3,700
7	Route 59 / Brooklawn Ave SB	N of	Briarwood Ave	0.3%	3,900
7	Park Ave NB	N of	US 1 / North Ave	0.5%	5,900
7	Park Ave SB	N of	US 1 / North Ave	0.6%	6,500
7	Madison Ave	N of	US 1 / North Ave	0.9%	10,700
7	Lindley St	W of	Route 8 Ramps	1.5%	16,900
7	Capitol Ave EB	W of	Route 25	0.7%	8,200
7	Capitol Ave WB	W of	Route 25	0.7%	7,500
7	Route 8 NB	Between	Int 4 and Int 5	3.8%	43,100
7	Route 8 SB	Between	Int 4 and Int 5	4.0%	45,600
7	Island Brook Ave Ext NB	N of	US 1 / North Ave / Capitol Ave	0.8%	8,900

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Table 2-4
2013 Average Weekday Traffic – Screenlines (continued)

7	Island Brook Ave Ext SB	N of	US 1 / North Ave / Capitol Ave	0.3%	3,600
7	Chopsey Hill Rd EB	W of	US 1 / North Ave	1.2%	13,700
7	Chopsey Hill Rd WB	W of	US 1 / North Ave	1.1%	12,900
7	Noble Ave NB	N of	US 1 / Boston Ave	0.2%	2,300
7	Noble Ave SB	N of	US 1 / Boston Ave	0.3%	3,500
7	Huntington Rd	N of	US 1 / Boston Ave	0.2%	1,800
7	Rotue 127 / E Main St	N of	US 1 / Boston Ave	1.1%	12,400
7	Success Ave	N of	US 1 / Boston Ave	0.5%	5,400
7	Broadbridge Ave	N of	US 1 / Barnum Ave	0.8%	9,400
7	Route 108 / Nichols Ave	N of	US 1 / Barnum Ave	0.8%	9,300
7	Route 113 / Main St	N of	US 1 / Barnum Ave	1.5%	16,900
7	Route 110 / E Main St NB	N of	US 1 / Barnum Ave	0.8%	9,500
7	Route 110 / E Main St SB	N of	US 1 / Barnum Ave	0.7%	7,700
7	Naugatuck Ave	N of	I-95	0.3%	3,400
7	Bic Dr	N of	I-95 Ramps	0.8%	8,900
7	West Ave EB	W of	Grinnell St	0.1%	700
7	West Ave WB	W of	Grinnell St	0.1%	800
7	Plains Rd EB	Wof	I-95 Ramps	0.2%	2,500
7	Plains Rd WB	Wof	I-95 Ramps	0.2%	2,700
7	Zion Hill Rd	N of	I-95 Ramps	0.5%	5,800
7	Milford Pkwy NB	N of	I-95	2.4%	27,400
7	Milford Pkwy SB	N of	I-95	2.4%	27,500
7	W River St NB	N of	I-95	0.1%	1,300
7	W River St SB	N of	I-95	0.1%	1,200
7	Route 121 / North St	N of	I-95	0.7%	7,600
7	Forest Rd	N of	I-95	0.2%	2,500
7	Cedarhurst Ln	N of	US 1 / Boston Post Rd	0.3%	4,000
7	Woodruff Rd NB	N of	Red Bush Lane	0.3%	3,500
7	Woodruff Rd SB	N of	Red Bush Lane	0.3%	3,400
7	Route 152 / Orange Center Rd	N of	US 1 / Boston Post Rd	0.6%	6,500
7	Lambert Rd NB	N of	US 1 / Boston Post Rd	0.2%	2,300
7	Lambert Rd SB	N of	US 1 / Boston Post Rd	0.2%	2,800
7	Old Tavern Rd	N of	US 1 / Boston Post Rd	0.4%	5,100
7	Route 114 / Racebrook Rd	N of	US 1 / Boston Post Rd	1.1%	13,000
7	Dogburn Lane NB	N of	US 1 / Boston Post Rd	0.1%	900
7	Dogburn Lane SB	N of	US 1 / Boston Post Rd	0.1%	900
7	Dogwood Rd	W of	Dogburn Rd	0.3%	3,800
7	Route 122 / Forest Rd	N of	US 1 / Boston Post Rd	1.3%	14,900
7	Route 10 / Ella Grasso Blvd NB	N of	US 1 / Columbus Ave	0.9%	10,000
7	Route 10 / Ella Grasso Blvd SB	N of	US 1 / Columbus Ave	1.0%	11,100
7	Howard Ave	N of	US 1 / Columbus Ave	0.7%	8,200
7	Church St NB	N of	US 1 / Columbus Ave	0.5%	5,500
7	Church St SB	N of	US 1 / Columbus Ave	0.3%	3,600
7	Columbus Ave	N of	Union Ave	0.4%	5,100
7	Route 34 EB	Between	Int 1 and I-95	3.2%	37,300
7	Route 34 WB	Between	Int 1 and I-95	3.1%	35,100
7	State St NB	N of	Water St	0.3%	3,300
7	State St SB	N of	Water St	0.8%	9,500
7	I-91 NB	Between	Int 2 Ramps T/F North and I-95	6.3%	72,700
7	I-91 SB	Between	Int 2 Ramps T/F North and I-95	6.5%	74,400
7	N Frontage Rd EB	Between	Orange St and State St	0.2%	2,800
7	N Frontage Rd WB	Between	Orange St and State St	0.4%	4,200
7	**Total**			**100.0%**	**1,148,300**

(continued)

Table 2-4
2013 Average Weekday Traffic – Screenlines (continued)

Screenline 8: N of Route 15 / Merritt Parkway

8	Westchester Ave EB	S of	Corporate Park Dr	1.1%	8,000
8	I-287 / Cross-Westchester Expy NB	Between	Int 9A and Int 9S / N	7.4%	51,800
8	I-287 / Cross-Westchester Expy SB	Between	Int 9A and Int 9S / N	7.0%	48,800
8	Route 120 / Purchase St NB	N of	Route 15 / Merritt Pkwy Ramps	0.7%	4,800
8	Route 120 / Purchase St SB	N of	Route 15 / Merritt Pkwy Ramps	0.7%	5,100
8	Route 120A / King St NB	N of	Route 15 / Merritt Pkwy Ramps	1.0%	7,300
8	Route 120A / King St SB	N of	Route 15 / Merritt Pkwy Ramps	1.1%	7,700
8	Riversville Rd	S of	Sherwood Ave	0.4%	3,100
8	Round Hill Rd NB	N of	Route 15 / Merritt Pkwy Ramps	0.3%	2,400
8	Round Hill Rd SB	N of	Route 15 / Merritt Pkwy Ramps	0.4%	2,600
8	Lake Ave NB	N of	Old Mill Rd	0.2%	1,500
8	Lake Ave SB	N of	Old Mill Rd	0.3%	1,900
8	North St NB	S of	Wyckman Hill Ln	0.5%	3,500
8	North St SB	S of	Wyckman Hill Ln	0.5%	3,700
8	Route 104 / Long Ridge Rd NB	N of	Route 15 / Merritt Pkwy Ramps	1.2%	8,700
8	Route 104 / Long Ridge Rd SB	N of	Route 15 / Merritt Pkwy Ramps	1.2%	8,500
8	Route 137 / High Ridge Rd	N of	Wire Mill Rd	2.9%	20,000
8	Route 104 / Old Stamford Rd	N of	Jelliff Mill Rd	1.5%	10,700
8	Route 124 / South Ave	N of	Conrad Ave	1.2%	8,100
8	White Oak Shade Rd	N of	Nursery Rd	0.5%	3,700
8	Route 123 / New Norwalk Ave	W of	Carter St	2.3%	16,400
8	Silvermine Ave NB	S of	Comstock Hill Ave	0.4%	2,500
8	Silvermine Ave SB	S of	Comstock Hill Ave	0.4%	2,500
8	US 7 NB	N of	Route 15 / Merritt Pkwy Ramps	2.9%	20,500
8	US 7 SB	N of	Route 15 / Merritt Pkwy Ramps	2.8%	19,800
8	Glover Ave	W of	Main Ave	0.6%	4,200
8	Main Ave NB	N of	Glover Ave	1.1%	7,700
8	Main Ave SB	N of	Glover Ave	1.1%	7,500
8	W Rocks Rd	N of	Route 15 / Merritt Pkwy	0.9%	6,100
8	Grumman Ave	N of	Route 15 / Merritt Pkwy	0.5%	3,600
8	Route 53 / Chestnut Hill Ave	S of	Field St	0.6%	4,400
8	Newtown Tpke	N of	Route 15 / Merritt Pkwy	0.4%	2,800
8	Route 33 / Wilton Rd	N of	Route 15 / Merritt Pkwy Ramps	2.2%	15,500
8	Route 57 / Weston Rd	N of	Route 15 / Merritt Pkwy Ramps	2.0%	14,000
8	Route 136 / Easton Rd	N of	Route 15 / Merritt Pkwy	1.0%	6,800
8	Burr St	N of	Route 15 / Merritt Pkwy	0.2%	1,600
8	Route 58 / Black Rock Tpke	N of	Route 15 / Merritt Pkwy Ramps	1.1%	8,000
8	Route 59 / Sport Hill Rd	N of	Route 15 / Merritt Pkwy Ramps	1.4%	10,100
8	S Park Ave	N of	Plumtree Ln	0.7%	4,700
8	Route 111 / Main St	N of	Chestnut Hill Rd	1.8%	12,800
8	Route 127 / Church Hill Rd	N of	Edison Rd	2.0%	13,800
8	Route 734 / Daniels Farm Rd	N of	Route 127 / Church Hill Rd	1.8%	12,900
8	Route 25 NB	Between	Int 8 and Int 9	3.2%	22,200
8	Route 25 SB	Between	Int 8 and Int 9	3.2%	22,200
8	Unity Rd	N of	Route 15 / Merritt Pkwy	0.8%	5,300
8	Route 108 / Huntington Tpke	N of	Route 15 / Merritt Pkwy	1.9%	13,200
8	Route 8 NB	Between	Int 10 and Int 11	5.7%	39,900
8	Route 8 SB	Between	Int 10 and Int 11	5.7%	39,500
8	Route 110 / Main St NB	N of	Route 15 / Merritt Pkwy	2.4%	16,900
8	Route 110 / Main St SB	N of	Route 15 / Merritt Pkwy	2.5%	17,300
8	Wheelers Farms Rd	N of	Route 15 / Wilbur Cross Expy Ramps	1.1%	7,400
8	Derby Milford Rd	N of	Route 15 / Wilbur Cross Expy	1.3%	9,100
8	Turkey Hill Rd	W of	Route 15 / Wilbur Cross Expy Ramps	0.2%	1,500
8	Route 121 / Grassy Hill Rd	N of	Route 15 / Wilbur Cross Expy Ramps	1.3%	9,100
8	Route 34 / Derby Ave EB	W of	Route 15 / Wilbur Cross Expy Ramps	2.8%	19,400
8	Route 34 / Derby Ave WB	W of	Route 15 / Wilbur Cross Expy Ramps	2.5%	17,300
8	Route 114 / Racebrook Ave	N of	Route 15 / Wilbur Cross Expy	1.2%	8,300
8	Johnson Rd	N of	Route 15 / Wilbur Cross Expy	0.2%	1,700
8	Route 243 / Fountain St	N of	Route 15 / Wilbur Cross Expy	1.2%	8,200
8	Route 63 / Amity Rd NB	N of	Lucy St	1.3%	9,000
8	Route 63 / Amity Rd SB	N of	Lucy St	1.4%	9,600
8	Route 69 / Litchfield Tpke	N of	Lucy St	1.5%	10,800
8	**Total**			**100.0%**	**698,000**

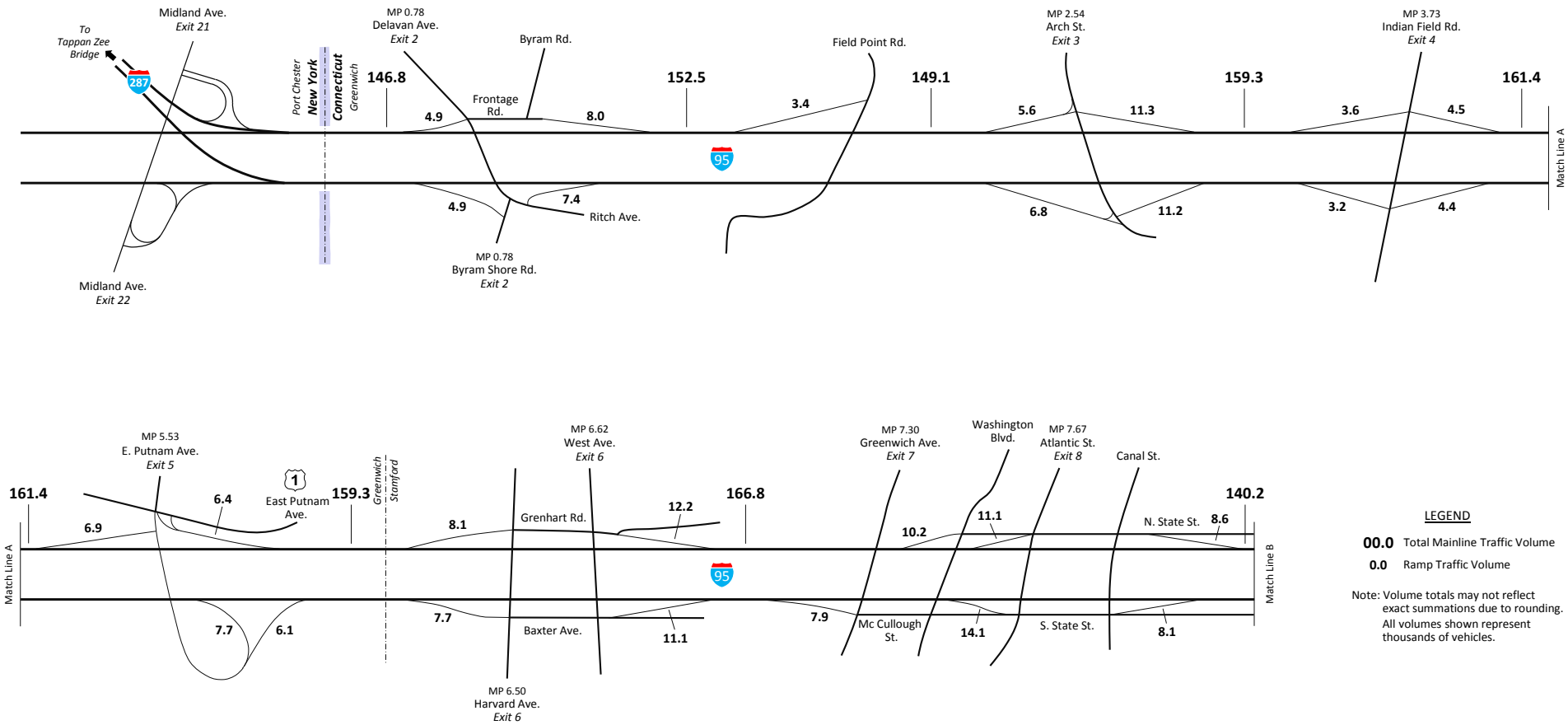
I-95 and Route 15. The resulting average weekday volumes for I-95 from the New York State line to the I-91 interchange in New Haven are displayed in thousands in schematic format in **Figures 2-18 through 2-24.** More than a dozen mainline locations experience more than 160,000 vehicles on an average weekday and occur within Greenwich, Stamford, Darien, Norwalk, and Bridgeport with somewhat lower volumes occurring through Westport, Fairfield, Stratford, Orange, Milford and West Haven. In New Haven, south of the I-91 interchange, volumes again reach more than 160,000 vehicles on an average weekday. The highest mainline volume of 171,100 occurs just south of the Route 25/Route 8 interchange in Bridgeport (**Figure 2-22**). Similarly, the ramp volumes to and from the Route 25/Route 8 interchange are among the highest in the corridor. For example, the southbound on ramp from Route 25/Route 8 carries 24,100 vehicles per weekday on average, and its reciprocal movement, an off ramp from I-95 northbound to Route 25/Route 8 north carries 25,600 vehicles on an average weekday. Both ramps to and from the north at the Route 25/Route 8 interchange carry more than 17,000 vehicles on an average weekday. Another location with significant ramp volumes is at the Route 7 interchange (Exit 15) in Norwalk. The volumes on each ramp to and from the south reach 15,000 vehicles on an average weekday. Similar volumes to and from the south are accommodated on the East Avenue ramps (Exit 16), just north of Route 7 interchange. This interchange is less than a half mile away from the Route 7 interchange, with both ramps serving a surge of traffic to/from Norwalk and the northern towns such as Wilton, and traffic flowing between I-95 and Route 15. The other high speed connection between Route 15 and I-95 includes the interchange between the Milford Parkway (Exit 38) and I-95, with ramps to and from the north carrying a total of about 30,000 vehicles on an average weekday.

Average weekday volumes along Route 15 are shown in **Figures 2-25 through 2-29**, spanning from the New York State line through the West Rock Tunnel in New Haven. The highest average weekday volume of 90,600 vehicles occurs just south of the Milford Parkway over the Housatonic River. Just south of the Milford Parkway, the ramps to and from the north at Exit 53 handle a total of 23,000 vehicles on an average weekday. This interchange provides direct access into Sikorsky Aircraft, a major employer for the region. Average weekday volumes of around 50,000 vehicles are lowest toward the New York end of the corridor in Greenwich. Volumes increase heading northward, building through the various towns before reaching their peak south of the Milford Parkway. South of the Milford Parkway, significant ramp volumes occur at the interchanges with Route 8 and Route 25 in Bridgeport with mainline segments carrying roughly 80,000 vehicles on an average weekday. South of these major interchanges, average weekday volumes are in the range of 65,000. The Route 7 interchange in Norwalk carries nearly 20,000 vehicles to and from the south on an average weekday.

Travel Speeds and Level of Service

INRIX Speed Data

Data on travel speeds were collected through the purchase of 2012 historical data from INRIX for Route 15, and all major arterials in the study area. In addition, through the I-95 Corridor Coalition, similar data at 5 minute intervals for all of 2012 was obtained on I-95. Travel speed data for internal weekdays (Tue, Wed, and Thu) were averaged to represent an average weekday condition, and were linked to a GIS file in order to visually display the data and to allow correspondence to the travel demand model network for comparison against modeled speeds during peak and off peak time periods.



LEGEND

00.0 Total Mainline Traffic Volume

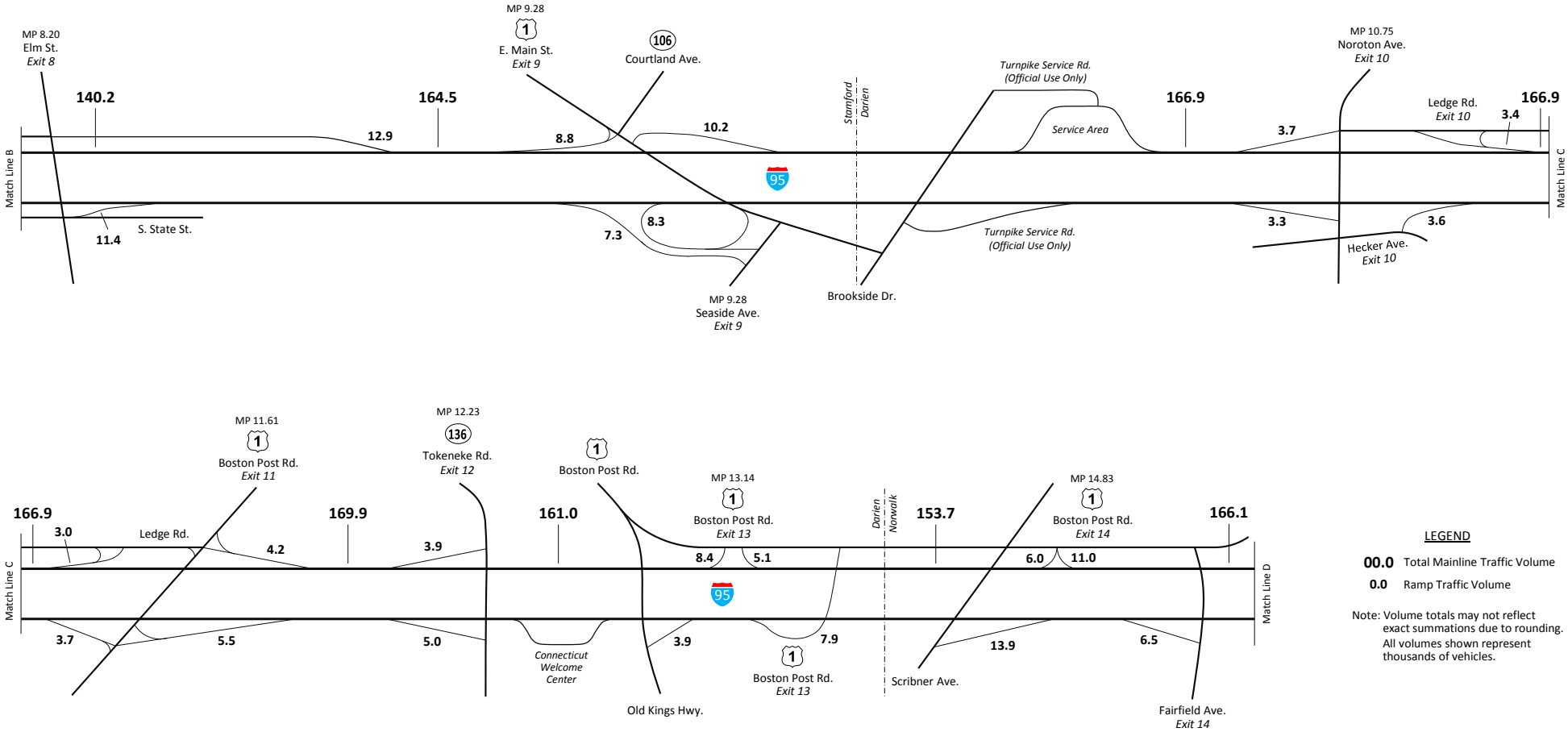
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-18



LEGEND

00.0 Total Mainline Traffic Volume

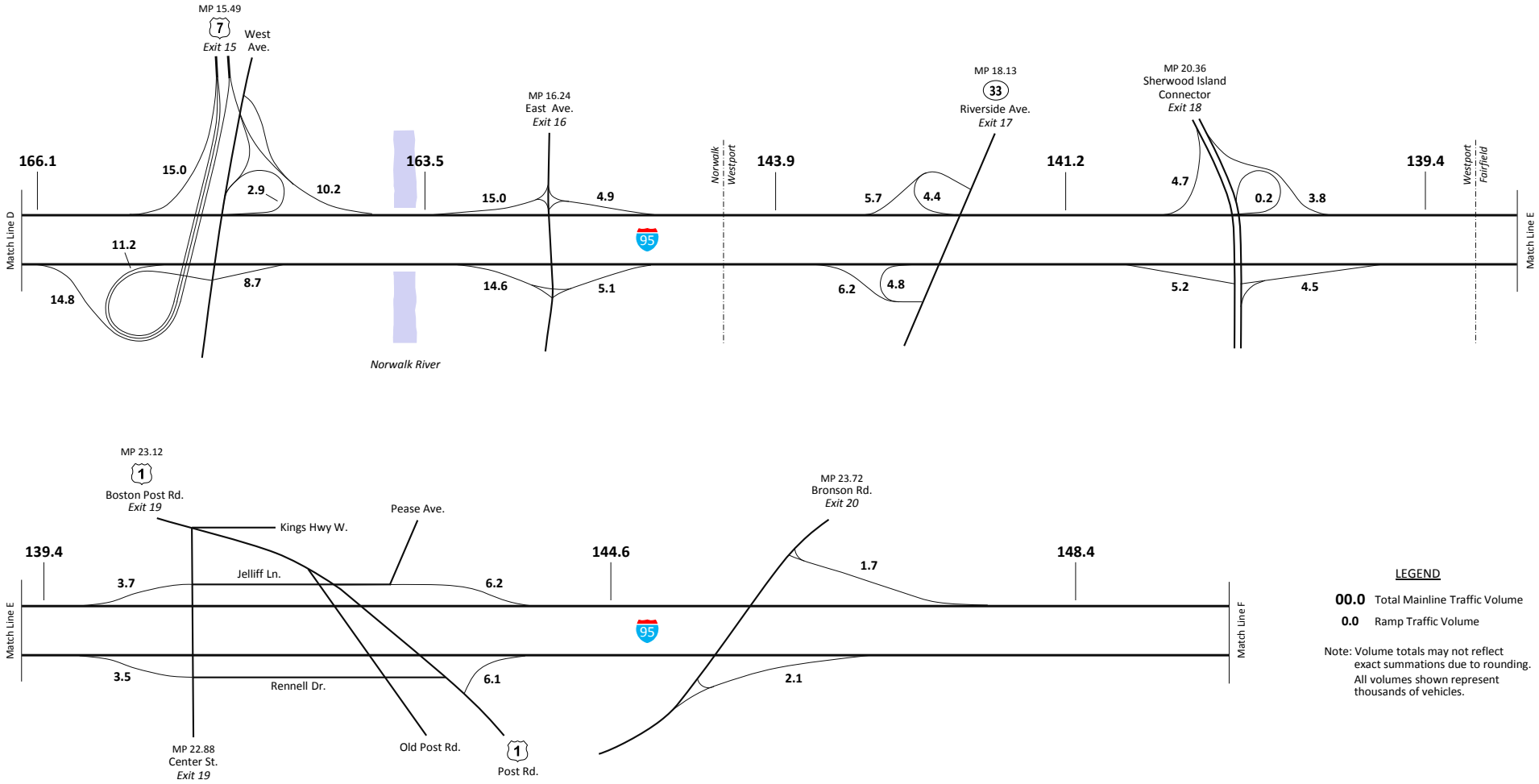
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-19



LEGEND

00.0 Total Mainline Traffic Volume

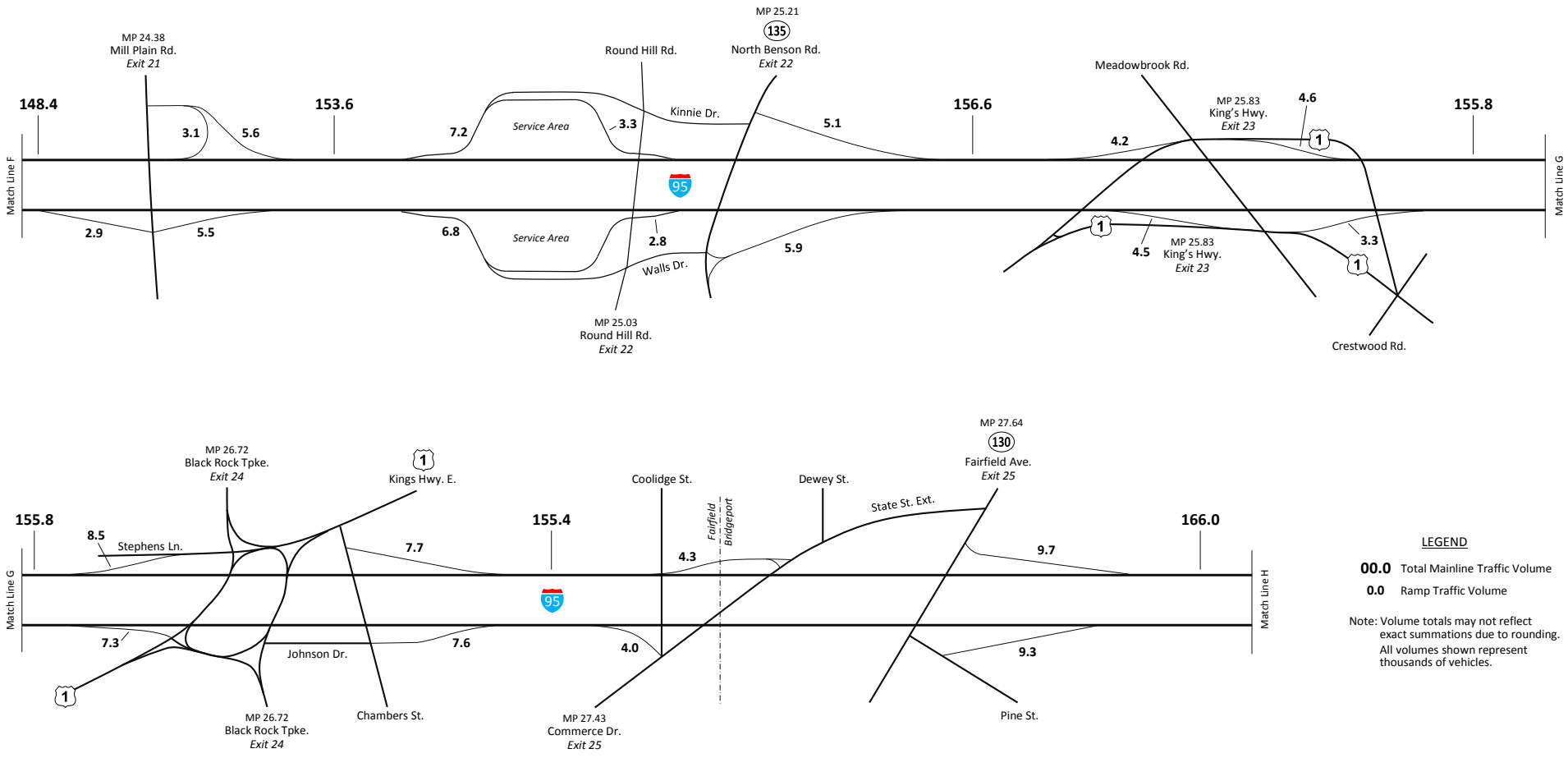
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-20



LEGEND

00.0 Total Mainline Traffic Volume

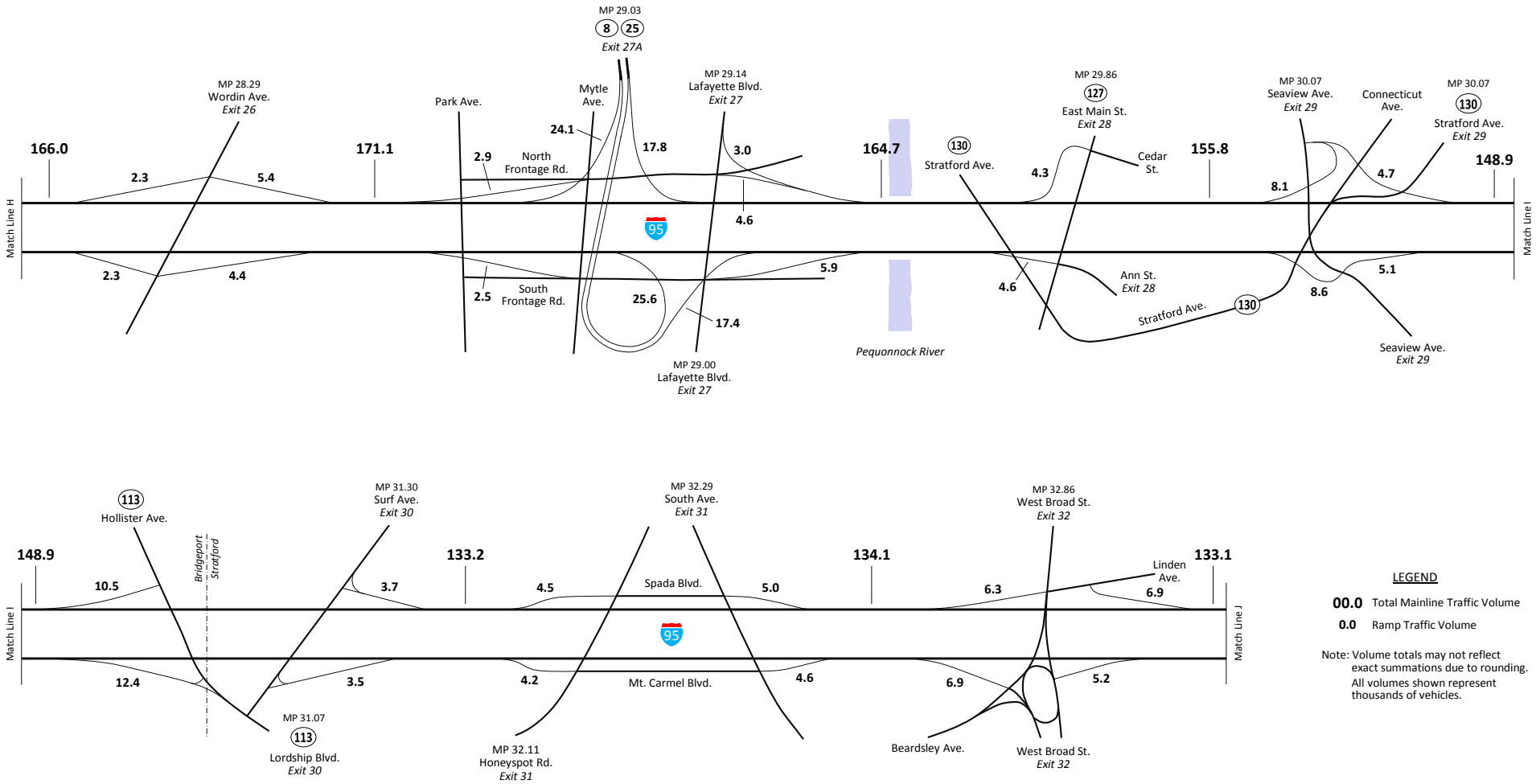
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-21



LEGEND

00.0 Total Mainline Traffic Volume

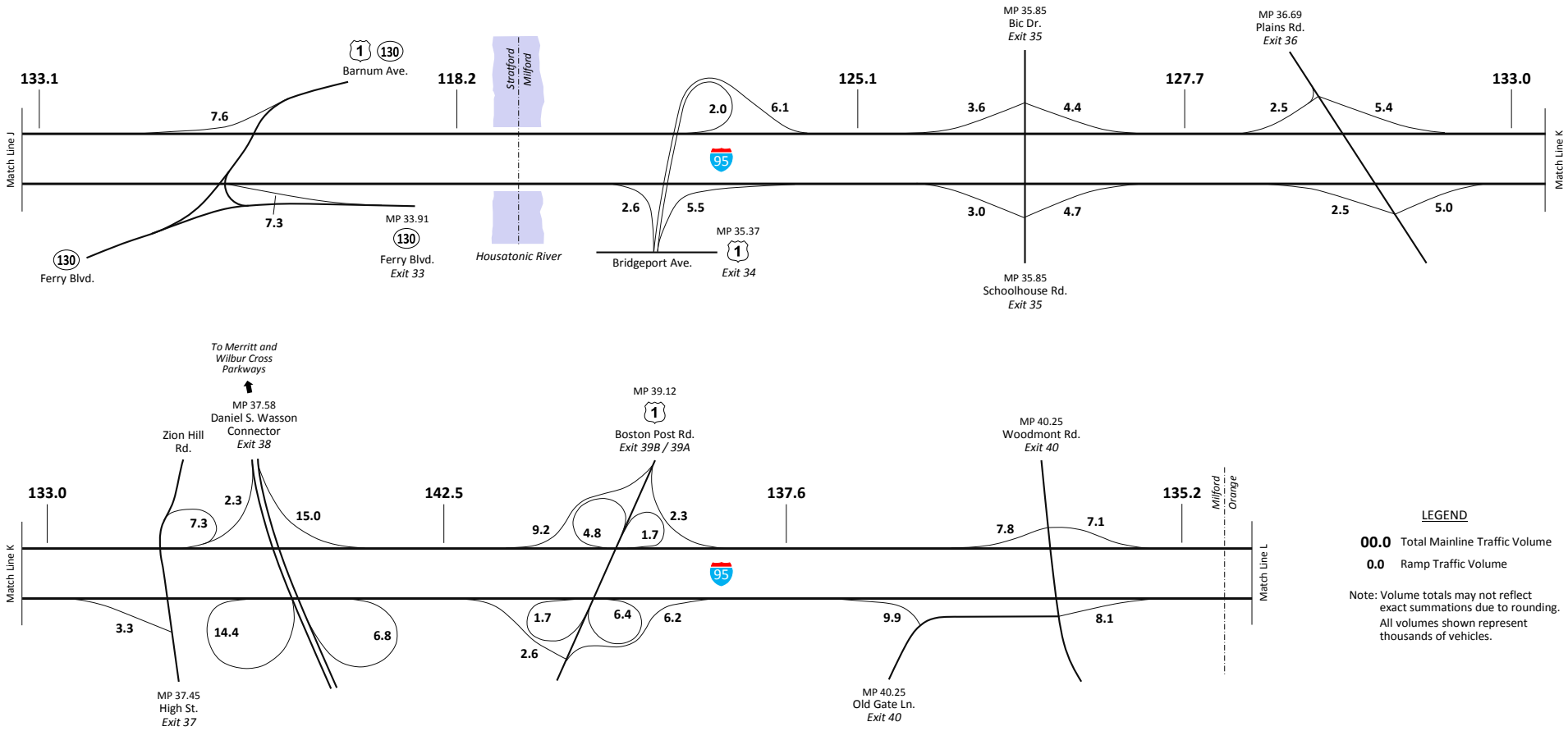
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

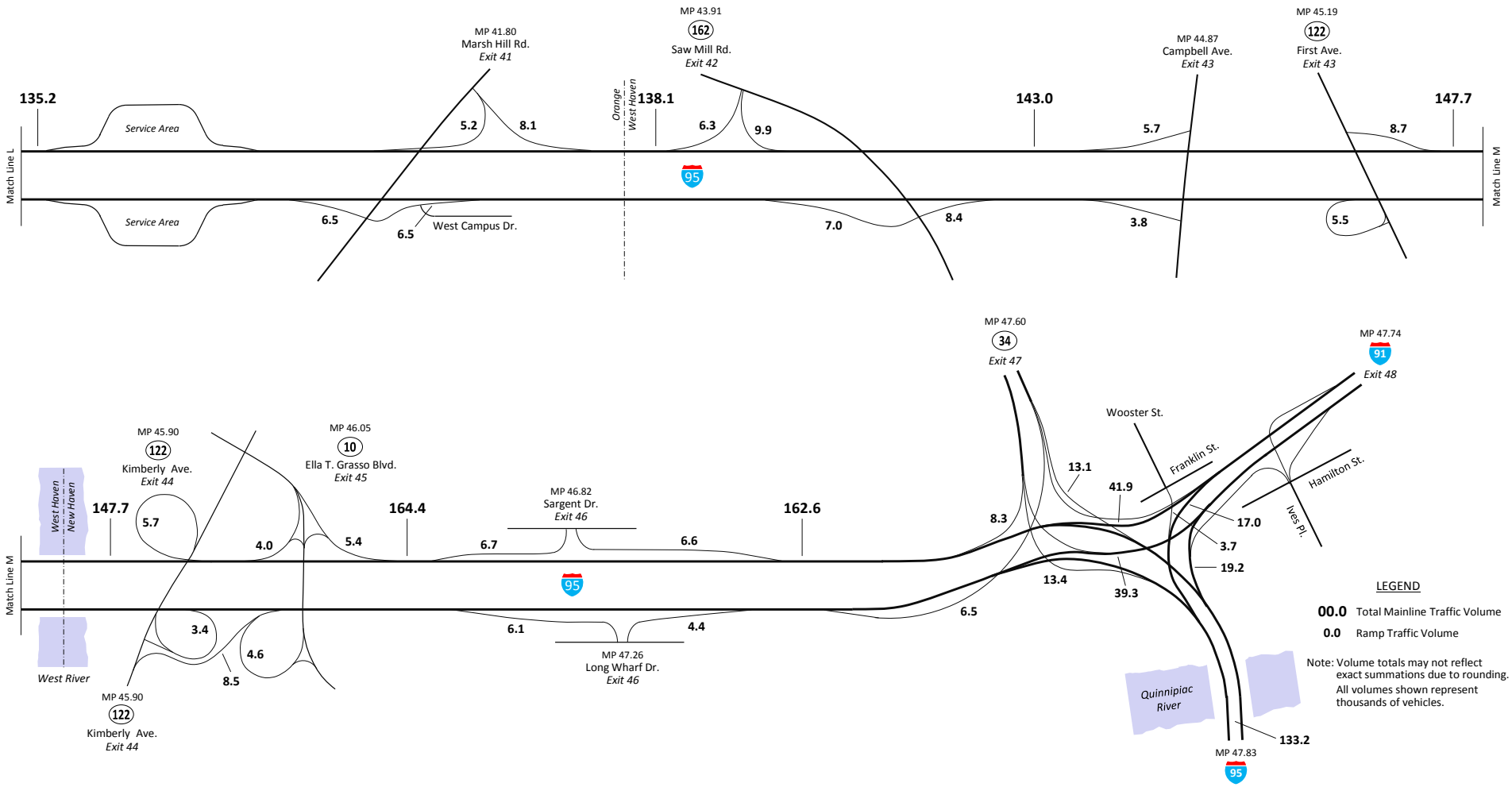
I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-22



I-95 WEEKDAY TRAFFIC PROFILE

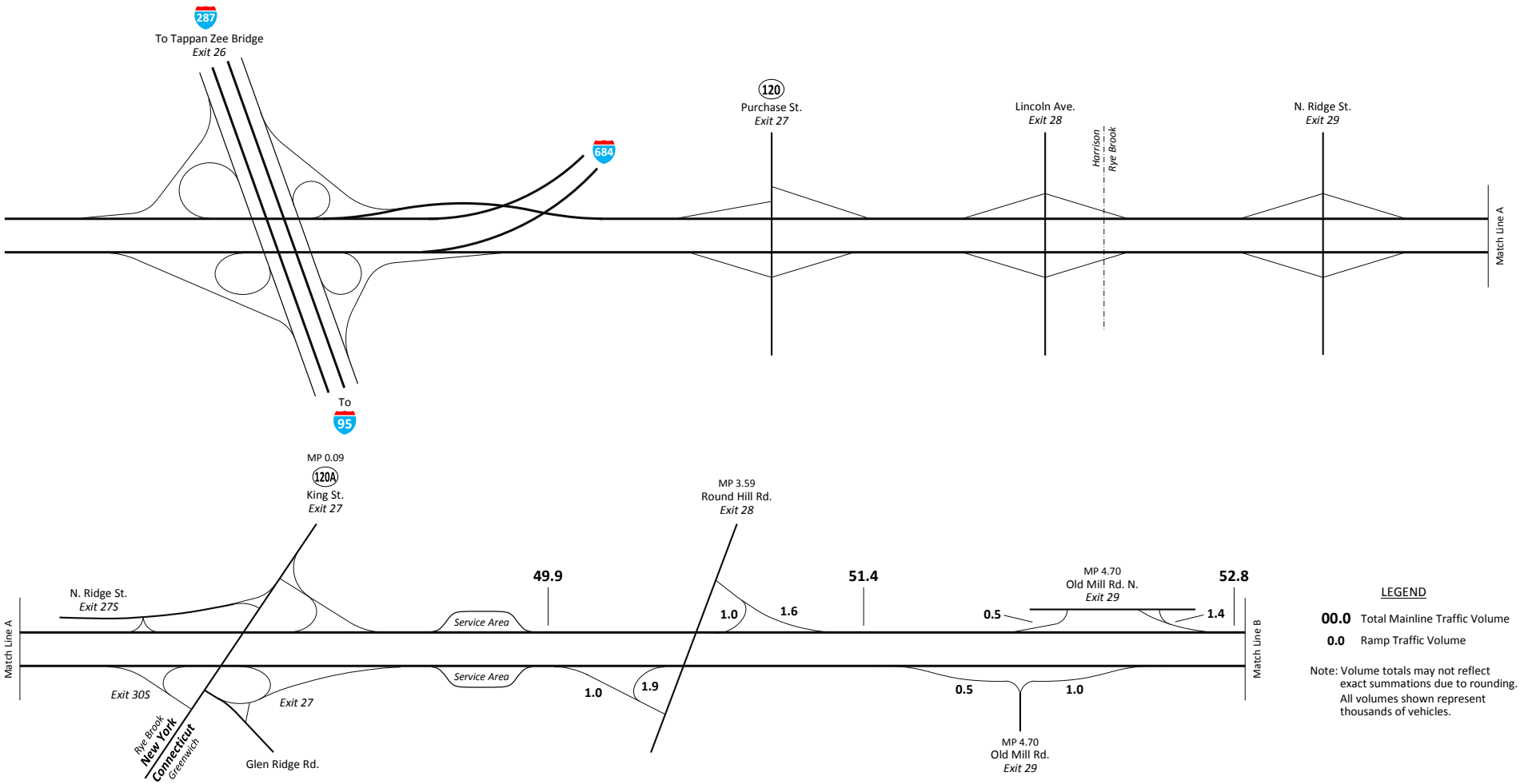
FIGURE 2-23



CDM Smith

I-95 WEEKDAY TRAFFIC PROFILE

FIGURE 2-24



LEGEND

00.0 Total Mainline Traffic Volume

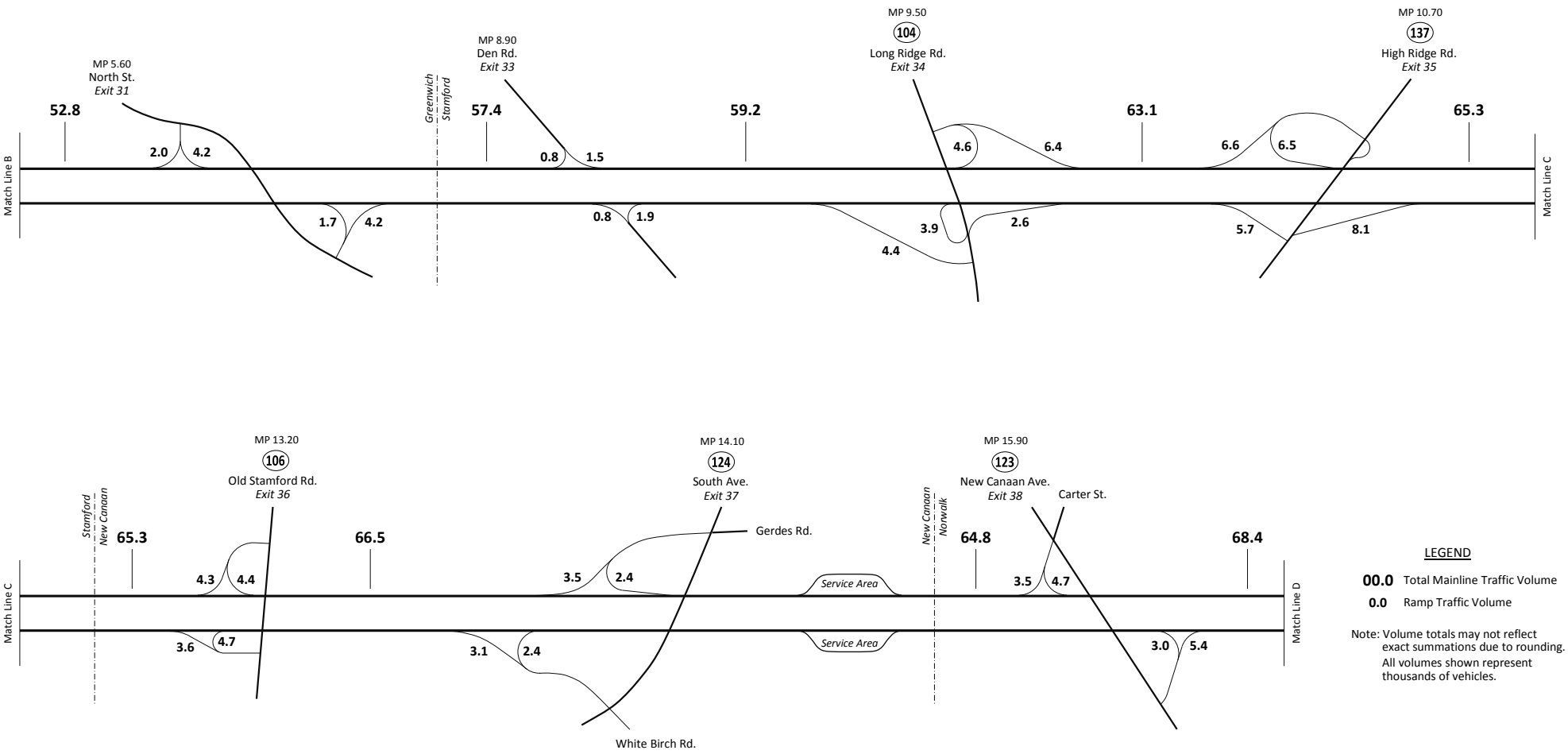
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

ROUTE 15 WEEKDAY TRAFFIC PROFILE

FIGURE 2-25



LEGEND

00.0 Total Mainline Traffic Volume

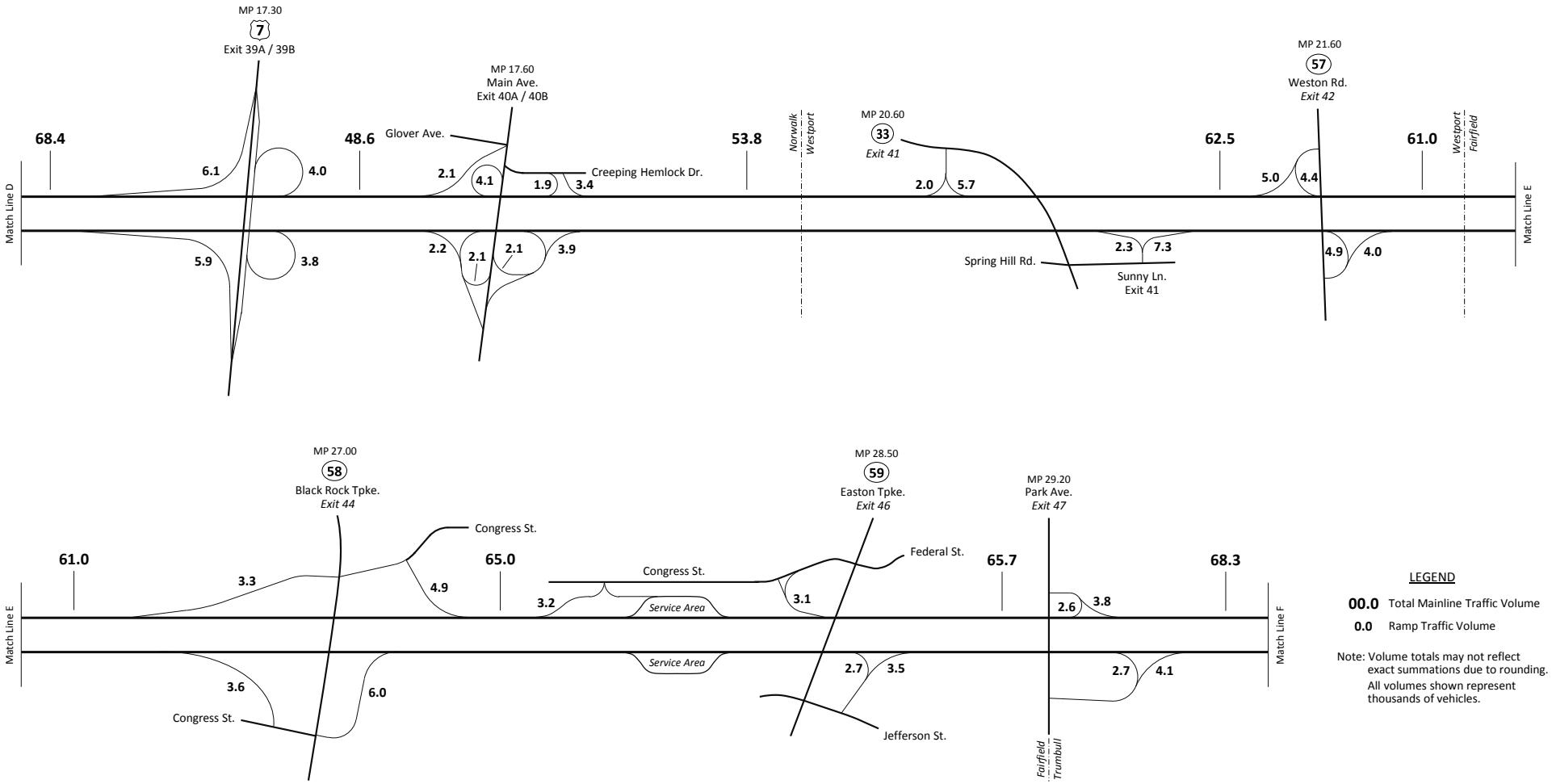
0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding. All volumes shown represent thousands of vehicles.

CDM Smith

ROUTE 15 WEEKDAY TRAFFIC PROFILE

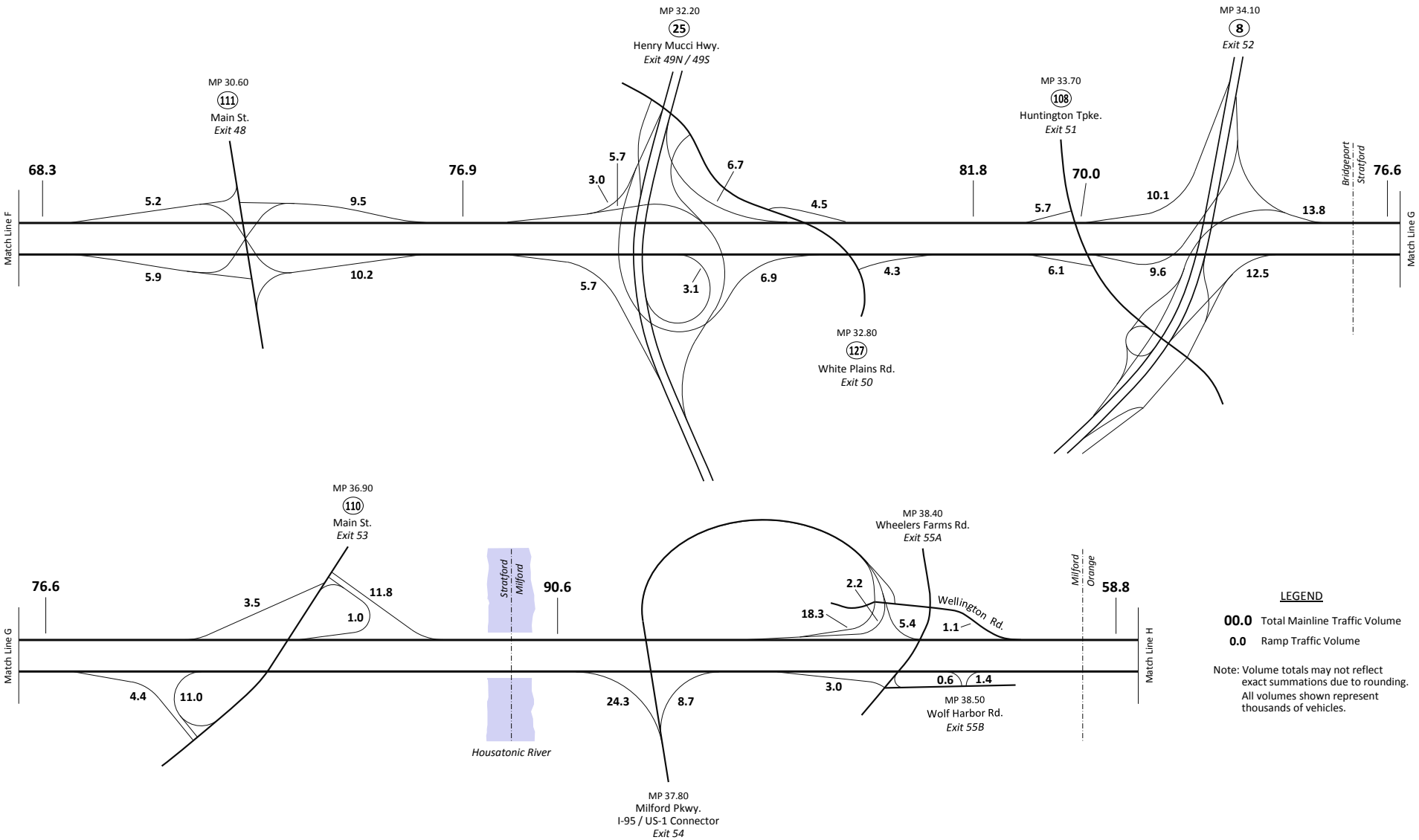
FIGURE 2-26



CDM Smith

ROUTE 15 WEEKDAY TRAFFIC PROFILE

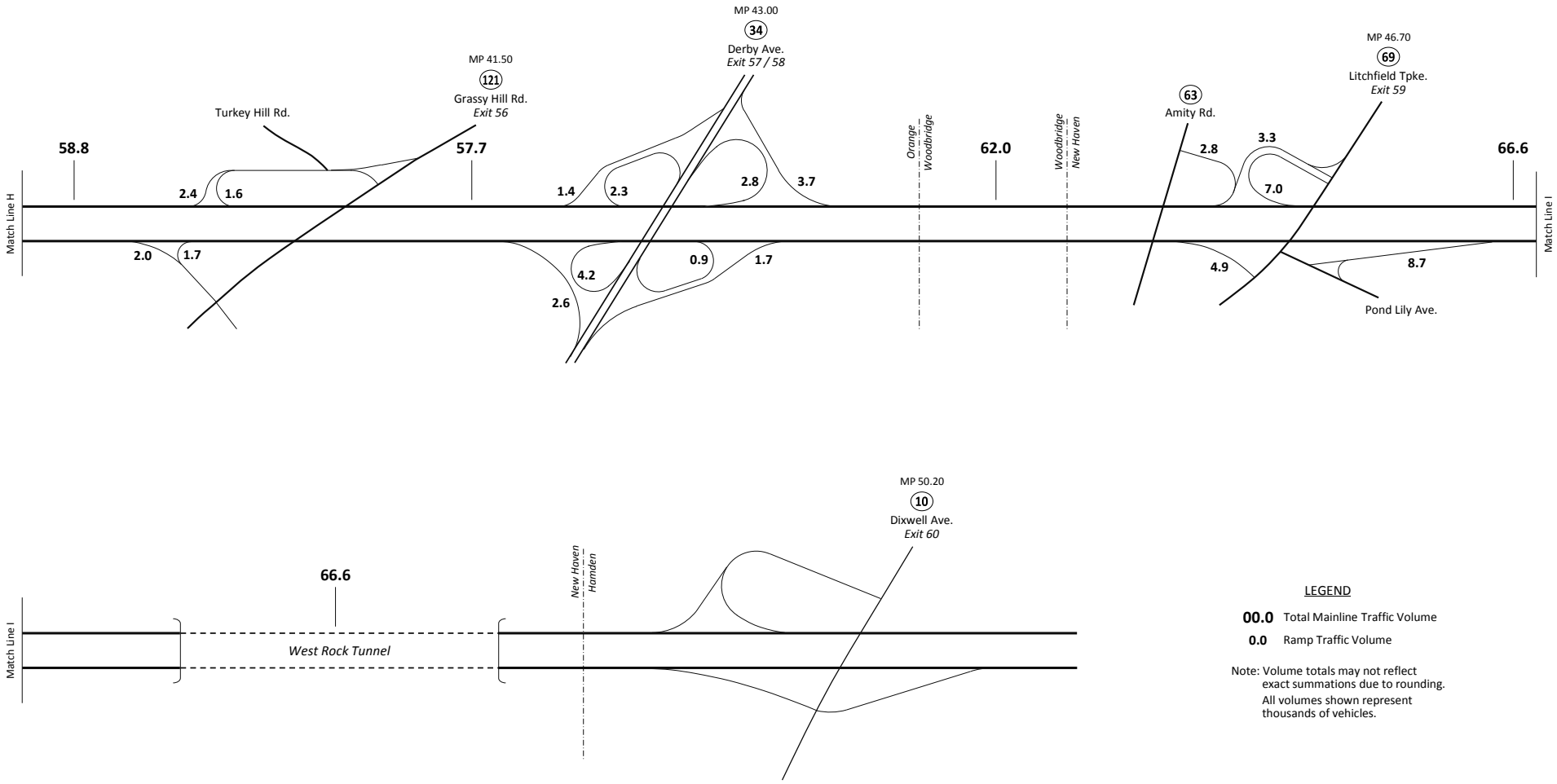
FIGURE 2-27



CDM Smith

ROUTE 15 WEEKDAY TRAFFIC PROFILE

FIGURE 2-28



LEGEND

00.0 Total Mainline Traffic Volume

0.0 Ramp Traffic Volume

Note: Volume totals may not reflect exact summations due to rounding.
All volumes shown represent thousands of vehicles.

CDM Smith

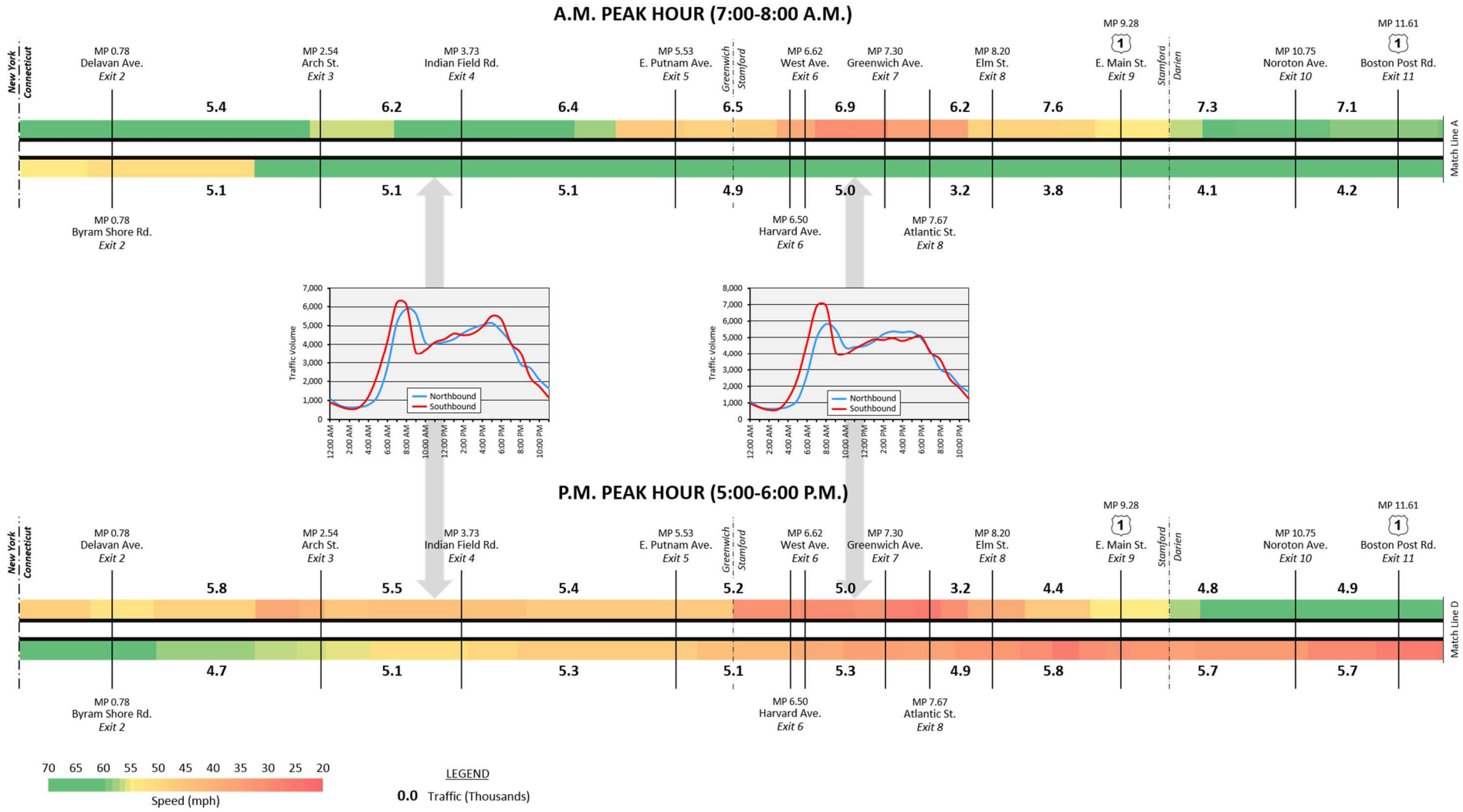
ROUTE 15 WEEKDAY TRAFFIC PROFILE

FIGURE 2-29

Figures 2-30 through 2-33 display several items on the I-95 schematic, including the I-95 travel speeds from the INRIX data for an AM(7-8AM) and PM(5-6PM) peak hour using Googlemap speed colors, peak hour volumes on mainlines between interchanges, and 24 hour volume graphs at selected locations. During the morning southbound peak on I-95, significant speed reductions are experienced between Bridgeport (Route 8/25 interchange/Exit 27) through the Route 7 interchange in Norwalk (Exit 15) (**Figures 2-31 and 2-32**). What is most interesting is that the hourly volumes within this 14 mile stretch barely reach 5,000 vehicles on facility that should accommodate roughly 6,000 vehicles per hour. This seemingly counterintuitive result is a function of the total breakdown in travel conditions that is occurring, where the congestion is limiting the amount of throughput. The hourly traffic graph at the town line of Bridgeport and Fairfield is the most telling (**Figure 2-32**). The graph shows understated southbound demand with no peaking in the AM period. The volumes do not exceed 5,000 vehicles per hour, whereas the cross-section of three lanes can handle volumes beyond 6,000 vehicles per hour. This bottleneck is relieved as traffic gets to Exit 12 and the roadway cross-section widens out to 3 general lanes plus 1 auxiliary lane before widening out to 4 lanes between Exits 9 and 10. In addition to the widening, the congestion conditions upstream present a metering effect on traffic, allowing traffic downstream of the queue to flow at normal conditions. Not only do speeds increase to near free flow between Exit 9 and Exit 13 because of this increase in physical capacity, but hourly demand is reaching more than 7,000 vehicles during the peak hour. A second but shorter pocket of congestion is present in Stamford from Exit 9 through Exit 5 in Greenwich in the southbound direction during the AM peak (**Figure 2-30**) as the roadway reduces back down to 3 lanes through Stamford. The speeds during the AM peak range between 30mph and 50mph on an average weekday in this section. At the opposite end of the study corridor, the delay shown in the New Haven area (**Figure 2-33**) can somewhat be attributed to the ongoing I-95 New Haven Harbor Crossing Corridor Improvement Program.

During the PM peak in the northbound direction, the same limits of congestion are present as were identified during the AM peak southbound direction. However, unlike the southbound direction, the Stamford to Darien section also experiences severe congestion. In this section, the northbound direction does not widen out to 4 lanes, but remains at a cross-section of 3 lanes in the northbound direction, and therefore does not provide a mechanism to accommodate relief of the queue. The northbound hourly graph shown between Exit 6 and 7 in Stamford on **Figure 2-30** displays again what the breakdown in travel operations has on vehicle throughput as only 5,300 vehicles per hour are processed on a cross-section that should accommodate more than 6,000 vehicles per hour in normal operations. The breakdown in travel conditions continues through Norwalk with vehicle throughput reaching north of 6,000 vehicles in some sections where auxiliary lanes are provided. However as displayed in the hourly profiles on **Figure 2-31**, demand is still being restricted by the breakdown in travel speeds. Breakdown in travel conditions continues into Bridgeport, with relief occurring just north of the Route 8 and Route 25 interchange (Exit 27) as traffic continues to drop off at the various exits and I-95 widens out to a 3+1 configuration in the northbound direction beginning north of Exit 25, allowing for normal traffic flow. In all, the extent of this congestion is more than 25 miles. The delay shown in the New Haven area (**Figure 2-33**) in the northbound direction can be somewhat attributed to the ongoing I-95 New Haven Harbor Crossing Corridor Improvement Program.

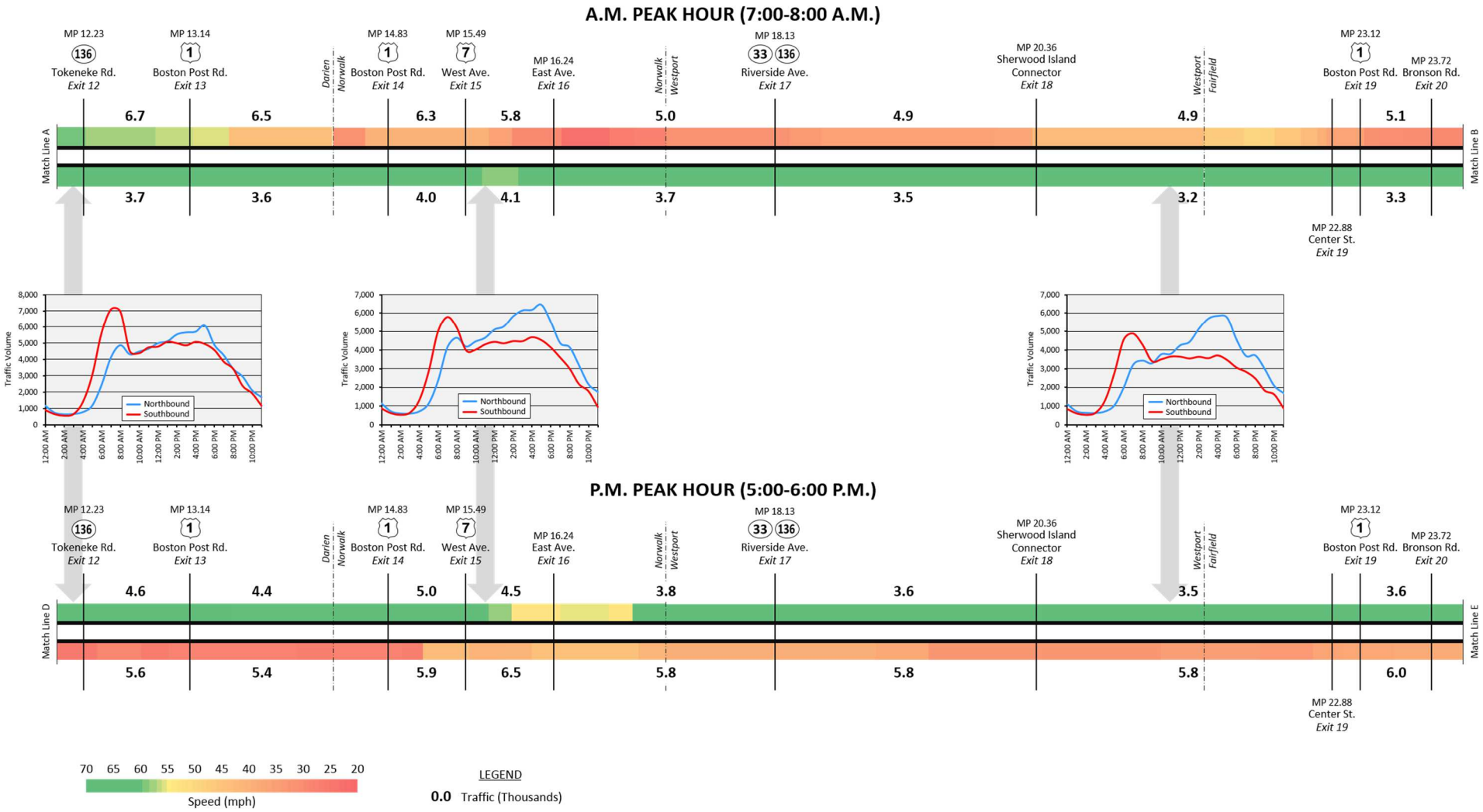
During the PM peak, delay and friction in traffic flow is also experienced in the southbound direction from Stamford to the New York State line. The main cause of this condition is the large amount of traffic entering I-95 southbound during the PM peak from the closely-spaced Atlantic Street and Washington Boulevard ramps and from weaving and merging of traffic southward along this segment.



CDM Smith

PEAK HOUR VOLUMES AND TRAVEL SPEEDS ALONG THE I-95 CORRIDOR

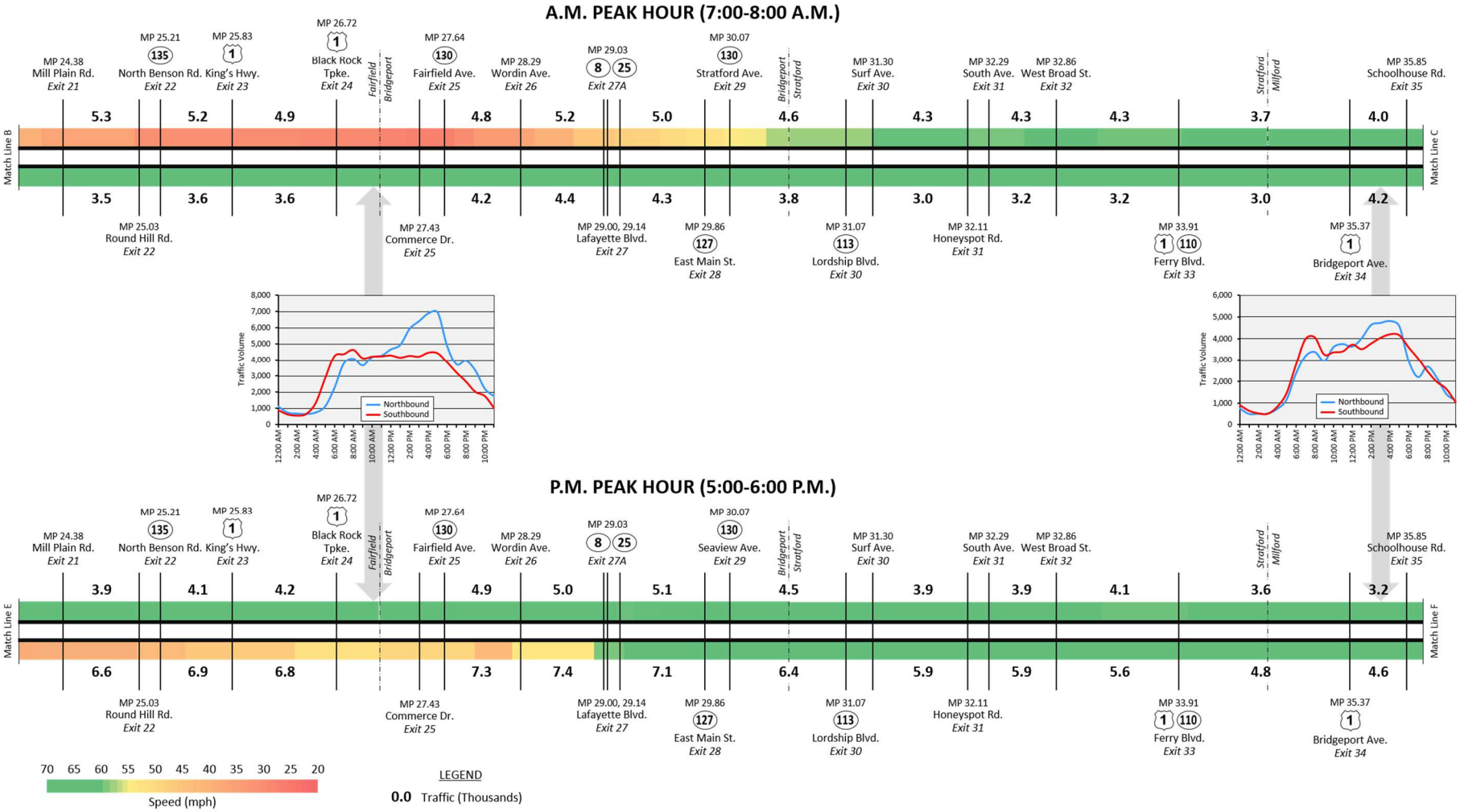
FIGURE 2-30



CDM Smith

PEAK HOUR VOLUMES AND TRAVEL SPEEDS ALONG THE I-95 CORRIDOR

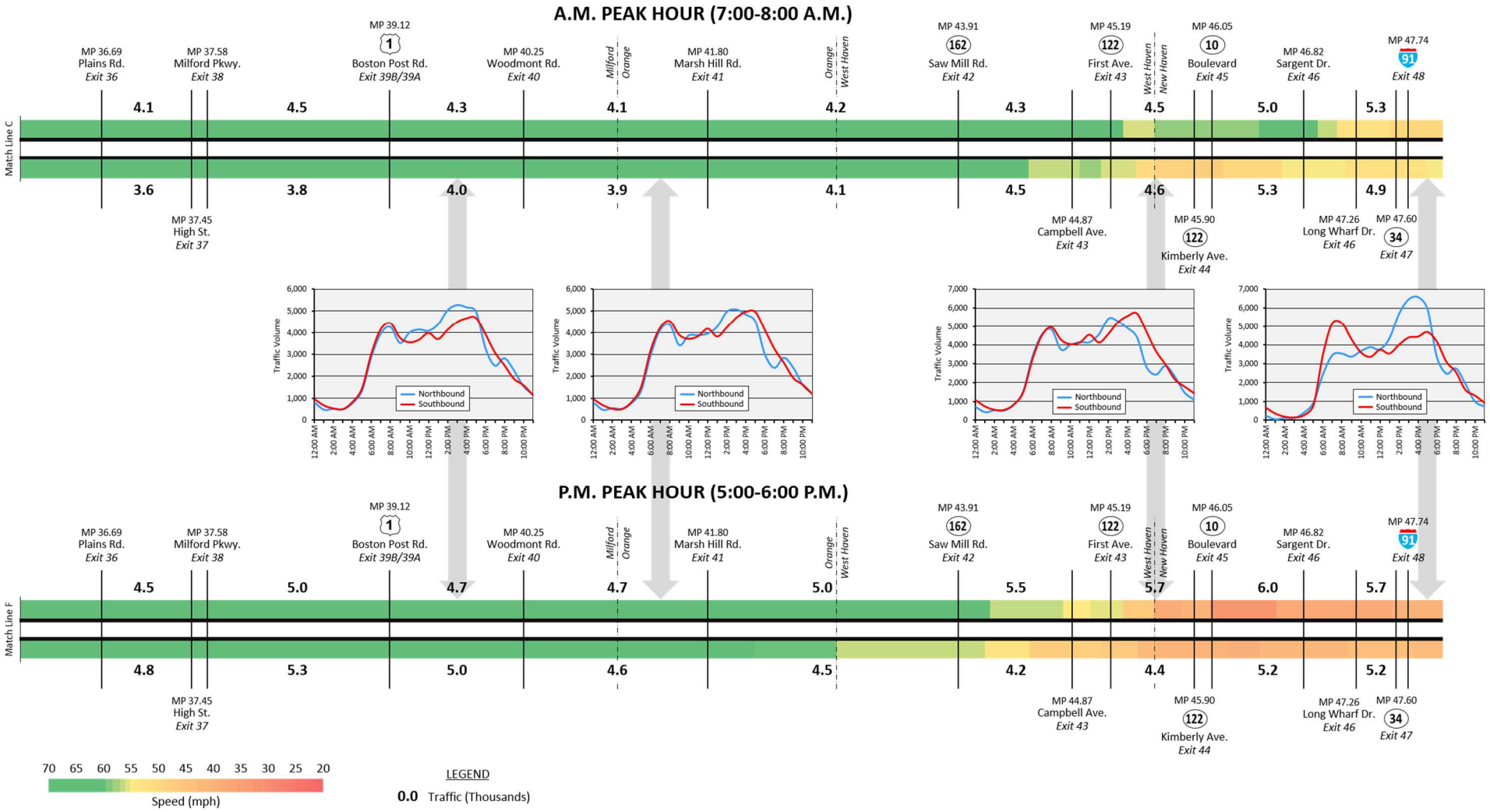
FIGURE 2-31



CDM Smith

PEAK HOUR VOLUMES AND TRAVEL SPEEDS ALONG THE I-95 CORRIDOR

FIGURE 2-32



CDM Smith

PEAK HOUR VOLUMES AND TRAVEL SPEEDS ALONG THE I-95 CORRIDOR

FIGURE 2-33

To further illustrate the build-up and duration of congestion across time and space," heat" maps were produced for I-95 and Route 15. **Figures 2-34 through 2-37** show speed ranges as color bands across the entire length of the I-95 corridor for each travel direction over the AM and PM peak periods. The X-axis of the graphic is to scale by mile post and the y-axis is the selected time frame. The green color range illustrates speeds from 70mph to 60mph; yellow to light orange illustrates decrease in speed from 55mph to 40mph and dark orange to red illustrate speeds of 35mph to 20mph.

Figure 2-34 displays the northbound direction of I-95 from Greenwich to New Haven between 6AM and 12:00 Noon. Very little delay is occurring during the northbound AM period. The slight degradation of speeds in the vicinity of New Haven can likely be attributed to the ongoing I-95 New Haven Harbor Crossing Corridor Improvement Program.

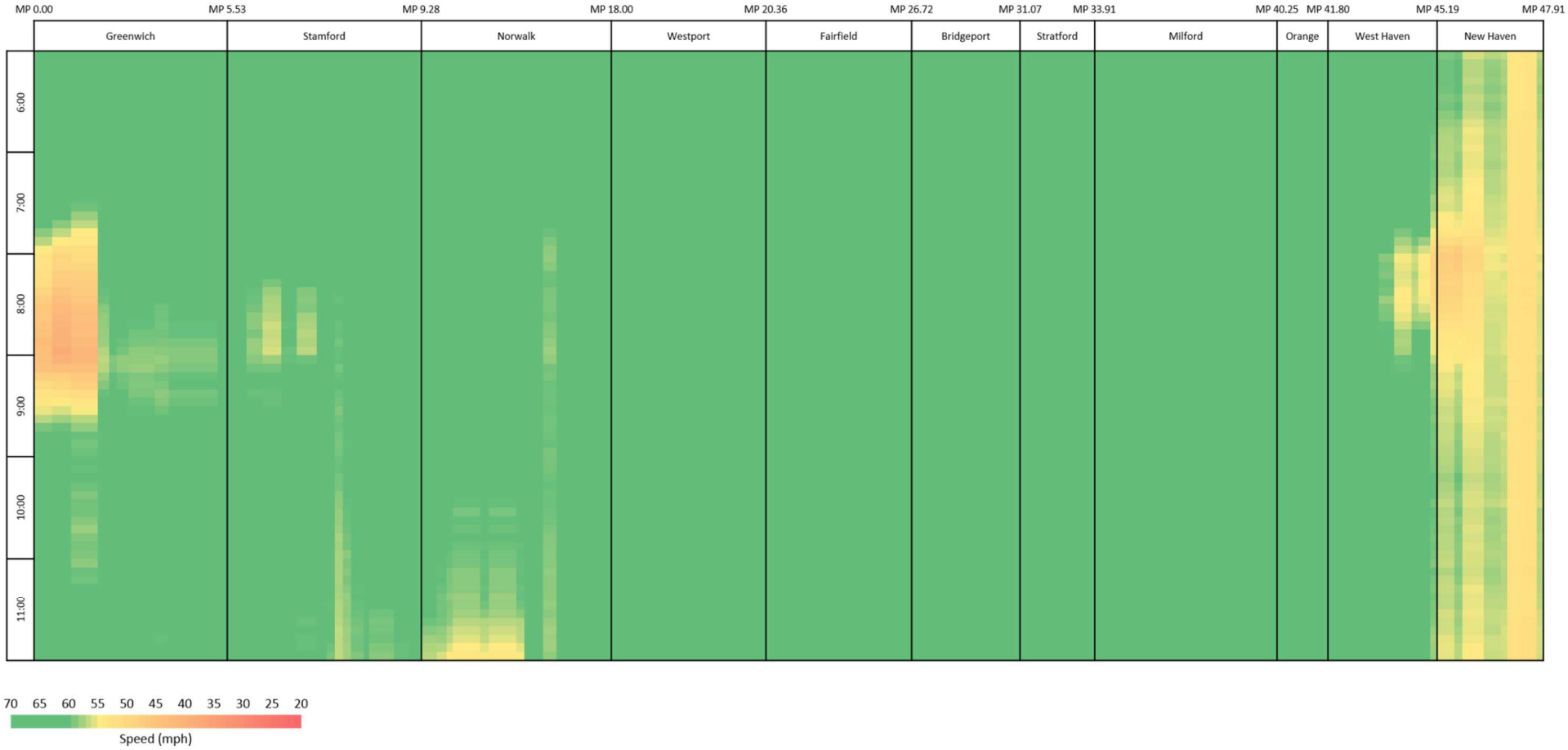
During the AM peak period in the southbound direction (**Figure 2-35**) significant delay is evident by the large swath of red and orange in the figure between 6:30AM and 10:00AM. Although there is some delay experienced between 7:30 and 9:30 between Stamford and Greenwich, most of the congestion is experienced between Bridgeport and Stamford. **Table 2-5** shows the average speeds for an AM peak hour (8-9AM) for a trip between New Haven and the New York State Line and between Bridgeport and Stamford. During the peak 8AM hour, 20 minutes of delay are being experienced on average for a through trip, with 18 minutes of that delay occurring between Bridgeport and Stamford. The additional 18 minutes of travel time over this 24 mile trip is an increase of more than 80 percent when compared to a delay free trip. Significant variation across the months occurs, with May and June having the highest levels of delay and the months of January and February having the lowest. On an average weekday in May and June, average delay increases significantly to around 40 minutes. It should be pointed out that the month of November should be considered somewhat of an anomaly in 2012 as Super Storm Sandy had significant impacts to travel in the northeast, including to Metro North and in particular to rail stations and subway lines in New York City.

Figure 2-36 displays the northbound direction between 3PM and 9PM. The swath of yellow and orange colors spans across 5 hours between Stamford and Norwalk. Similar to the AM southbound direction, congestion on average is shown to be significant between Bridgeport and Greenwich, spanning nearly 4 hours in duration. **Table 2-6** shows the average speeds for a PM Peak hour (5-6PM) trip between New Haven and the New York State Line and between Stamford and Bridgeport. During the peak 5PM hour, 20 minutes of delay are being experienced on average for a through trip, with 16 minutes of that delay occurring between Stamford and Bridgeport. The additional 16 minutes of travel time over this 24 mile trip is an increase of more than 70 percent when compared to a delay free trip.

Figure 2-37 displays the southbound direction of I-95 from Greenwich to New Haven between 3PM and 9PM. Some delay is evident through Greenwich and into Stamford between 5PM and 7PM reflecting the reverse commute out of Connecticut toward New York.

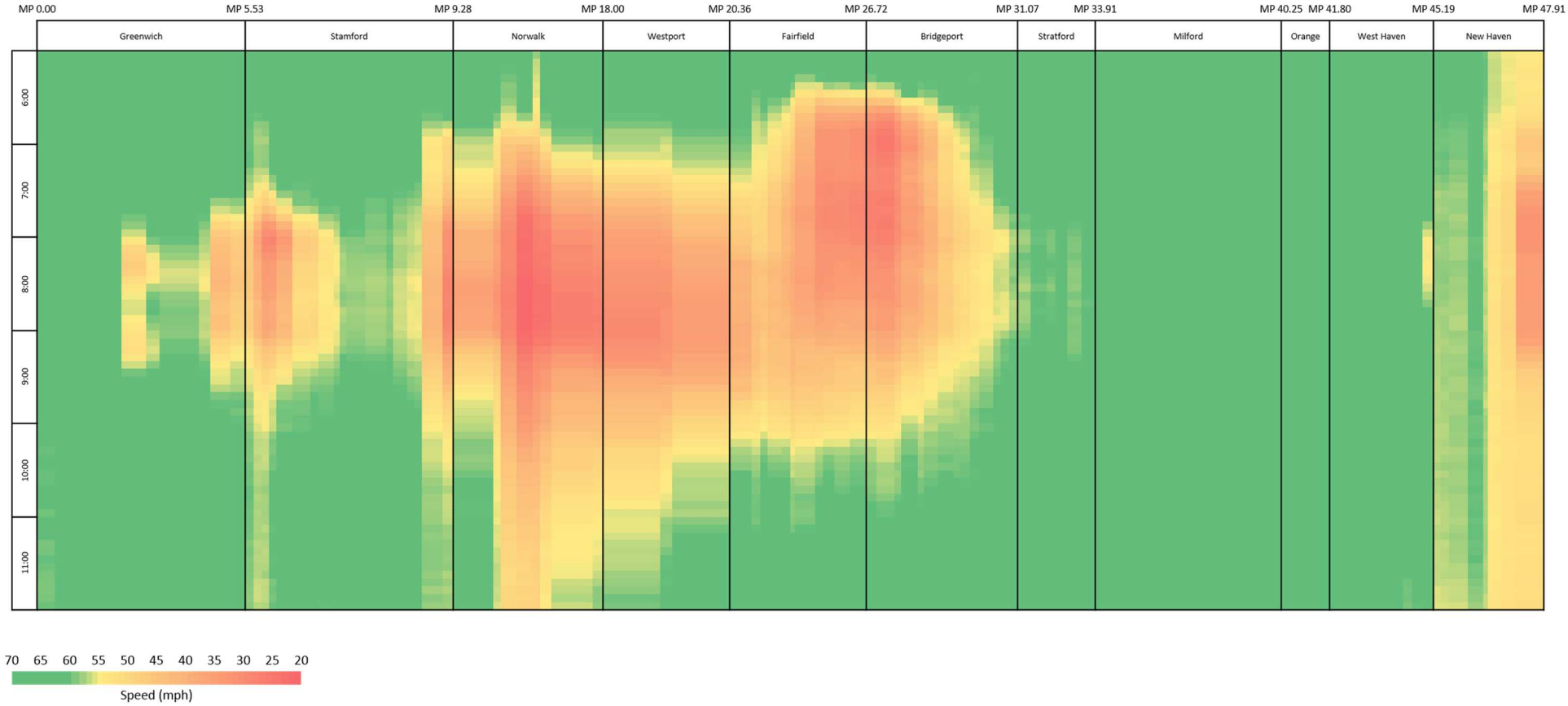
Figures 2-38 through 2-41 show heat maps of Route 15. **Figure 2-38** displays average weekday travel conditions in the northbound direction of Route 15 from Greenwich to New Haven between 6AM and 12:00 Noon. As shown, the facility operates at normal travel speeds with no evidence of recurring congestion.

During the AM peak period in the southbound direction (**Figure 2-39**) significant delay is evident by the large swath of red, orange, and yellow between 7:00AM and 9:30AM between the Route 25 interchange (Exit 49) in Trumbull and Exit 35 in Stamford, covering a distance of more than 20 miles. It's interesting to note that there seems to be a clear separation within the traffic operations of the



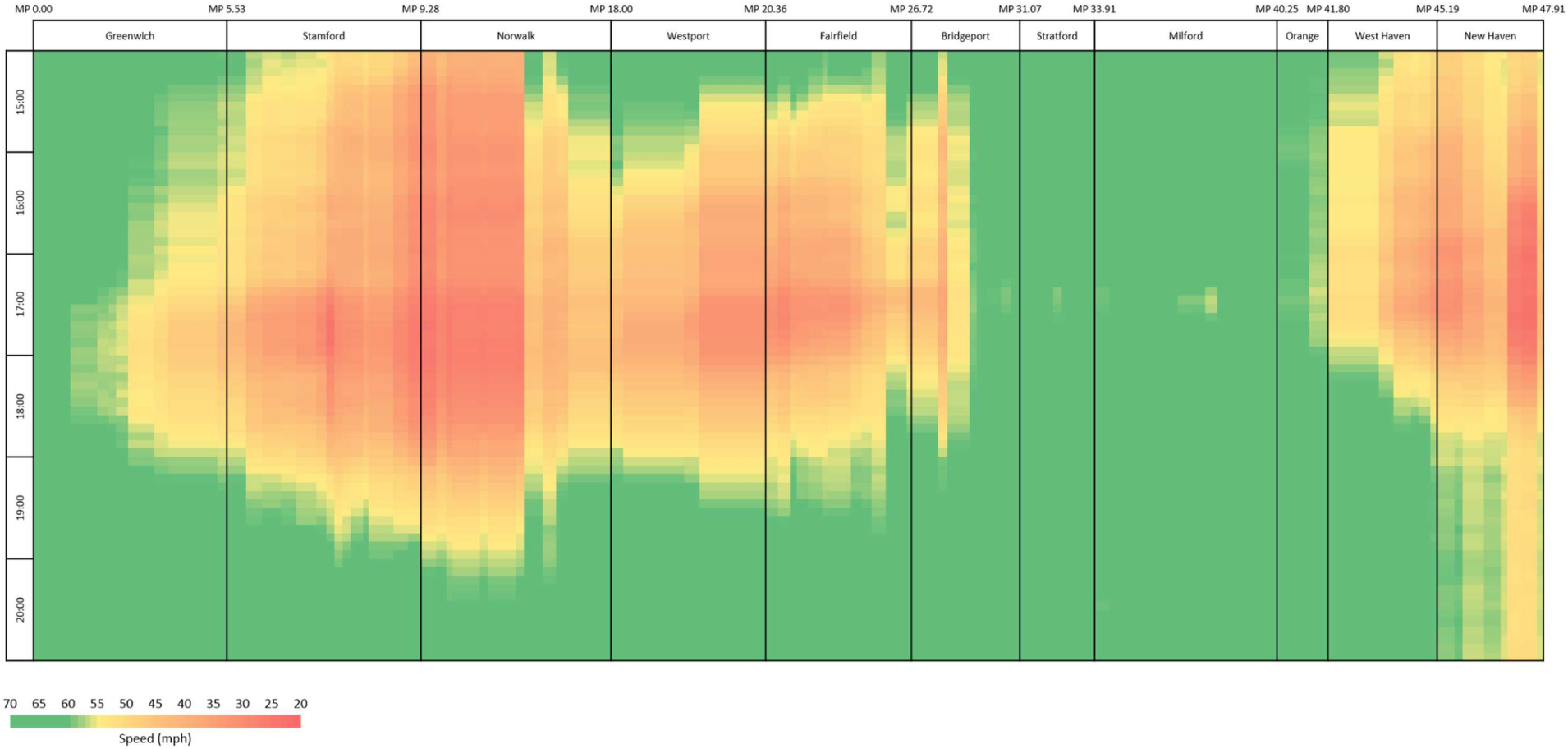
INRIX: I-95 AVERAGE WEEKDAY TRAVEL SPEEDS - NORTHBOUND AM

FIGURE 2-34



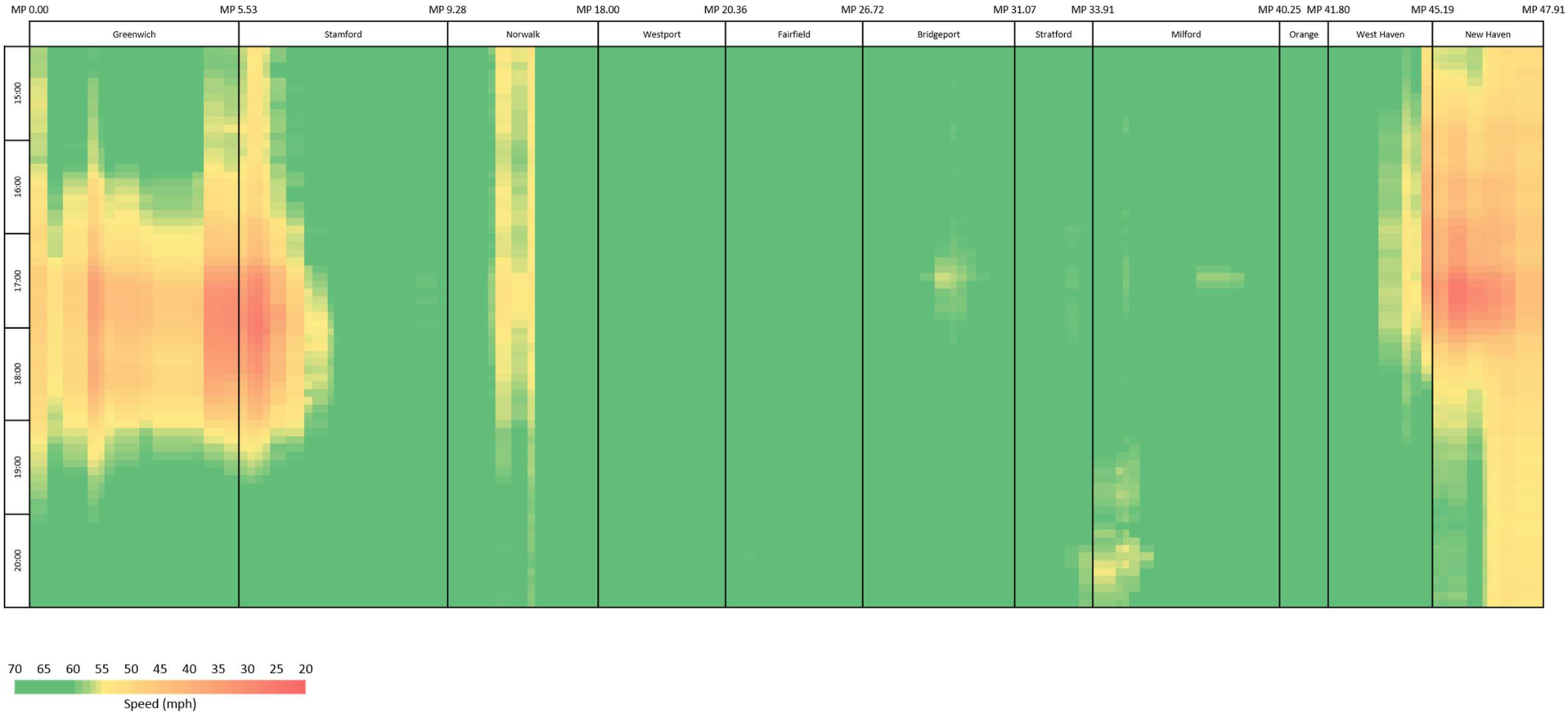
INRIX: I-95 AVERAGE WEEKDAY TRAVEL SPEEDS - SOUTHBOUND AM

FIGURE 2-35



INRIX: I-95 AVERAGE WEEKDAY TRAVEL SPEEDS - NORTHBOUND PM

FIGURE 2-36



INRIX: I-95 AVERAGE WEEKDAY TRAVEL SPEEDS - SOUTHBOUND PM

FIGURE 2-37

Table 2-5
Average Weekday Southbound AM Peak (8 - 9 AM)

	New Haven to Greenwich (47 miles)			Bridgeport to Stamford (24 miles)		
Time Period	**Travel Time (minutes)**	**Travel Speed (mph)**	**Delay (minutes)**	**Travel Time (minutes)**	**Travel Speed (mph)**	**Delay (minutes)**
Freeflow	**44**	**65**	**0**	**22**	**65**	**0**
Average	**64**	**44**	**20**	**40**	**36**	**18**
JAN	56	50	12	32	45	10
FEB	52	54	8	29	50	7
MAR	60	47	16	36	40	14
APR	64	44	20	40	36	18
MAY	85	33	41	59	24	37
JUN	82	34	38	57	25	35
JUL	65	43	21	40	36	18
AUG	61	46	17	37	39	15
SEP	72	39	28	47	31	25
OCT	75	38	31	50	29	28
NOV	72	39	28	46	31	24
DEC	60	47	16	36	40	14

Data Source: INRIX

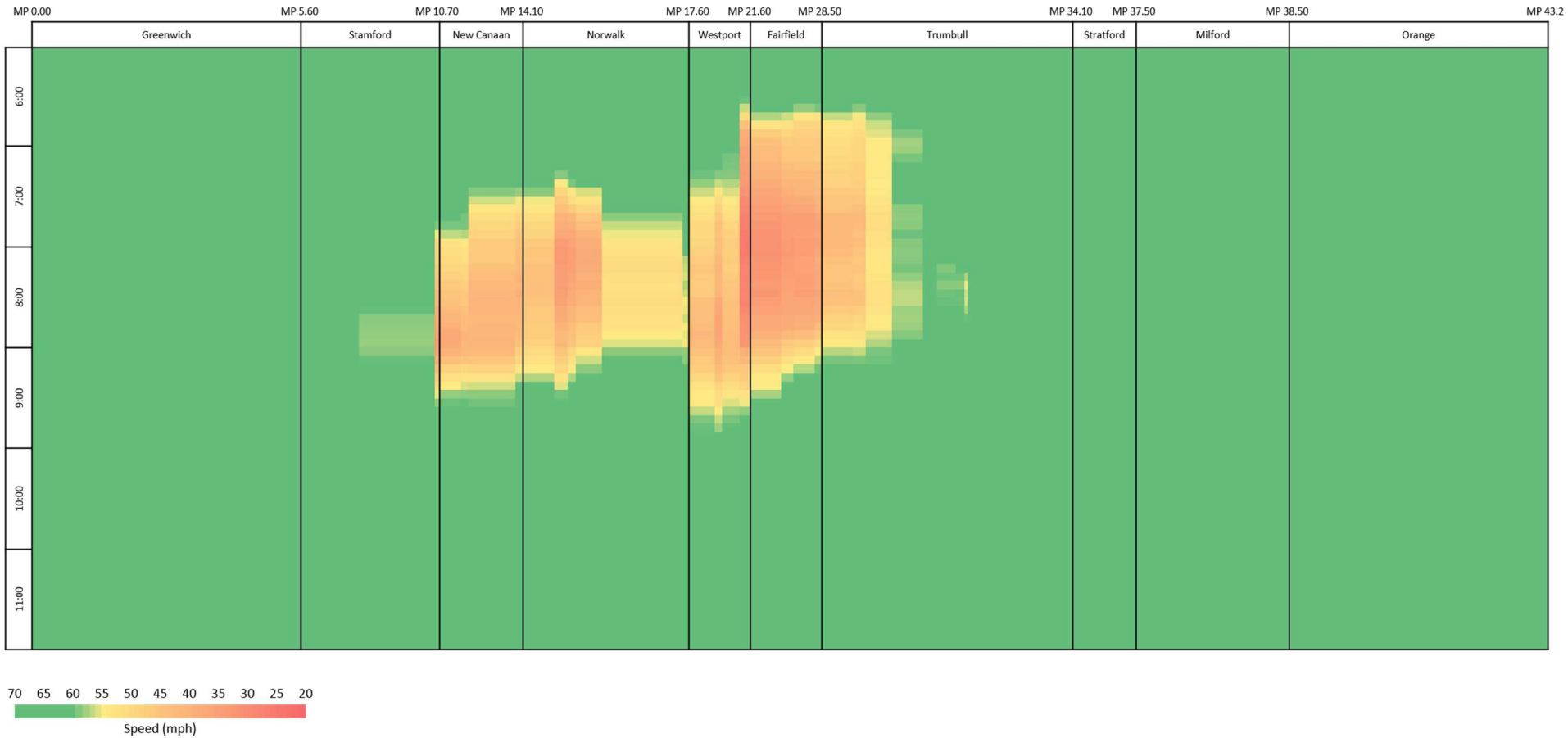
Table 2-6
Average Weekday Northbound PM Peak (5 - 6 PM)

	Greenwich to New Haven (47 miles)			Stamford to Bridgeport (24 miles)		
Time Period	**Travel Time (minutes)**	**Travel Speed (mph)**	**Delay (minutes)**	**Travel Time (minutes)**	**Travel Speed (mph)**	**Delay (minutes)**
Freeflow	**44**	**65**	**0**	**22**	**65**	**0**
Average	**64**	**44**	**20**	**38**	**38**	**16**
JAN	54	52	10	30	48	8
FEB	52	54	8	29	50	7
MAR	57	49	13	33	44	11
APR	68	41	24	40	36	18
MAY	74	38	30	45	32	23
JUN	87	32	43	52	28	30
JUL	70	40	26	39	37	17
AUG	73	39	29	42	34	20
SEP	61	46	17	36	40	14
OCT	62	45	18	38	38	16
NOV	74	38	30	47	31	25
DEC	70	40	26	44	33	22

Data Source: INRIX

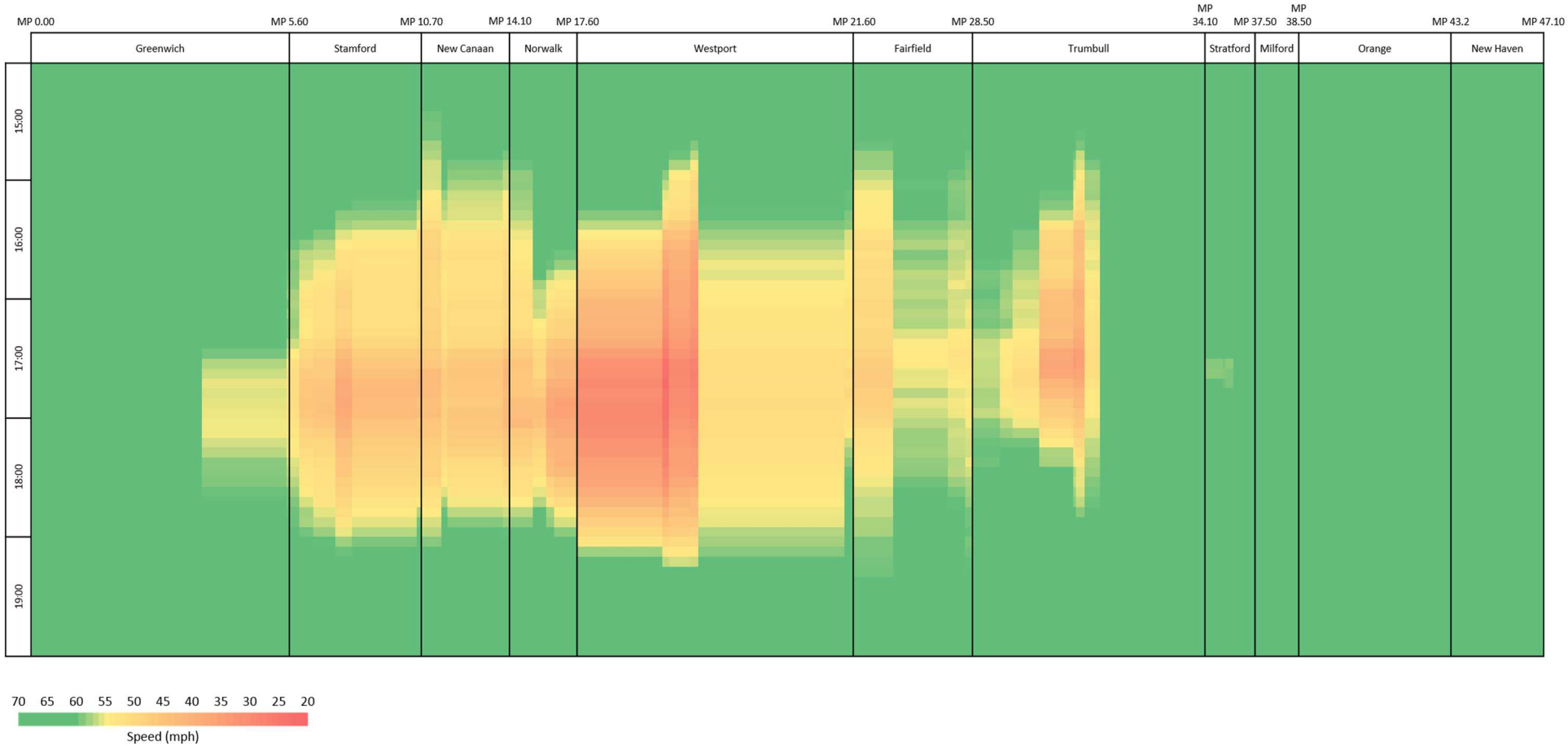
INRIX: CT-15 TRAVEL SPEEDS - NORTHBOUND AM

FIGURE 2-38



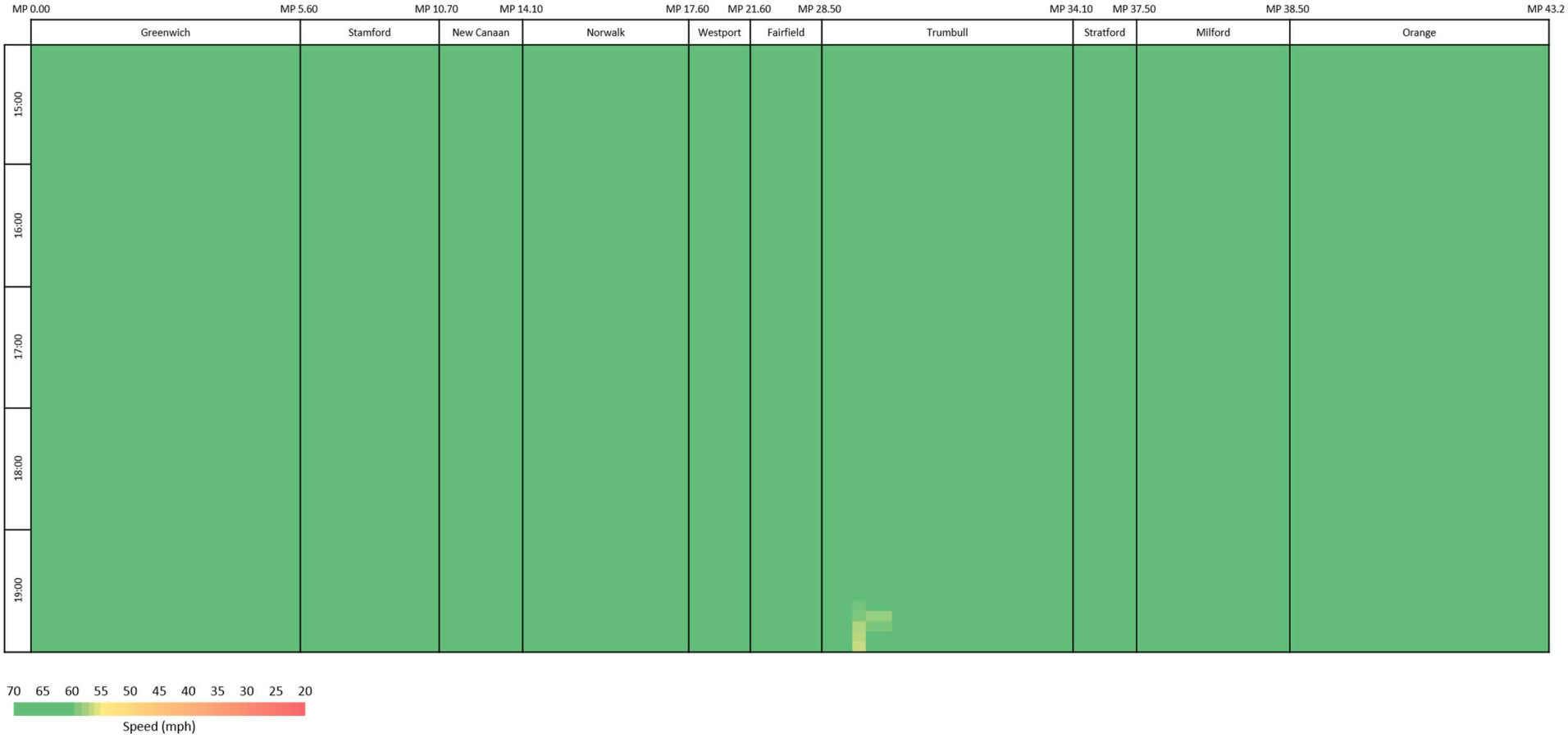
INRIX: CT-15 TRAVEL SPEEDS - SOUTHBOUND AM

FIGURE 2-39



INRIX: CT-15 TRAVEL SPEEDS - NORTHBOUND PM

FIGURE 2-40



INRIX: CT-15 TRAVEL SPEEDS - SOUTHBOUND PM

FIGURE 2-41

corridor occurring at the Norwalk/Westport line. At Exit 41 in Westport and Exit 40A/40B in Norwalk large amounts of traffic exit Route 15 and as a result the merging and weaving activity of traffic is causing friction. The head of another queue is present around Exit 35 and Exit 36 in Stamford where significant traffic is exiting and entering Route 15 resulting in merging and weaving activity and friction along the mainline. This delay lasts from 7:30 to 9:00AM, while the congestion between Exit 40 and Exit 49 is more in the range of 7:00 to 9:30AM. Similar to I-95, the congestion extends predominantly from Trumbull/Bridgeport to Stamford.

Figure 2-40 displays the travel conditions in the northbound direction of Route 15 between 3PM and 8PM. The swath of yellow and orange is concentrated in the 4:30 to 6:30PM time of day. Similar to the AM southbound direction, congestion on average is shown to be significant between Trumbull and Stamford, spanning nearly 25 miles. Heaviest delay is experienced through Exits 41 and 42 in Westport due to high levels of merging and weaving of traffic exiting and entering Route 15. Route 15 is unique in that the ramp access requires traffic to accelerate quickly to enter the facility. This results in a metering effect of entering traffic and therefore helps to dampen the traffic operations impact on the mainline. However, the need for traffic to accelerate quickly to enter the facility also impacts the right lane, causing traffic to slow and thereby having a negative effect on the operations. Congestion within Trumbull is a result of the merging friction caused by the Route 25 and Route 8 interchange, as well as traffic entering from Route 127 (at Exit 50).

Figure 2-41 displays the southbound direction of Route 15 from Greenwich to New Haven between 3PM and 8PM. No recurring delay is evident with average traffic operations displaying normal conditions.

Level of Service

Additional data on queuing and bottlenecks was collected through Skycomp surveillance of AM and PM peak hours of I-95 and Route 15 extending from Route 34 in New Haven to I-287 in New York. Using a fixed-wing airplane to photograph the survey area, Skycomp collected high-resolution overlapping digital photographs during morning and evening peak hours, suitable for the extraction of traffic densities and queue lengths along I-95 and Route 15. The data was summarized from three flight days during morning and evening peak hours of the two corridors. In total, twelve flights were completed to provide average weekday queuing and bottleneck statistics.

Figures 2-42 through 2-49 illustrate performance rating (Level of Service) tables of traffic conditions on I-95 and Route 15 for morning and evening peak periods. The ratings are presented in tables by highway segment, by direction, and by time slice. Each rating represents the average of approximately three flyovers (from three different days), minus any data affected by incidents. The ratings are density-based level-of-service (LOS) designations A, B, C, D, E and F, as defined in the Highway Capacity Manual (HCM). The definitions from the 2010 HCM are given below:

LOS A describes free-flow operations. Free-flow speed (FFS) prevails on the freeway, and vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed.

LOS B represents reasonably free-flow operations, and FFS on the freeway is maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and point breakdowns are still easily absorbed.

Southbound

Time	21	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
		MP 0.78	MP 2.54	MP 3.73	MP 5.53	MP 6.50 MP 6.62	MP 7.30	MP 7.67 MP 8.20	MP 9.28	MP 10.75	MP 11.61	MP 12.23	MP 13.14	MP 14.83	MP 15.49	MP 16.24	MP 18.13	MP 20.36	MP 22.88 MP 23.12	MP 23.72	MP 24.38	MP 25.03 MP 25.21
	I-287	Delavan Ave. / Byram Shore Rd.	Arch St.	Indian Field Rd.	E. Putnam Ave.	West Ave.	Greenwich Ave.	Atlantic St. / Elm St.	US 1 (Boston Post Rd.)	Noroton Ave.	US 1	SR 136 (Tokeneke Rd.)	US 1	US 1	US 7	East Ave.	SR 33 / SR 136	Sherwood Island Connector	Center St. / US 1	Bronson Rd.	Mill Plain Rd.	Round Hill Rd. / SR 135
6:30-7:00		B	B	C	C	C	D	C	C	D	C	D	D	D	E	F	D	D	E	E	E	F
7:00-7:30		B	C	C	C	C	D	B	C	C	D	D	D	D	F	F	E	E	E	E	E	F
7:30-8:00		C	C	D	D	E	E	C	C	D	D	E	D	F	F	F	F	E	F	E	E	F
8:00-8:30		C	C	E	D	D	F	F	E	D	D	E	F	F	F	F	F	F	F	F	F	F
8:30-9:00		C	C	E	E	E	E	D	D	D	D	D	F	F	F	F	F	F	F	E	F	F
9:00-9:30		B	B	E	C	D	E	E	D	D	D	E	F	E	F	F	F	F	F	F	F	F

Matchline A

Northbound

Time	21	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
		MP 0.78	MP 2.54	MP 3.73	MP 5.53	MP 6.50 MP 6.62	MP 7.30	MP 7.67 MP 8.20	MP 9.28	MP 10.75	MP 11.61	MP 12.23	MP 13.14	MP 14.83	MP 15.49	MP 16.24	MP 18.13	MP 20.36	MP 22.88 MP 23.12	MP 23.72	MP 24.38	MP 25.03 MP 25.21
	I-287	Delavan Ave. / Byram Shore Rd.	Arch St.	Indian Field Rd.	E. Putnam Ave.	West Ave.	Greenwich Ave.	Atlantic St. / Elm St.	US 1 (Boston Post Rd.)	Noroton Ave.	US 1	SR 136 (Tokeneke Rd.)	US 1	US 1	US 7	East Ave.	SR 33 / SR 136	Sherwood Island Connector	Center St. / US 1	Bronson Rd.	Mill Plain Rd.	Round Hill Rd. / SR 135
6:30-7:00	C	C	C	C	C	C	A	C	B	C	B	B	B	B	B	B	B	B	A	A	B	
7:00-7:30	C	C	B	C	C	C	B	C	C	B	C	C	C	A	B	B	B	B	C	B	B	
7:30-8:00	C	D	C	D	D	E	B	C	C	C	D	C	C	C	C	C	B	C	B	C	C	
8:00-8:30	E	E	D	E	D	E	B	D	C	C	D	D	D	B	C	C	C	C	B	C	B	
8:30-9:00	F	F	D	E	D	E	C	B	A	C	C	D	F	C	C	D	C	B	C	B	C	
9:00-9:30	F	F	F	E	D	E	C	C	C	D	C	C	E	B	C	C	B	B	C	D	A	

Matchline B

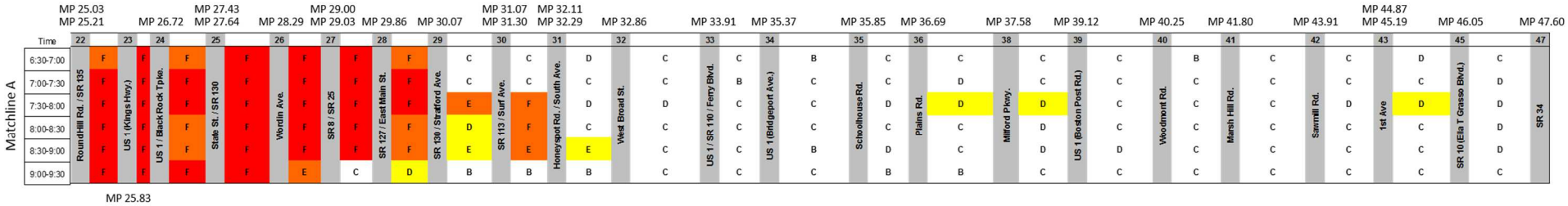
LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

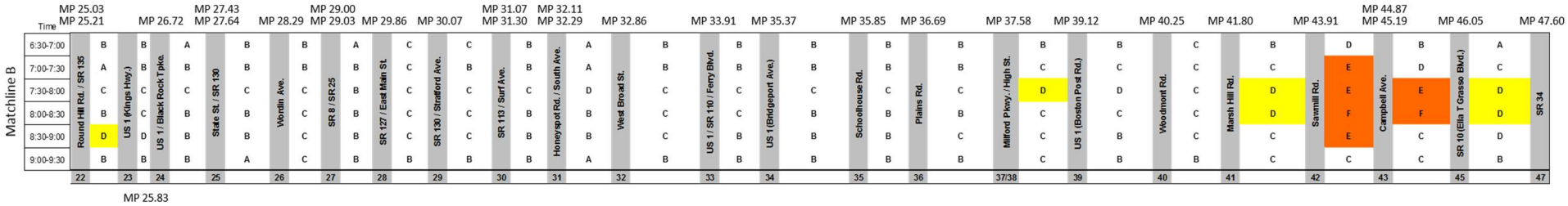
I-95 MORNING LEVEL OF SERVICE PROFILE

FIGURE 2-42

Southbound



Northbound

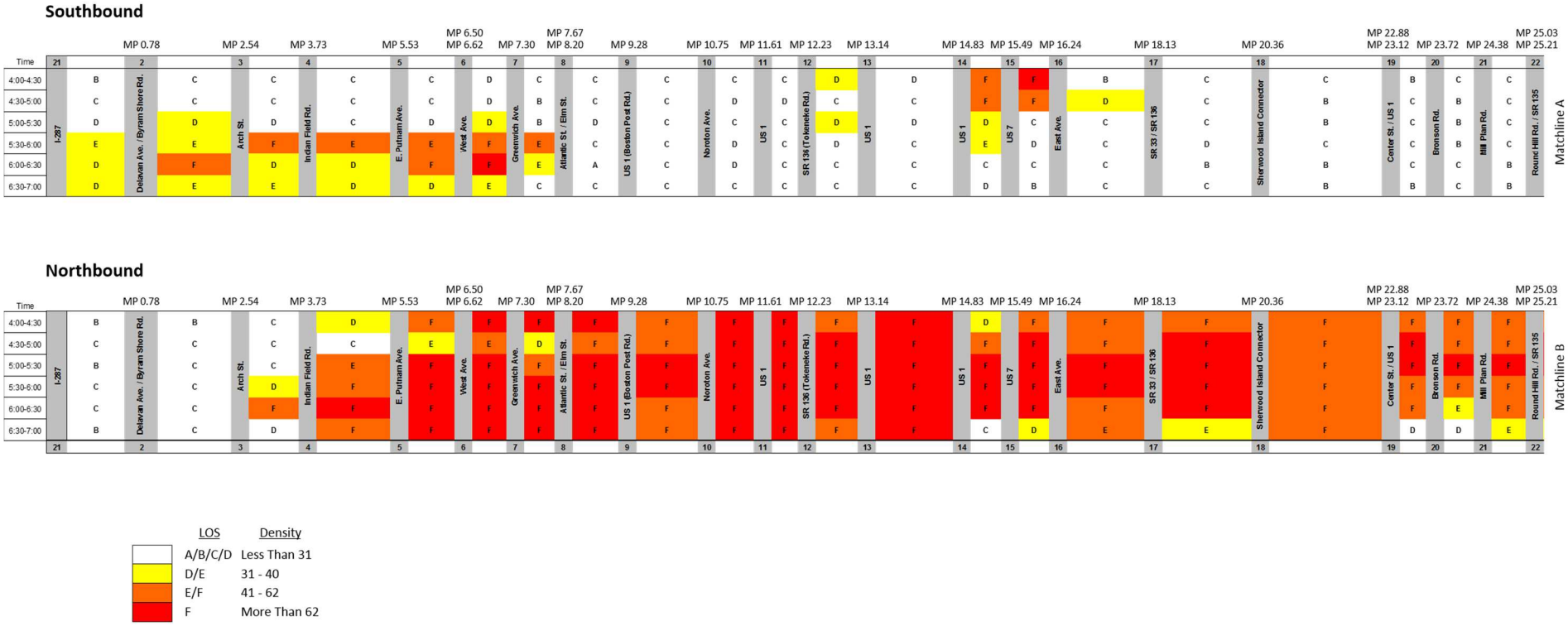


LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

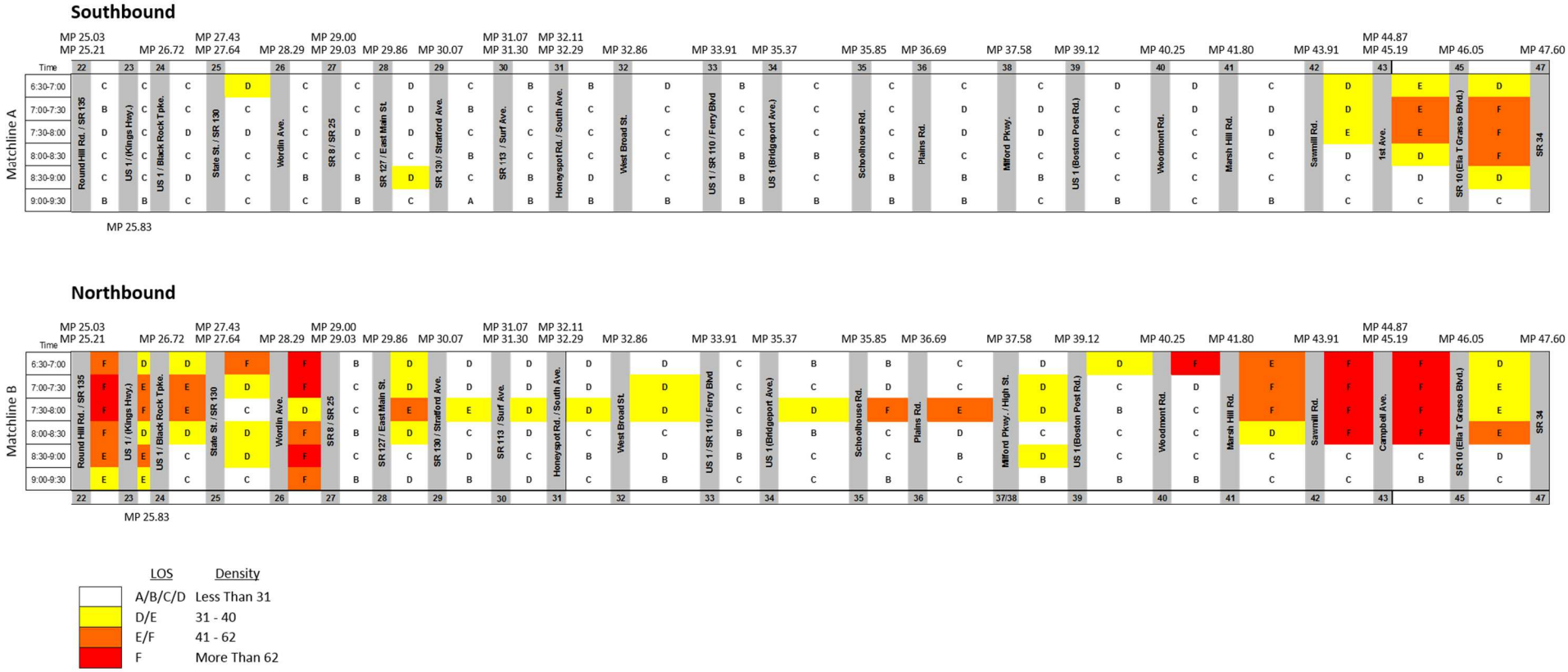
SKYCOMP DATA - I-95 MORNING LEVEL OF SERVICE PROFILE

FIGURE 2-43



SKYCOMP DATA - I-95 EVENING LEVEL OF SERVICE PROFILE

FIGURE 2-44



LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

SKYCOMP DATA - I-95 EVENING LEVEL OF SERVICE PROFILE

FIGURE 2-45

Southbound

Time	26		27		28		29		30 / 27		28		29		31		33		34		35		36		37		38		39		40		41
		MP 0.09										MP 3.59		MP 4.70		MP 5.60		MP 8.90		MP 9.50		MP 10.70		MP 13.20		MP 14.10		MP 15.90		MP 17.30		MP 17.60		MP 20.60
6:30-7:00	I-287	A	Purchase St.	A	Lincoln Ave.	A	N Ridge Rd.	A	SR 120A (King St.)	B	Round Hill Rd	B	Old Mill Rd.	C	North St.	B	Den Rd.	C	SR 104 (Long Ridge Rd.)	C	SR 137 (High Ridge Rd.)	D	SR 106 (Old Stamford Rd.)	D	SR 124 (South Ave.)	D	SR 123 (New Canaan Rd.)	D	US 7	C	Main Ave.	D	SR 33 (Wilton Rd.)
7:00-7:30		B		B		B		A		B		C		C		C		C		C		D		D		D		F		E		C	
7:30-8:00		B		D		D		C		B		C		D		D		D		D		D		D		F		F		F		F	
8:00-8:30		C		D		C		B		B		B		C		D		C		C		D		D		F		F		F		E	
8:30-9:00		B		D		C		B		B		C		C		C		D		D		E		D		F		F		F		E	
9:00-9:30		A		A		B		B		B		B		C		C		C		B		D		D		D		C		A		C	

Matchline A

Northbound

Time	26		27		28		29		30 / 27		28		29		31		33		34		35		36		37		38		39		40		41
		MP 0.09										MP 3.59		MP 4.70		MP 5.60		MP 8.90		MP 9.50		MP 10.70		MP 13.20		MP 14.10		MP 15.90		MP 17.30		MP 17.60		MP 20.60
6:30-7:00	I-287	A	Purchase St.	A	Lincoln Ave.	A	N Ridge Rd.	A	SR 120A (King St.)	A	Round Hill Rd	A	Old Mill Rd.	A	North St.	A	Den Rd.	A	SR 104 (Long Ridge Rd.)	A	SR 137 (High Ridge Rd.)	A	SR 106 (Old Stamford Rd.)	A	SR 124 (South Ave.)	A	SR 123 (New Canaan Rd.)	B	US 7	A	Main Ave.	A	SR 33 (Wilton Rd.)
7:00-7:30		B		B		B		B		B		A		B		A		B		B		B		C		A		B		B		A	
7:30-8:00		D		B		B		B		B		B		C		B		A		C		A		C		B		C		B		B	
8:00-8:30		C		B		C		B		B		B		C		C		A		B		C		B		C		B		A		B	
8:30-9:00		C		B		B		C		B		B		C		B		C		C		C		D		C		C		B		A	
9:00-9:30		B		B		B		B		A		B		B		B		B		B		B		B		C		B		B		A	
	26		27		28		29		30 / 27		28		29		31		33		34		35		36		37		38		39		40		41

Matchline B

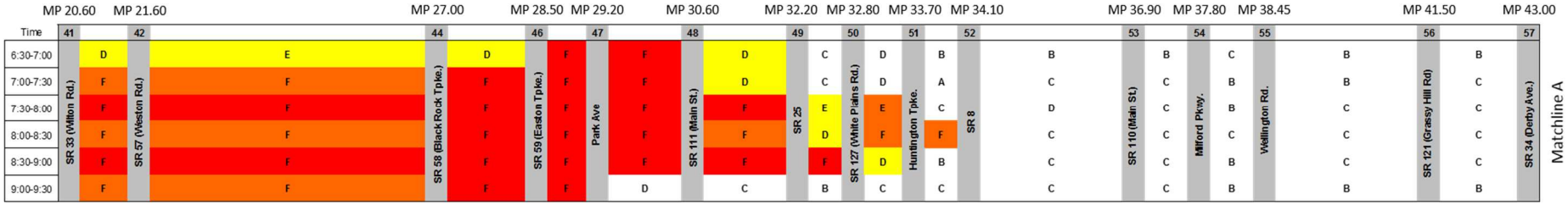
LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

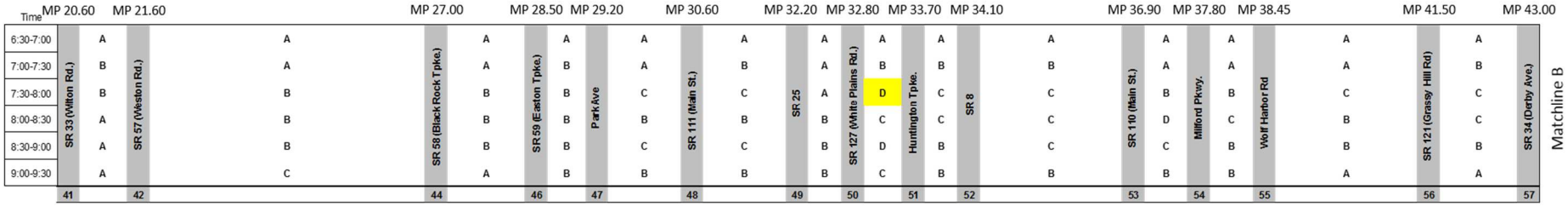
SKYCOMP DATA - ROUTE 15 MORNING LEVEL OF SERVICE PROFILE

FIGURE 2-46

Southbound



Northbound



LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

SKYCOMP DATA - ROUTE 15 MORNING LEVEL OF SERVICE PROFILE

FIGURE 2-47

Southbound

Time	26		27		28		29		30 / 27		28		29		31		33		34		35		36		37		38		39		40		41
		MP 0.09								MP 3.59		MP 4.70		MP 5.60		MP 8.90		MP 9.50		MP 10.70		MP 13.20		MP 14.10		MP 15.90		MP 17.30		MP 17.60		MP 20.60	
4:00-4:30	I-287	B	Purchase St.	B	Lincoln Ave.	B	N. Ridge Rd.	B	SR 120A (King St.)	B	Round Hill Rd	B	Old Mill Rd.	B	North St.	B	Den Rd.	B	SR 104 (Long Ridge Rd.)	C	SR 137 (High Ridge Rd.)	C	SR 106(Old Stamford Rd.)	B	SR 124 (South Ave.)	B	SR 123 (New Canaan Rd.)	B	US 7	A	Main Ave.	B	SR 33 (Wilton Rd.)
4:30-5:00		A		C		C		C		B		B		B		B		C		C		D		C		C		B		A		B	
5:00-5:30		B		C		B		B		B		B		C		B		C		D		C		D		C		D		C		B	
5:30-6:00		A		B		B		B		B		A		B		C		C		B		B		C		C		D		B		B	
6:00-6:30		B		B		B		B		B		B		B		B		C		B		C		C		C		C		B		A	
6:30-7:00		A		A		B		A		B		B		A		B		B		A		B		A		B		D		A		A	

Matchline A

Northbound

Time	26		27		28		29		30 / 27		28		29		31		33		34		35		36		37		38		39		40		41
		MP 0.09								MP 3.59		MP 4.70		MP 5.60		MP 8.90		MP 9.50		MP 10.70		MP 13.20		MP 14.10		MP 15.90		MP 17.30		MP 17.60		MP 20.60	
4:00-4:30		C		B		B		B		B		B		C		C		C		E		E		E		E		E		E		F	
4:30-5:00		B		C		D		B		B		C		C		C		F		F		F		F		F		F		F		F	
5:00-5:30		C		C		C		C		B		C		C		D		C		E		F		F		F		F		F		F	
5:30-6:00		D		B		B		B		C		C		C		C		F		F		F		F		E		F		F		F	
6:00-6:30		C		B		B		B		B		C		B		C		F		F		F		F		F		F		F		F	
6:30-7:00		C		B		B		B		B		B		C		C		F		F		D		E		E		D		F		E	

Matchline B

LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

SKYCOMP DATA - ROUTE 15 EVENING LEVEL OF SERVICE PROFILE

FIGURE 2-48

Southbound

Time	41	42	44	46	47	48	49	50	51	52	53	54	55	56	57
	MP 20.60	MP 21.60	MP 27.00	MP 28.50	MP 29.20	MP 30.60	MP 32.20	MP 32.80	MP 33.70	MP 34.10	MP 36.90	MP 37.80	MP 38.45	MP 41.50	MP 43.00
	SR 33 (Wilton Rd.)	SR 57 (Weston Rd.)	SR 58 (Black Rock Tpke.)	SR 59 (Easton Tpke.)	Park Ave.	SR 111 (Main St.)	SR 25	SR 127 (White Plains Rd.)	Huntington Tpke.	SR 8	SR 110 (Main St.)	Milford Pkwy.	Wellington Rd.	SR 121 (Grassy Hill Rd)	SR 34 (Derby Ave.)
6:30-7:00	B	B	B	B	C	C	B	D	B	B	B	C	B	B	
7:00-7:30	B	A	C	B	B	C	C	D	B	C	C	A	B	B	
7:30-8:00	B	B	B	C	C	C	B	C	C	D	B	B	B	C	
8:00-8:30	B	B	B	B	B	C	C	D	C	D	C	A	C	B	
8:30-9:00	B	B	B	B	B	C	B	D	B	C	C	B	B	B	
9:00-9:30	B	A	B	B	B	B	B	D	B	C	A	A	B	B	

Matchline A

Northbound

Time	41	42	44	46	47	48	49	50	51	52	53	54	55	56	57
	MP 20.60	MP 21.60	MP 27.00	MP 28.50	MP 29.20	MP 30.60	MP 32.20	MP 32.80	MP 33.70	MP 34.10	MP 36.90	MP 37.80	MP 38.45	MP 41.50	MP 43.00
	SR 33 (Wilton Rd.)	SR 57 (Weston Rd.)	SR 58 (Black Rock Tpke.)	SR 59 (Easton Tpke.)	Park Ave.	SR 111 (Main St.)	SR 25	SR 127 (White Plains Rd.)	Huntington Tpke.	SR 8	SR 110 (Main St.)	Milford Pkwy.	Wellington Rd.	SR 121 (Grassy Hill Rd)	SR 34 (Derby Ave.)
6:30-7:00	F	E	F	E	E	E	D	F	C	C	C	C	C	C	
7:00-7:30	F	A	A	A	C	C	F	E	C	D	C	C	C	C	
7:30-8:00	F	E	F	F	F	E	F	E	B	C	C	C	C	C	
8:00-8:30	F	E	F	F	E	D	E	F	C	C	D	D	C	D	
8:30-9:00	F	E	E	D	D	E	D	E	C	C	B	B	B	B	
9:00-9:30	E	D	E	C	C	C	C	D	B	B	B	A	B	B	

Matchline B

LOS	Density
A/B/C/D	Less Than 31
D/E	31 - 40
E/F	41 - 62
F	More Than 62

CDM Smith

SKYCOMP DATA - ROUTE 15 EVENING LEVEL OF SERVICE PROFILE

FIGURE 2-49

LOS C provides for flow with speeds near the FFS of the freeway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service quality will be significant. Queues may be expected to form behind any significant blockages.

LOS D is the level at which speeds begin to decline with increasing flows, with density increasing more quickly. Freedom to maneuver within the traffic stream is seriously limited and drivers experience reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.

LOS E describes operation at capacity. Operations on the freeway at this level are highly volatile because there are virtually no usable gaps within the traffic stream, leaving little room to maneuver within the traffic stream. Any disruption to the traffic stream, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown and substantial queuing. The physical and psychological comfort afforded to drivers is poor.

LOS F describes breakdown, or unstable flow. Such conditions exist within queues forming behind bottlenecks. Breakdowns occur for a number of reasons:

- Traffic incidents can temporarily reduce the capacity of a short segment, so that the number of vehicles arriving at a point is greater than the number of vehicles that can move through it.
- Points of recurring congestion, such as merge or weaving segments and lane drops, experience very high demand in which the number of vehicles arriving is greater than the number of vehicles that can be discharged.
- In analyses using forecast volumes, the projected flow rate can exceed the estimated capacity of a given location.

In all cases, breakdown occurs when the ratio of existing demand to actual capacity, or of forecast demand to estimated capacity, exceeds 1.00. Operations immediately downstream of, or even at, such a point, however, are generally at or near LOS E, and downstream operations improve (assuming that there are no additional downstream bottlenecks) as discharging vehicles move away from the bottleneck.

LOS F operations within a queue are the result of a breakdown or bottleneck at a downstream point. In practical terms, the point of the breakdown has a v/c ratio greater than 1.00, and is also labeled LOS F, although actual operations at the breakdown point and immediately downstream may actually reflect LOS E conditions. Whenever queues due to a breakdown exist, they have the potential to extend upstream for considerable distances.

Figures 2-42 and 2-43 provide similar and consistent findings to the INRIX speed data, further illustrating the significant queuing and bottlenecks experienced on the I-95 corridor during the AM peak period. During the AM Peak in the southbound direction, travel operations are at LOS of "F" from the Bridgeport/Stratford town line at Exit 30 (**Figure 2-43**) until the Norwalk/Darien town line at exit 12. From there, conditions ease to LOS of "D" with pockets of "E" and "F" until Exit 3. The duration of LOS "F" spans several hours. In the northbound direction, LOS "E" and "F" were observed between I-

287 and Exit 7 in Stamford. A small pocket of near breakdown conditions was observed between Exits 13 and 14 in Norwalk.

Figures 2-44 and 2-45 display the same information for I-95 during the PM peak period. In the northbound direction LOS "F" begins south of Exit 4 and continues to Exit 27 in Bridgeport. As shown, this breakdown condition spans the entire survey period during the evening commute. In the southbound direction, high densities were recorded between the New York State line and Exit 8 in Stamford indicative of the reverse commute back to New York.

Figures 2-46 and 2-47 provide morning peak period LOS conditions for Route 15. Similar to I-95, oversaturation is evident in the southbound direction from Exit 35 in Stamford to Exit 50 in Bridgeport (22miles) and lasting for 2 to 3 hours. The northbound direction during the AM peak period shows much lower densities with the majority of Route 15 operating a LOS "A" or "B", with some small time periods and segments operating at LOS "C".

Figures 2-48 and 2-49 provide evening peak period LOS conditions for Route 15. Similar to I-95, oversaturation is evident in the northbound direction from Exit 34 in Stamford to Exit 51 in Bridgeport (24 miles) and lasting for of 2 to 3 hours in duration. The southbound direction during the PM peak period shows much lower densities, with the majority of Route 15 operating a LOS "A" or "B", with some small time periods and segments operating at LOS "C".

Skycomp provided a standalone report documenting the survey, density measurements, and locations of queuing and probable causes of the bottlenecks causing breakdown conditions. Their report is included as **Appendix A**.

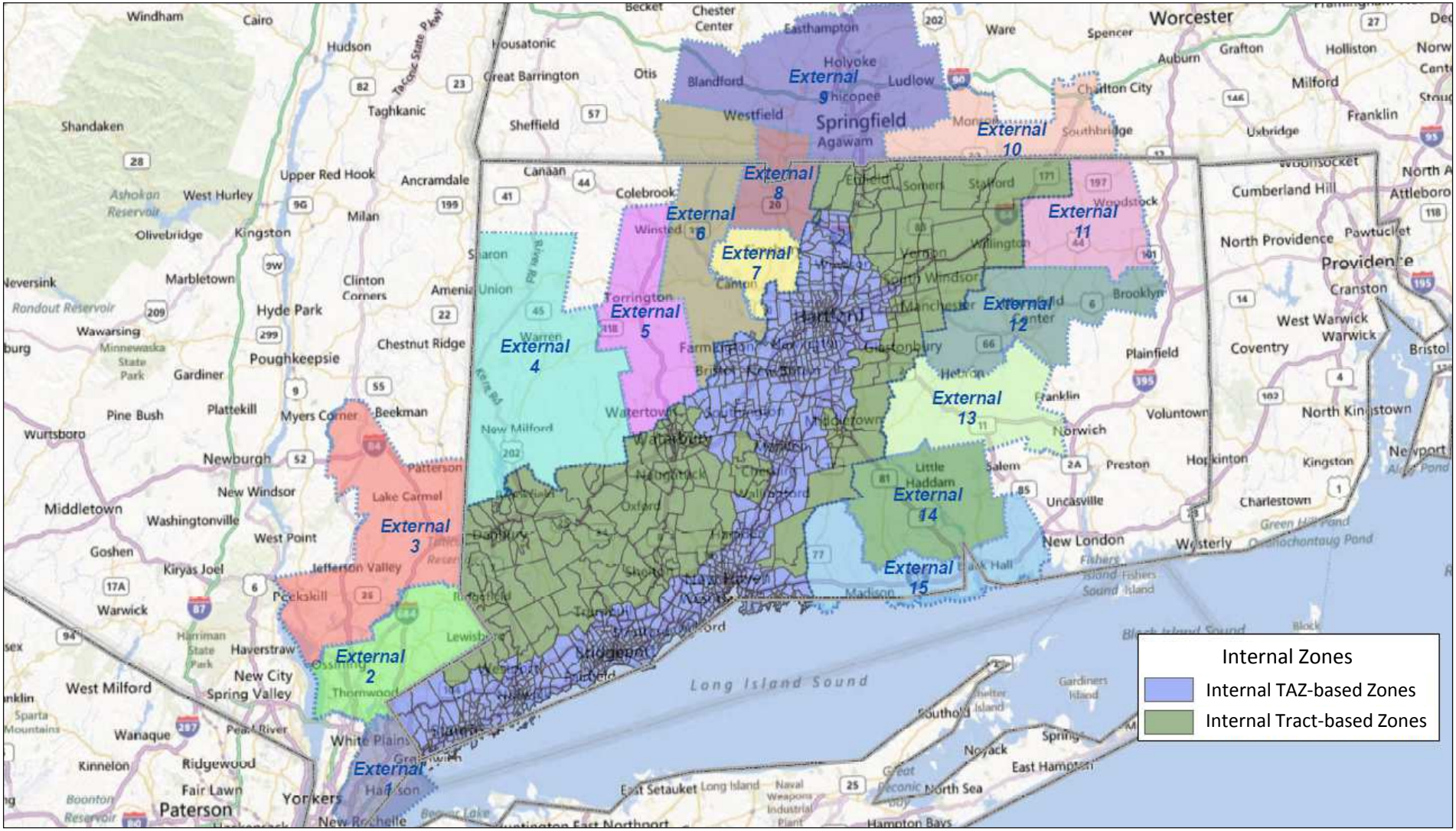
Travel Patterns and Characteristics

Travel Patterns

Information on travel patterns were collected using Airsage anonymous cell phone data for traffic analysis zones (TAZs) as showed in **Figure 2-50**. The passive survey identified travel origins and destinations for the area shown for use in analyzing regional and corridor travel patterns and to compare against the CT DOT Statewide travel demand model, particularly in the I-95 and Route 15 study area. To better understand the corridor travel patterns, the smaller TAZs were grouped into twelve super-zones along the corridor (**Figure 2-51**), representing major cities and town boundaries. **Table 2-7** provides a summary of all trips by these twelve super-zones. As would be expected, Stamford, Norwalk, Bridgeport, and New Haven have the highest totals for trip origins and destinations. Because these four cities span across large dense areas and many TAZs, they also have the highest volumes of internal trips. **Table 2-8** provides a summary of percent of trips by origin. This table illustrates the distribution of each origin zone across the twelve destinations. Bordering towns along with inner-city trips account for the highest percent share as shown by the highest percentages along the diagonal portion of the table.

Vehicle License Plate Survey

A visual license plate survey was conducted in May 2013 at three locations on I-95 and three locations on Route 15. On I-95, these surveys were performed in Greenwich at the James Street overpass, in Milford at the High Street overpass, and at the Sasco Creek Road overpass in Westport. On Route 15, the license plate surveys were collected from overpasses located in Greenwich on Round Hill Road, in Fairfield from Morehouse Road, and in Woodbridge from Racebrook Road. Vehicle license plate



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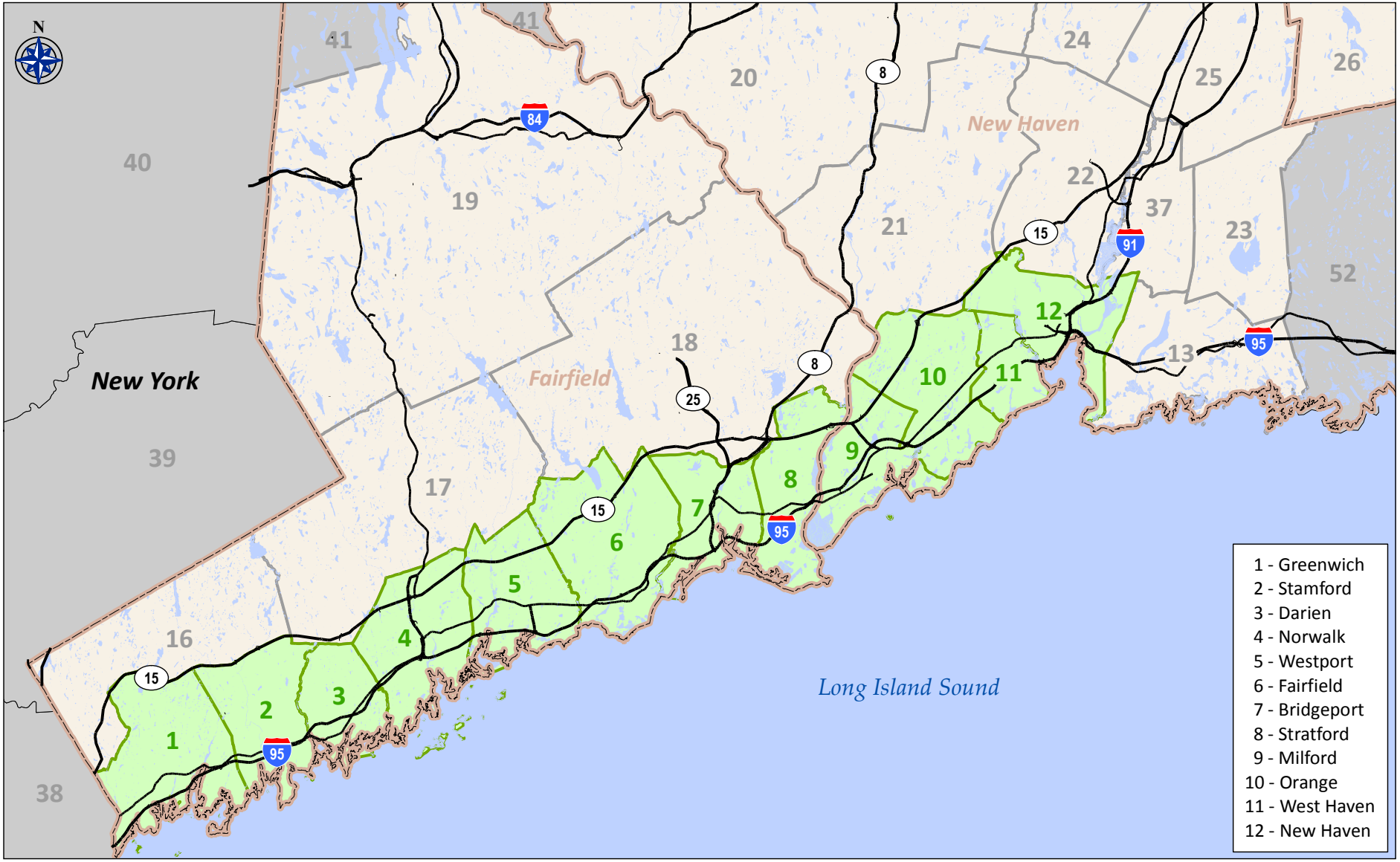
AIRSAGE O-D ZONE STRUCTURE

FIGURE 2-50



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CORRIDOR SUPERZONES

FIGURE 2-51

Table 2-7
AirSage Daily O-D Data
Trips

FROM	TO 1 Greenwich	2 Stamford	3 Darien	4 Norwalk	5 Westport	6 Fairfield	7 Bridgeport	8 Stratford	9 Milford	10 Orange	11 West Haven	12 New Haven	Total
1 Greenwich	50,917	15,953	2,588	5,431	1,904	3,118	3,373	1,636	1,315	1,212	711	1,762	89,920
2 Stamford	16,958	74,783	9,984	15,292	3,863	5,924	6,324	2,852	2,475	1,993	1,108	2,641	144,197
3 Darien	2,445	9,666	11,344	7,758	1,297	1,813	1,788	798	605	547	298	709	39,068
4 Norwalk	5,577	14,790	7,851	63,647	12,213	7,723	7,323	3,207	2,426	1,967	1,052	2,499	130,274
5 Westport	1,823	3,543	1,141	11,031	30,056	9,347	4,823	1,889	1,422	1,078	577	1,345	68,075
6 Fairfield	3,085	5,831	1,694	7,736	9,653	52,686	20,479	4,764	3,318	2,349	1,179	2,668	115,443
7 Bridgeport	3,529	6,740	1,757	8,110	5,391	21,576	78,915	15,503	6,667	4,492	2,035	4,331	159,046
8 Stratford	1,676	2,955	743	3,213	1,891	4,978	14,906	34,014	10,547	3,492	1,415	2,710	82,541
9 Milford	1,377	2,424	606	2,407	1,389	3,299	6,276	9,847	29,559	10,888	3,139	3,954	75,165
10 Orange	1,226	2,043	548	1,987	990	2,458	4,027	3,299	10,525	30,060	10,511	7,701	75,375
11 West Haven	693	1,090	259	1,055	521	1,195	2,196	1,430	3,348	11,003	28,070	17,877	68,737
12 New Haven	1,639	2,623	585	2,271	1,228	2,536	4,198	2,701	4,041	8,124	17,977	106,165	154,087
Total	90,945	142,442	39,100	129,939	70,395	116,652	154,627	81,939	76,248	77,206	68,072	154,362	1,201,928

Table 2-8
AirSage Daily O-D Data
% Trips by Origin

FROM	TO 1 Greenwich	2 Stamford	3 Darien	4 Norwalk	5 Westport	6 Fairfield	7 Bridgeport	8 Stratford	9 Milford	10 Orange	11 West Haven	12 New Haven	Total
1 Greenwich	57%	18%	3%	6%	2%	3%	4%	2%	1%	1%	1%	2%	100%
2 Stamford	12%	52%	7%	11%	3%	4%	4%	2%	2%	1%	1%	2%	100%
3 Darien	6%	25%	29%	20%	3%	5%	5%	2%	2%	1%	1%	2%	100%
4 Norwalk	4%	11%	6%	49%	9%	6%	6%	2%	2%	2%	1%	2%	100%
5 Westport	3%	5%	2%	16%	44%	14%	7%	3%	2%	2%	1%	2%	100%
6 Fairfield	3%	5%	1%	7%	8%	46%	18%	4%	3%	2%	1%	2%	100%
7 Bridgeport	2%	4%	1%	5%	3%	14%	50%	10%	4%	3%	1%	3%	100%
8 Stratford	2%	4%	1%	4%	2%	6%	18%	41%	13%	4%	2%	3%	100%
9 Milford	2%	3%	1%	3%	2%	4%	8%	13%	39%	14%	4%	5%	100%
10 Orange	2%	3%	1%	3%	1%	3%	5%	4%	14%	40%	14%	10%	100%
11 West Haven	1%	2%	0%	2%	1%	2%	3%	2%	5%	16%	41%	26%	100%
12 New Haven	1%	2%	0%	1%	1%	2%	3%	2%	3%	5%	12%	69%	100%
Total	8%	12%	3%	11%	6%	10%	13%	7%	6%	6%	6%	13%	100%

registrations were identified for the States of Connecticut, New York, New Jersey, Massachusetts, New Hampshire, Rhode Island, and all others.

The data was collected during daylight hours between 7AM and 6PM and is summarized in **Tables 2-9 and 2-10** for I-95 and Route 15, respectively. **Table 2-9** shows the distribution among states at each survey location along I-95 by direction, by time period, and for the total day. Over the survey time period, only 36 percent of traffic at the James Street overpass in Greenwich consisted of Connecticut vehicles. This location is less than a half mile north of the New York State line. New York plates accounted for the largest number of vehicles at 39 percent, while New Jersey was a distant third among specific States identified at 8.5 percent. Interestingly, the significant commute pattern into Connecticut from New York is shown by the high percentage of New York plates headed northbound during the AM peak period (68 percent). At the Sasco Creek Road location in Westport, 68 percent of traffic had Connecticut plates, while New York accounted for 13 percent. At the High Street overpass in Milford, 75 percent of traffic observed had Connecticut license plates, while New York plates accounted for 7 percent of the total traffic.

Table 2-10 displays the license plate distribution classified by state for Route 15. At the Round Hill Road overpass on Route 15 in Greenwich, the percent share of Connecticut plates was 54% of total traffic, significantly higher than the I-95 location in Greenwich. At the Morehouse Drive overpass, Connecticut plates accounted for 75 percent of overall traffic, increasing to 80 percent at the Racebrook Road location just north of Route 34. Overall, Route 15 contains a higher share of Connecticut plates when compared to I-95. This would be expected as I-95 accommodates more interstate travel than Route 15 and long distance freight or any vehicles over eight feet in height, weighing more than four tons, towing a trailer, or containing more than four wheels are not allowed on Route 15.

Vehicle Occupancy Survey

Vehicle occupancy surveys were also performed at the same three locations on I-95. Vehicles were classified as containing one, two, or three or more passengers. However, the distinction between two and three passengers was difficult to visually confirm. Therefore, the data presented in **Table 2-11** reflects only the breakdown of single and two-or-more occupant vehicles.

As would be expected, the highest concentration of single occupant vehicles occurs during the AM period, when commuting to work is the major trip purpose. For the total survey period, single-occupant vehicles account for 80 percent of the vehicles on I-95 at the James Street survey location in Greenwich, 84 percent of the vehicles on I-95 at the Sasco Creek Road survey location in Westport, and 81 percent of vehicles at the High Street location in Milford.

A second source of occupancy percentages was summarized from data from the 2008 Traffic Accident Database maintained by the Division of Planning Inventory & Data, Bureau of Policy and Planning. This data includes the number of vehicle occupants in crashes on the non-local roadways within the three Regional Planning Agencies through the project: South Western Regional Planning Agency (SWRPA), Greater Bridgeport Regional Council (GBRC), and South Central Regional Council of Governments (SCRCOG). **Table 2-12** shows the daily variation of single, HOV 2, and HOV 3+ occupants. For the total day, single occupant vehicles made up 77 percent of the vehicle composition involved in crashes, while HOV2 and HOV3+ made up 16 percent and 7 percent respectively. The AM peak accounted for the highest concentration of single occupant vehicles at 87 percent while the midday and evening accounted for the highest concentration of HOV vehicles. This variation throughout the day is consistent with the visual survey and is expected. When correlating the

Table 2-9
Percent of Traffic by State of Vehicle Registration

Manual Count		State of Vehicle Registration							
Location	Period	CT	NY	NJ	MA	NH	RI	Other	Total
I-95 NB at High Street	7AM-9AM	78.7	8.2	4.5	1.1	0.5	0.7	6.3	100.0
	9AM-3PM	68.2	10.2	4.9	4.0	1.5	1.2	10.0	100.0
	3PM-6PM	79.2	4.1	2.4	4.4	1.7	0.6	7.6	100.0
I-95 SB at High Street	7AM-9AM	84.2	2.7	1.1	5.1	2.5	1.7	2.8	100.0
	9AM-3PM	70.2	7.5	5.2	5.9	2.8	2.5	5.9	100.0
	3PM-6PM	74.4	8.2	6.1	3.7	1.9	2.1	3.6	100.0
I-95 NB at High Street Total		**74.7**	**7.5**	**3.9**	**3.4**	**1.4**	**0.9**	**8.3**	**100.0**
I-95 SB at High Street Total		**75.0**	**6.7**	**4.6**	**4.9**	**2.4**	**2.1**	**4.3**	**100.0**
I-95 SB at High Street Total		**74.8**	**7.1**	**4.2**	**4.2**	**1.9**	**1.5**	**6.3**	**100.0**
I-95 NB at Sasco Creek Road	7AM-9AM	74.0	15.8	2.1	1.8	1.3	0.3	4.8	100.0
	9AM-3PM	66.0	16.6	2.8	4.6	1.9	1.2	6.9	100.0
	3PM-6PM	78.3	5.7	2.8	4.2	1.7	0.7	6.6	100.0
I-95 SB at Sasco Creek Road	7AM-9AM	81.6	6.3	1.3	5.6	2.7	0.4	2.1	100.0
	9AM-3PM	58.9	11.3	6.2	8.8	2.7	2.8	9.3	100.0
	3PM-6PM	62.1	18.0	8.2	4.4	1.4	1.3	4.6	100.0
I-95 NB at Sasco Creek Road Total		**73.3**	**11.5**	**2.7**	**3.8**	**1.7**	**0.8**	**6.3**	**100.0**
I-95 SB at Sasco Creek Road Total		**62.3**	**13.5**	**6.6**	**6.8**	**2.2**	**2.0**	**6.7**	**100.0**
I-95 SB at Sasco Creek Road Total		**67.8**	**12.5**	**4.6**	**5.3**	**1.9**	**1.4**	**6.5**	**100.0**
I-95 NB at James Street	7AM-9AM	14.0	68.0	9.1	1.2	0.4	0.2	7.1	100.0
	9AM-3PM	29.5	39.8	9.1	3.5	1.7	1.6	14.8	100.0
	3PM-6PM	54.0	23.6	3.1	3.5	1.4	1.3	13.0	100.0
I-95 SB at James Street	7AM-9AM	65.4	22.6	3.4	2.8	0.7	1.5	3.6	100.0
	9AM-3PM	39.1	32.1	10.3	5.7	2.2	2.7	7.9	100.0
	3PM-6PM	26.6	47.6	12.3	3.0	2.0	1.6	6.9	100.0
I-95 NB at James Street Total		**33.2**	**42.2**	**7.2**	**2.9**	**1.3**	**1.1**	**12.2**	**100.0**
I-95 SB at James Street Total		**39.3**	**36.3**	**9.8**	**4.1**	**1.8**	**2.0**	**6.7**	**100.0**
I-95 SB at James Street Total		**36.2**	**39.3**	**8.5**	**3.5**	**1.5**	**1.6**	**9.4**	**100.0**

Table 2-10
Percent of Traffic by State of Vehicle Registration

Manual Count		State of Vehicle Registration							
Location	Period	CT	NY	NJ	MA	NH	RI	Other	Total
CT-15 NB at Racebrook Road	7AM-9AM	92.2	4.2	1.5	0.9	0.1	0.1	1.0	100.0
	9AM-3PM	80.7	6.0	3.7	4.8	0.1	0.9	3.8	100.0
	3PM-6PM	89.2	2.3	1.5	3.9	0.2	0.5	2.2	100.0
CT-15 SB at Racebrook Road	7AM-9AM	83.8	3.4	2.8	5.6	0.5	0.5	3.4	100.0
	9AM-3PM	70.5	7.6	6.5	8.5	1.5	1.3	4.1	100.0
	3PM-6PM	69.8	9.3	7.4	7.7	1.1	0.9	3.7	100.0
CT-15 NB at Racebrook Road Total		**87.0**	**4.0**	**2.3**	**3.6**	**0.2**	**0.6**	**2.5**	**100.0**
CT-15 SB at Racebrook Road Total		**72.8**	**7.5**	**6.1**	**7.6**	**1.2**	**1.0**	**3.8**	**100.0**
CT-15 at Racebrook Road Total		**79.9**	**5.7**	**4.2**	**5.6**	**0.7**	**0.8**	**3.1**	**100.0**
CT-15 NB at Morehouse Road	7AM-9AM	79.2	11.0	5.3	1.9	0.4	0.4	1.7	100.0
	9AM-3PM	71.3	11.6	7.4	4.5	0.8	1.0	3.4	100.0
	3PM-6PM	80.1	7.4	4.2	4.8	0.9	0.7	2.0	100.0
CT-15 SB at Morehouse Road	7AM-9AM	91.1	2.9	0.8	2.6	0.6	0.3	1.7	100.0
	9AM-3PM	75.3	8.5	5.0	5.3	0.7	1.0	4.2	100.0
	3PM-6PM	65.3	16.9	8.6	3.6	1.1	1.3	3.2	100.0
CT-15 NB at Morehouse Road Total		**76.3**	**9.6**	**5.7**	**4.3**	**0.8**	**0.8**	**2.6**	**100.0**
CT-15 SB at Morehouse Road Total		**72.9**	**11.2**	**6.0**	**4.4**	**0.8**	**1.0**	**3.6**	**100.0**
CT-15 at Morehouse Road Total		**74.6**	**10.4**	**5.8**	**4.3**	**0.8**	**0.9**	**3.1**	**100.0**
CT-15 NB at Round Hill Road	7AM-9AM	25.7	61.7	8.3	0.9	0.3	0.1	3.0	100.0
	9AM-3PM	44.5	33.0	9.3	4.3	0.5	0.8	7.5	100.0
	3PM-6PM	69.2	18.2	4.6	3.0	0.9	0.5	3.5	100.0
CT-15 SB at Round Hill Road	7AM-9AM	82.6	13.9	1.1	0.6	0.3	0.1	1.4	100.0
	9AM-3PM	58.5	25.7	6.5	4.9	0.9	0.6	2.9	100.0
	3PM-6PM	39.1	37.7	12.9	4.5	1.0	1.0	3.8	100.0
CT-15 NB at Round Hill Road Total		**52.2**	**31.3**	**7.1**	**3.2**	**0.7**	**0.6**	**5.0**	**100.0**
CT-15 SB at Round Hill Road Total		**56.1**	**27.8**	**7.8**	**3.9**	**0.8**	**0.6**	**2.9**	**100.0**
CT-15 at Round Hill Road Total		**54.2**	**29.5**	**7.4**	**3.5**	**0.7**	**0.6**	**4.0**	**100.0**

Table 2-11
Vehicle Occupancy Percentages on I-95

Location	Period	Single	2 or More	Total
I-95 NB at High Street	7AM-9AM	0.84	0.16	1.00
	9AM-3PM	0.82	0.18	1.00
	3PM-6PM	0.80	0.20	1.00
	Average	0.82	0.18	1.00
I-95 SB at High Street	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.77	0.23	1.00
	3PM-6PM	0.79	0.21	1.00
	Average	0.80	0.20	1.00
Daily NB & SB Average		**0.81**	**0.19**	**1.00**
I-95 NB at Sasco Creek Road	7AM-9AM	0.88	0.12	1.00
	9AM-3PM	0.86	0.14	1.00
	3PM-6PM	0.85	0.15	1.00
	Average	0.86	0.14	1.00
I-95 SB at Sasco Creek Road	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.84	0.16	1.00
	3PM-6PM	0.78	0.22	1.00
	Average	0.82	0.18	1.00
Daily NB & SB Average		**0.84**	**0.16**	**1.00**
I-95 NB at James Street	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.79	0.21	1.00
	3PM-6PM	0.76	0.24	1.00
	Average	0.80	0.20	1.00
I-95 SB at James Street	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.79	0.21	1.00
	3PM-6PM	0.77	0.23	1.00
	Average	0.80	0.20	1.00
Daily NB & SB Average		**0.80**	**0.20**	**1.00**

Table 2-12
2008 Interstate Vehicle Occupancy Rates

Hour Beginning	SOV	HOV 2	HOV 3+	Total	SOV	HOV 2	HOV 3+	Total
0:00	63	24	13	100	0.63	0.24	0.13	1.00
1:00	71	15	12	98	0.72	0.15	0.12	1.00
2:00	40	6	4	50	0.80	0.12	0.08	1.00
3:00	44	7	4	55	0.80	0.13	0.07	1.00
4:00	34	9	4	47	0.72	0.19	0.09	1.00
5:00	67	13	1	81	0.83	0.16	0.01	1.00
6:00	193	24	13	230	0.84	0.10	0.06	1.00
7:00	429	50	15	494	0.87	0.10	0.03	1.00
8:00	571	53	26	650	0.88	0.08	0.04	1.00
9:00	391	44	16	451	0.87	0.10	0.04	1.00
10:00	207	48	27	282	0.73	0.17	0.10	1.00
11:00	274	64	23	361	0.76	0.18	0.06	1.00
12:00	307	70	39	416	0.74	0.17	0.09	1.00
13:00	308	63	24	395	0.78	0.16	0.06	1.00
14:00	347	88	37	472	0.74	0.19	0.08	1.00
15:00	484	137	62	683	0.71	0.20	0.09	1.00
16:00	665	153	83	901	0.74	0.17	0.09	1.00
17:00	877	155	83	1,115	0.79	0.14	0.07	1.00
18:00	403	90	53	546	0.74	0.16	0.10	1.00
19:00	232	57	29	318	0.73	0.18	0.09	1.00
20:00	166	50	21	237	0.70	0.21	0.09	1.00
21:00	180	54	26	260	0.69	0.21	0.10	1.00
22:00	131	41	13	185	0.71	0.22	0.07	1.00
23:00	128	37	16	181	0.71	0.20	0.09	1.00
	6,612	1,352	644	8,608	0.77	0.16	0.07	1.00
7AM-9AM	1,000	103	41	1,144	0.87	0.09	0.04	1.00
9AM-3PM	1,834	377	166	2,377	0.77	0.16	0.07	1.00
3PM-6PM	2,026	445	228	2,699	0.75	0.16	0.08	1.00
7AM-6PM	4,860	925	435	6,220	0.78	0.15	0.07	1.00

Source: CT DOT Bureau of Policy and Planning
Data collected across three Regional Planning Agencies: SWRPA, GBRC, and SCRCOG.

percentages with the visual survey (7AM-6PM), the results are similar, with single occupant vehicles from the crash data accounting for 78 percent of total traffic and 82 percent on average from the visual survey.

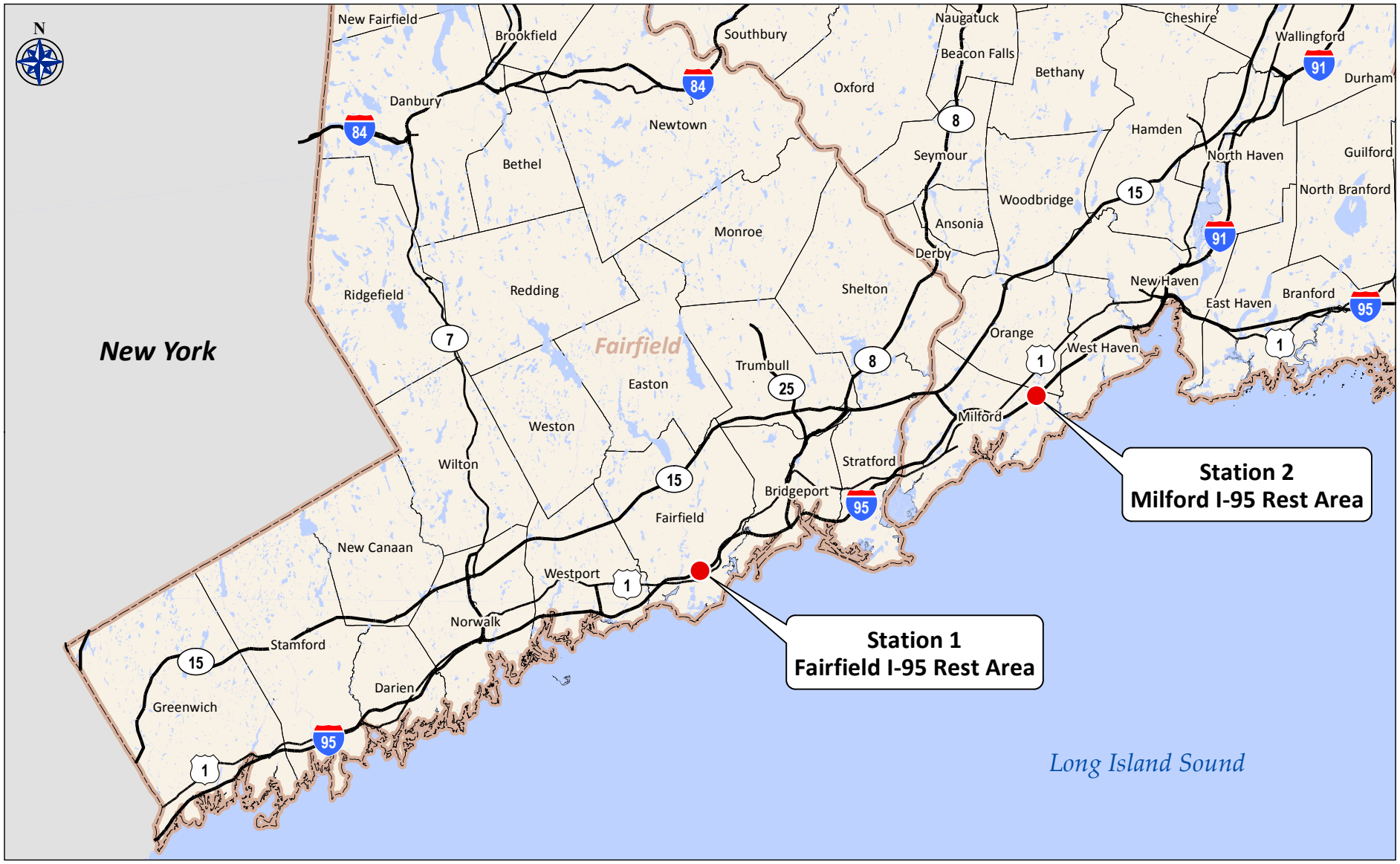
Truck Origin and Destination Survey

A commercial vehicle origin and destination survey was conducted in each travel direction at the Fairfield and Milford Rest Areas off I-95 (**Figure 2-52**). A direct interview was conducted of commercial vehicle drivers responding to the survey shown in **Figure 2-53**.

Table 2-13 displays summaries of trip purpose, EZ-Pass ownership, and trip frequency. Almost all of the commercial vehicle drivers interviewed indicated they were on company business. 34-35 percent of those surveyed at Station 1 and Station 2 in the northbound direction indicated they make this trip 4 or more times per week, while this dropped to 24-25 percent for both station in the southbound direction. In the northbound direction, 17-19 percent of commercial vehicles surveyed indicated they made the trip 2 to 3 times per week. In the southbound direction this percent is higher with range of 23-24 percent. In general, 50 percent of those individuals interviewed make this trip at least twice per week. EZ-Pass ownership levels were found to be significant, ranging between 65 and 77 percent.

Table 2-13
Truck Survey Summaries

	Trip Purpose			
	Station 1 NB	Station 1 SB	Station 2 NB	Station 2 SB
Company Business	98%	99%	98%	99%
Personal Business	2%	1%	2%	1%
To/From work	0%	0%	0%	0%
	Trip Frequency			
	Station 1 NB	Station 1 SB	Station 2 NB	Station 2 SB
4 or more per week	34%	25%	35%	24%
2-3 per week	19%	23%	17%	24%
1 per week	15%	9%	12%	15%
1-3 per month	8%	17%	10%	13%
Less than 1 per month	17%	19%	9%	22%
No answer	7%	7%	17%	1%
	EZ Pass			
	Station 1 NB	Station 1 SB	Station 2 NB	Station 2 SB
Yes	77%	67%	65%	72%
No	6%	28%	12%	27%
Plan to acquire	15%	0%	20%	1%
No answer	2%	5%	3%	0%



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I-95 TRUCK SURVEY LOCATIONS

FIGURE 2-52

Commercial Vehicle Origin-Destination Survey

Station No. ☐☐ Station Name _____ Surveyor _____ Page No. _____ Date ☐☐ Day ☐☐ Month ☐☐ Year

Time		Where did this trip begin in this direction?	Where will this trip end (in this direction)? (Should not be the same answer as to Question 3)	Trip Purpose				Do you have an E-Z Pass transponder? 1. Yes 2. No 3. Plan to acquire	Trip Frequency						Where did you enter I-95 for this trip?	Where do you plan to exit I-95?	Alternate Route	What is your home state?	State of vehicle registration	Vehicle Class					Vehicle Occupancy
Hr.	Min.	- Street Address - City / Town - State, Zip Code - Other explanation (e.g. nearest intersection, airport, mall, etc.)	- Street Address - City / Town - State, Zip Code - Other explanation (e.g. nearest intersection, airport, mall, etc.)	To / from work	Company business	Personal business	Code		4 or more per week	2-3 per week	1 per week	1-3 per month	Less than one per month	Code	(Interchange Number, Route Number or Nearest Town & State)	(Interchange Number, Route Number or Nearest Town & State)	If you did not use I-95 for this trip today, which road would you use?			Number of axles	Single unit	Single trailer	Multi-trailer	Code	
				A	B	C			A	B	C	D	E							A	B	C		
1	2	3	4				5	6						7	8	9	10	11	12	13			14	15

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ORIGIN - DESTINATION SURVEY FORM

FIGURE 2-53

A broad spread of vehicle registrations and home states were identified by those surveyed (**Table 2-14**). In the northbound direction, Connecticut was identified as the highest percentage of vehicle registrations at Station 1 (34%), while Massachusetts (32%) was the most identified registration at Station 2. At Station 1 and Station 2 in the southbound direction, trucks registered in New Jersey had the highest percent of 22 and 27 percent for Station 1 and Station 2, respectively.

Table 2-14
Truck Survey Summaries
Home State

	Station 1 NB	Station 1 SB	Station 2 NB	Station 2 SB
CT	35%	21%	19%	17%
RI	2%	1%	10%	0%
NJ	11%	20%	11%	24%
NY	15%	16%	13%	19%
PA	2%	9%	4%	10%
MA	14%	2%	25%	9%
IL	1%	3%	1%	1%
IN	0%	0%	1%	1%
MO	1%	3%	0%	1%
NC	1%	2%	0%	2%
TN	2%	4%	0%	2%
TX	1%	2%	3%	2%
FL	1%	3%	1%	2%
Other	13%	12%	11%	10%

State of Vehicle Registration

	Station 1 NB	Station 1 SB	Station 2 NB	Station 2 SB
CT	34%	21%	18%	14%
RI	0%	0%	9%	0%
NJ	10%	22%	18%	27%
NY	10%	14%	9%	15%
PA	3%	5%	3%	8%
MA	8%	4%	32%	8%
IL	2%	4%	2%	3%
IN	5%	5%	8%	5%
MO	1%	0%	0%	1%
NC	2%	1%	0%	3%
TN	4%	5%	0%	1%
TX	2%	4%	2%	2%
FL	2%	2%	0%	1%
Other	15%	14%	0%	14%

Chapter 3

Model Development

This chapter provides documentation on the development of a time of day traffic assignment model based on the Connecticut Statewide Model and the calibration of the model to study area traffic volumes and travel speeds. This chapter provides information on the following:

- Development of Time of Day Model Parameters;
- Comparison of model travel patterns with AirSage origin and destination data;
- Expansion of the network coverage area;
- Calibration of a four time period traffic assignment model in the I-95 study area; and
- Future Year Assumptions.

The current Connecticut Travel Demand Model (CTTDM) is a traditional daily four step travel demand model with trip generation, trip distribution, mode choice, and traffic assignment. This study started with the existing daily trip tables and networks and focused in on preparing a finer time period traffic assignment for use in estimating traffic, revenue, and diversion impacts of various pricing scenarios for I-95 and Route 15 from New Haven to the New York State Line.

Time of Day Structure

CDM Smith created a time of day assignment in the CUBE modeling platform to support the I-95 congestion relief study. The intent of the time of day implementation was to provide period level traffic forecasts while maintaining as much of the basic model structure as possible. CDM Smith choose to implement a standard practice time of day implementation by disaggregating the daily person trip table post mode choice into four periods by the use of purpose specific time of day (diurnal) factors. The time of day factors provide the percent of trips per period and also reflect the directionality of travel within each travel period. The result from application of the time of day factors is a set of four period specific trip tables that incorporate the direction of travel.

The network was modified to use period capacities for assignment. The period capacities were developed using the hourly distribution of traffic counts and calculating a period capacity factor. The factor was then applied to the hourly capacity of the model network to represent period capacity values.

Time of Day Parameters

In development of the time of day model, parameters were required for the following steps:

- Period factors by trip purpose including directionality of trips (P to A and A to P); and
- Period capacity factors to convert hourly capacity to period capacity.

The time period factors were developed by reviewing other regional models CDM Smith has worked with and then slightly adjusting the factors to fit the travel patterns observed in the I-95 study corridor. Period capacity factors were developed by analyzing traffic counts in the study corridor area.

Period Factors by Trip Purpose

As part of the review process, CDM Smith looked at time-of-day models of other metropolitan areas, including New York, Washington, Southern California, and the Hartford Capital region. Considering the proximity of I-95 corridor with the New York Metropolitan Area, CDM Smith started the calibration process with the diurnal factors used in New York regional model. During the model calibration for study area, the time of day factors were refined to improve the distribution of traffic by time period and also expanded to include the internal-external trip purposes. Adjustments to the factors were based on comparing the period traffic flows to counts. In addition, the distribution of trips were balanced to ensure equal trips in the P to A and A to P direction. The applied factors are shown in **Table 3-1**.

Table 3-1
Applied Time of Day Factors for Person Trips by Trip Purpose

	Home based work		Home based non-work		Non-home based	
Time Periods	Origins	Destinations	Origins	Destinations	Origins	Destinations
AM Peak 6:00 AM-10:00	0.362	0.006	0.076	0.009	0.036	0.036
Midday 10:00 AM-3:00PM	0.062	0.114	0.216	0.144	0.251	0.251
PM Peak 3:00 PM-7:00 PM	0.014	0.413	0.106	0.149	0.141	0.141
Night 7:00 PM-6:00 AM	0.009	0.022	0.080	0.221	0.072	0.072

During the model calibration for the study area, the time of day factors were also refined to improve the distribution of external to external (E-E) traffic and commercial vehicle trips (Trucks) by time period. Adjustments to the factors were based on comparing the model period traffic flows to counts at external count stations and permanent classification counts on I-95 corridor. The applied factors for External and Truck trips are shown in **Table 3-2**.

Table 3-2
Applied Time of Day Factors for External and Truck Trips

Time Periods	External to External Trips	Commercial Vehicle Trips
AM Peak 6:00 AM-10:00 AM	0.240	0.190
Midday 10:00 AM-3:00PM	0.260	0.290
PM Peak 3:00 PM-7:00 PM	0.260	0.140
Night 7:00 PM-6:00 AM	0.240	0.380

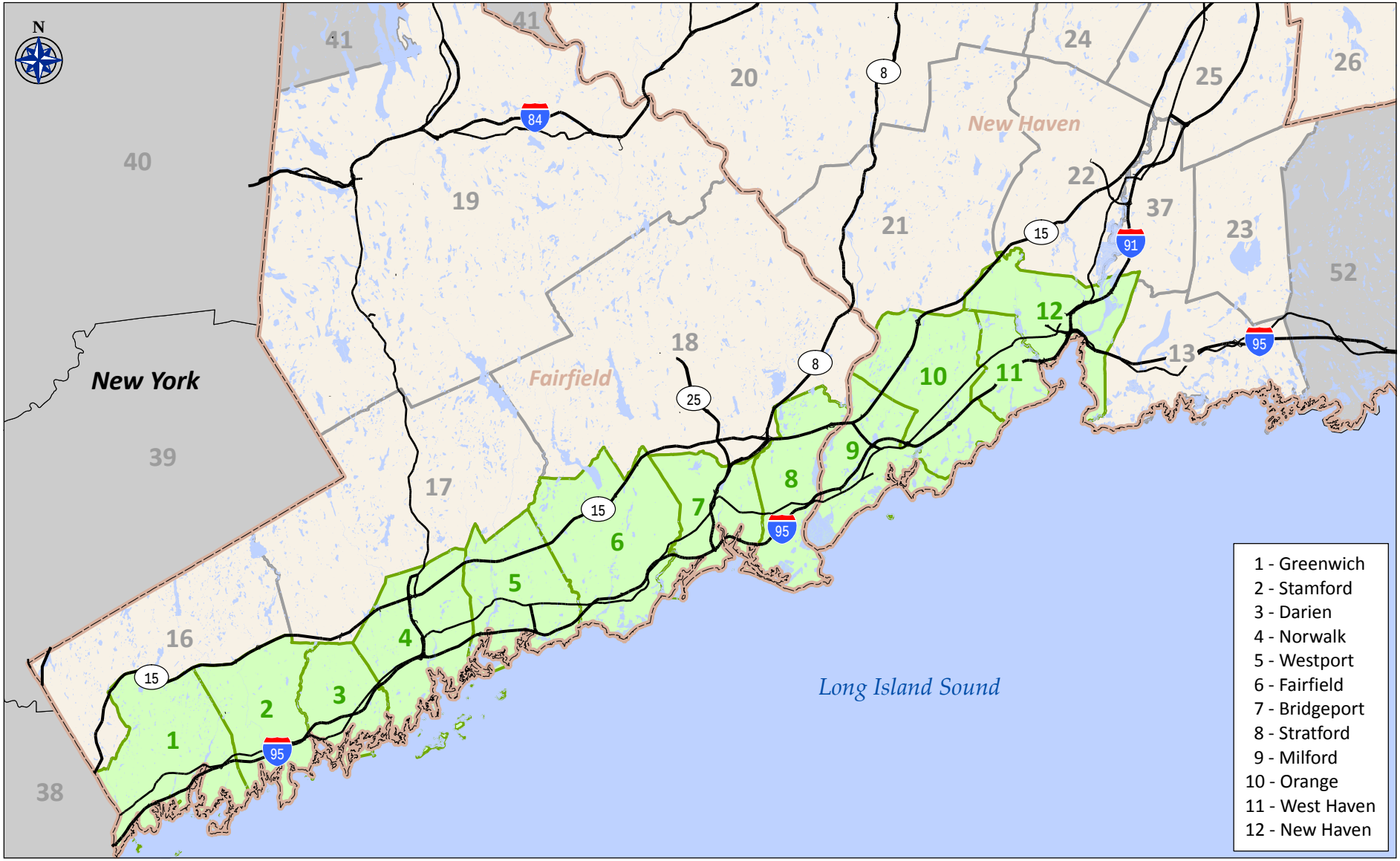
Period Capacity Factors

CDM Smith developed time of day capacities based on an analysis of traffic volumes along the I-95 and Route 15 corridors between New Haven and New York. Those factors are as follows:

- AM peak period (6AM-10AM) to AM peak hour, multiply by 0.29;
- Midday period (10AM-3PM) to midday peak hour, multiply by 0.22;
- PM peak period (3PM-7PM) to PM peak hour, multiply by 0.27; and
- Night period (7PM-6AM) to night time peak hour, multiply by 0.20.

The values were estimated by analyzing the count data taken for the study area and calculating associated period factors as shown in the far right column of **Table 3-3**. The capacity factor is calculated by dividing the highest hourly traffic in the time period by the sum of the total period traffic.Comparison of Model Travel Patterns with AirSage Data

As discussed in Chapter2, information on travel patterns were collected using AirSage anonymous cell phone data were analyzed for the twelve super-zones along the I-95 corridor (**Figure 3-1**). **Table 3-4** provides a summary of percent trips by origin. As would be expected, Stamford, Norwalk, Bridgeport, and New Haven have the highest share of total trip origins and destinations. Because these four cities span across large dense areas and many TAZs, they also have the highest percent of internal trips. Similarly, **Table 3-5** provides a summary of ConnDOT's statewide model trips by the same twelve super-zones by origin. These two tables illustrate that the travel pattern of the ConnDOT's model is similar to the observed patterns from the AirSage data. Both summaries show bordering towns along with inner-city trips account for the highest percent share as shown by the highest percentages along the diagonal portion of the table. This is not surprising, given the number of closely spaced interchanges and relatively short average trip length along I-95. The model O-D shows a tendency for a higher percent of internal superzone trips than the AirSage observed O-D data. While the AirSage O-D tends to show a higher share of long distance travel compared to the model O-D.



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CORRIDOR SUPERZONES

FIGURE 3-1

Table 3-3
Analysis of Count Data and Associated Capacity Factors

Hour	Total of Counts	Percent of Daily	Period Capacity Factor
6AM - 7AM	401,731	0.23	0.286
7AM - 8AM	563,223		
8AM - 9AM	580,171		
9AM - 10AM	480,188		
10AM - 11AM	457,174	0.282	0.224
11AM - 12PM	473,961		
12PM - 1PM	489,767		
1PM - 2PM	500,774		
2PM - 3PM	556,277		
3PM - 4PM	595,361	0.268	0.267
4PM - 5PM	615,911		
5PM - 6PM	628,824		
6PM - 7PM	515,862		
7PM - 8PM	403,427	0.22	0.208
8PM - 9PM	348,472		
9PM - 10PM	271,272		
10PM - 11PM	204,001		
11PM - 12AM	144,489		
12AM - 1AM	101,309		
1AM - 2AM	66,313		
2AM - 3AM	56,112		
3AM - 4AM	58,042		
4AM - 5AM	94,376		
5AM - 6AM	191,205		

Table 3-6 and **Table 3-7** provides similar summary of trips by destination for the AirSage observed O-D data and ConnDOT's model O-D data, respectively. Destination trip percentage shows similar travel pattern in both observed and model trips as described for the origin trip percentages. In general, the AirSage data provided validation that the existing patterns within the model are generally reflective of observed study corridor patterns at a superzone level.

Table 3-4
AirSage Daily O-D Data
% Trips by Origin

		TO												
		1	2	3	4	5	6	7	8	9	10	11	12	
FROM	**Super-Zone**	**Greenwich**	**Stamford**	**Darien**	**Norwalk**	**Westport**	**Fairfield**	**Bridgeport**	**Stratford**	**Milford**	**Orange**	**West Haven**	**New Haven**	**Total**
1	Greenwich	57%	18%	3%	6%	2%	3%	4%	2%	1%	1%	1%	2%	100%
2	Stamford	12%	52%	7%	11%	3%	4%	4%	2%	2%	1%	1%	2%	100%
3	Darien	6%	25%	29%	20%	3%	5%	5%	2%	2%	1%	1%	2%	100%
4	Norwalk	4%	11%	6%	49%	9%	6%	6%	2%	2%	2%	1%	2%	100%
5	Westport	3%	5%	2%	16%	44%	14%	7%	3%	2%	2%	1%	2%	100%
6	Fairfield	3%	5%	1%	7%	8%	46%	18%	4%	3%	2%	1%	2%	100%
7	Bridgeport	2%	4%	1%	5%	3%	14%	50%	10%	4%	3%	1%	3%	100%
8	Stratford	2%	4%	1%	4%	2%	6%	18%	41%	13%	4%	2%	3%	100%
9	Milford	2%	3%	1%	3%	2%	4%	8%	13%	39%	14%	4%	5%	100%
10	Orange	2%	3%	1%	3%	1%	3%	5%	4%	14%	40%	14%	10%	100%
11	West Haven	1%	2%	0%	2%	1%	2%	3%	2%	5%	16%	41%	26%	100%
12	New Haven	1%	2%	0%	1%	1%	2%	3%	2%	3%	5%	12%	69%	100%
	Total	8%	12%	3%	11%	6%	10%	13%	7%	6%	6%	6%	13%	100%

Table 3-5
ConnDOT Statewide Model Daily O-D
% Trips by Origin

		TO												
		1	2	3	4	5	6	7	8	9	10	11	12	
FROM	**Super-Zone**	**Greenwich**	**Stamford**	**Darien**	**Norwalk**	**Westport**	**Fairfield**	**Bridgeport**	**Stratford**	**Milford**	**Orange**	**West Haven**	**New Haven**	**Total**
1	Greenwich	77%	18%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	100%
2	Stamford	10%	76%	6%	6%	1%	1%	0%	0%	0%	0%	0%	0%	100%
3	Darien	3%	30%	37%	24%	2%	1%	1%	0%	0%	0%	0%	0%	100%
4	Norwalk	1%	7%	5%	72%	9%	3%	1%	1%	0%	0%	0%	0%	100%
5	Westport	1%	3%	1%	24%	49%	13%	5%	2%	1%	0%	0%	0%	100%
6	Fairfield	0%	1%	0%	5%	7%	55%	24%	4%	1%	1%	0%	1%	100%
7	Bridgeport	0%	0%	0%	1%	2%	14%	64%	12%	3%	1%	1%	1%	100%
8	Stratford	0%	0%	0%	1%	1%	5%	24%	51%	9%	4%	1%	2%	100%
9	Milford	0%	0%	0%	1%	1%	2%	7%	10%	50%	21%	5%	4%	100%
10	Orange	0%	0%	0%	0%	0%	1%	3%	4%	23%	41%	16%	10%	100%
11	West Haven	0%	0%	0%	0%	0%	1%	2%	2%	6%	19%	46%	25%	100%
12	New Haven	0%	0%	0%	0%	0%	0%	1%	1%	2%	5%	12%	77%	100%
	Total	8%	14%	3%	13%	4%	8%	14%	7%	6%	6%	5%	11%	100%

Table 3-6
AirSage Daily O-D Data
% Trips by Destination

FROM	Super-Zone	TO 1 Greenwich	2 Stamford	3 Darien	4 Norwalk	5 Westport	6 Fairfield	7 Bridgeport	8 Stratford	9 Milford	10 Orange	11 West Haven	12 New Haven	Total
1	Greenwich	56%	11%	7%	4%	3%	3%	2%	2%	2%	2%	1%	1%	7%
2	Stamford	19%	53%	26%	12%	5%	5%	4%	3%	3%	3%	2%	2%	12%
3	Darien	3%	7%	29%	6%	2%	2%	1%	1%	1%	1%	0%	0%	3%
4	Norwalk	6%	10%	20%	49%	17%	7%	5%	4%	3%	3%	2%	2%	11%
5	Westport	2%	2%	3%	8%	43%	8%	3%	2%	2%	1%	1%	1%	6%
6	Fairfield	3%	4%	4%	6%	14%	45%	13%	6%	4%	3%	2%	2%	10%
7	Bridgeport	4%	5%	4%	6%	8%	18%	51%	19%	9%	6%	3%	3%	13%
8	Stratford	2%	2%	2%	2%	3%	4%	10%	42%	14%	5%	2%	2%	7%
9	Milford	2%	2%	2%	2%	2%	3%	4%	12%	39%	14%	5%	3%	6%
10	Orange	1%	1%	1%	2%	1%	2%	3%	4%	14%	39%	15%	5%	6%
11	West Haven	1%	1%	1%	1%	1%	1%	1%	2%	4%	14%	41%	12%	6%
12	New Haven	2%	2%	1%	2%	2%	2%	3%	3%	5%	11%	26%	69%	13%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 3-7
ConnDOT Statewide Model Daily O-D
% Trips by Destination

FROM	Super-Zone	TO 1 Greenwich	2 Stamford	3 Darien	4 Norwalk	5 Westport	6 Fairfield	7 Bridgeport	8 Stratford	9 Milford	10 Orange	11 West Haven	12 New Haven	Total
1	Greenwich	77%	10%	3%	1%	1%	0%	0%	0%	0%	0%	0%	0%	8%
2	Stamford	18%	76%	30%	7%	3%	1%	0%	0%	0%	0%	0%	0%	14%
3	Darien	1%	6%	37%	5%	1%	0%	0%	0%	0%	0%	0%	0%	3%
4	Norwalk	2%	6%	24%	72%	24%	5%	1%	1%	1%	0%	0%	0%	13%
5	Westport	0%	1%	2%	9%	49%	7%	2%	1%	1%	0%	0%	0%	4%
6	Fairfield	0%	1%	1%	3%	13%	55%	14%	5%	2%	1%	1%	0%	8%
7	Bridgeport	0%	0%	1%	1%	5%	24%	64%	24%	7%	3%	2%	1%	14%
8	Stratford	0%	0%	0%	1%	2%	4%	12%	51%	9%	4%	2%	1%	7%
9	Milford	0%	0%	0%	0%	1%	1%	3%	9%	50%	23%	6%	2%	6%
10	Orange	0%	0%	0%	0%	0%	1%	1%	4%	21%	41%	19%	5%	6%
11	West Haven	0%	0%	0%	0%	0%	0%	1%	1%	5%	16%	46%	12%	5%
12	New Haven	0%	0%	0%	0%	0%	1%	1%	2%	4%	10%	25%	77%	11%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Expansion of the Model Coverage

The current Connecticut Travel Demand Model (CTTDM) is a traditional statewide travel demand model covering the entire state of Connecticut. The ConnDOT's model terminates into external zones for I-95, Route 15 and I-84 in the southwest Connecticut. In order to evaluate pricing strategies more appropriately on the I-95 and/or Route 15 corridors, it was decided to expand the current model extent from the Stateline to further into New York. **Figure 3-2** illustrates the model coverage area for current ConnDOT model and the expanded coverage area. The new expanded model coverage includes New York counties of Dutchess and Putnam in the west and Westchester and Bronx in the south. The expanded model network allows multiple point of choice for trips before they enter into Connecticut under any pricing scenario or physical alternative. CDM Smith utilized the New York Best Practice Model (NYBPM), a regional travel forecasting model for the New York Metropolitan Transportation Council (NYMTC) area for the highway network and vehicle trips in the expanded coverage area. Standard technical practices were followed for "stitching" the highway network and trip tables of ConnDOT's statewide model with the NYBPM model.

Connecticut Statewide Time of Day Model Calibration

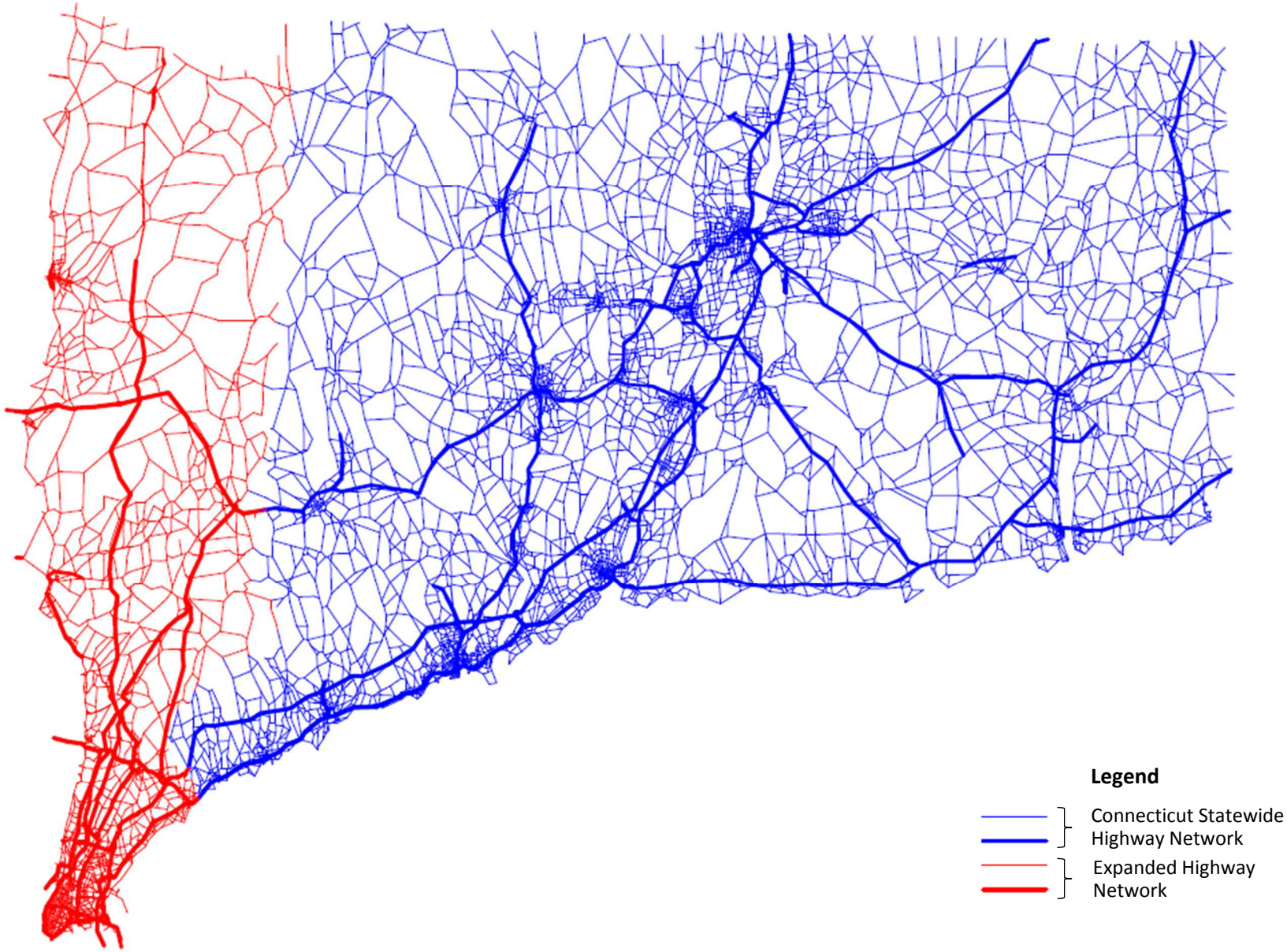
During the model calibration, the following adjustments were made to the model:

- Time of Day Factors: Based on a comparison of the total flows by period, the time of day factors by purpose were adjusted to better replicate period flows;
- Volume Delay Functions: Adjusted the volume delay functions on key corridor segments to improve the volume loading and congested speed relationship as compared to the INRIX travel time data;
- Link Level Adjustments: Within the I-95 study area, localized adjustments were made to the link speeds and capacities to reflect the unique design constraints and impacts on operations; and
- A matrix estimation process was employed which further calibrated the assignment traffic volumes to traffic counts by adjusting and scaling origin and destination pairs in the trip tables.

Screenline Volumes

For the eight "screenlines", a corresponding list of count locations was identified and presented in **Figure 3-3**. Traffic counts were collected through existing sources and where not available, new counts were conducted and summarized into tabular format. The screenlines were used in evaluating the travel demand model by comparing the total traffic assigned across the screenlines versus the count data. Calibration adjustments to the traffic model were then made to improve the fit to the overall traffic demand across the screenlines and at the individual count locations.

Among the eight screenlines, the first six screenline are north-south screenlines covering the southwest Connecticut from I-84/I-684 in the north to Long Island Sound in the south. In general, these six screenlines cover traffic flow heading east and west through the corridor. The two east-west screenlines cover the area from New York Stateline through New Haven along the I-95 and Route 15 corridors. In general, these two screenlines capture traffic flow in a north and south direction.



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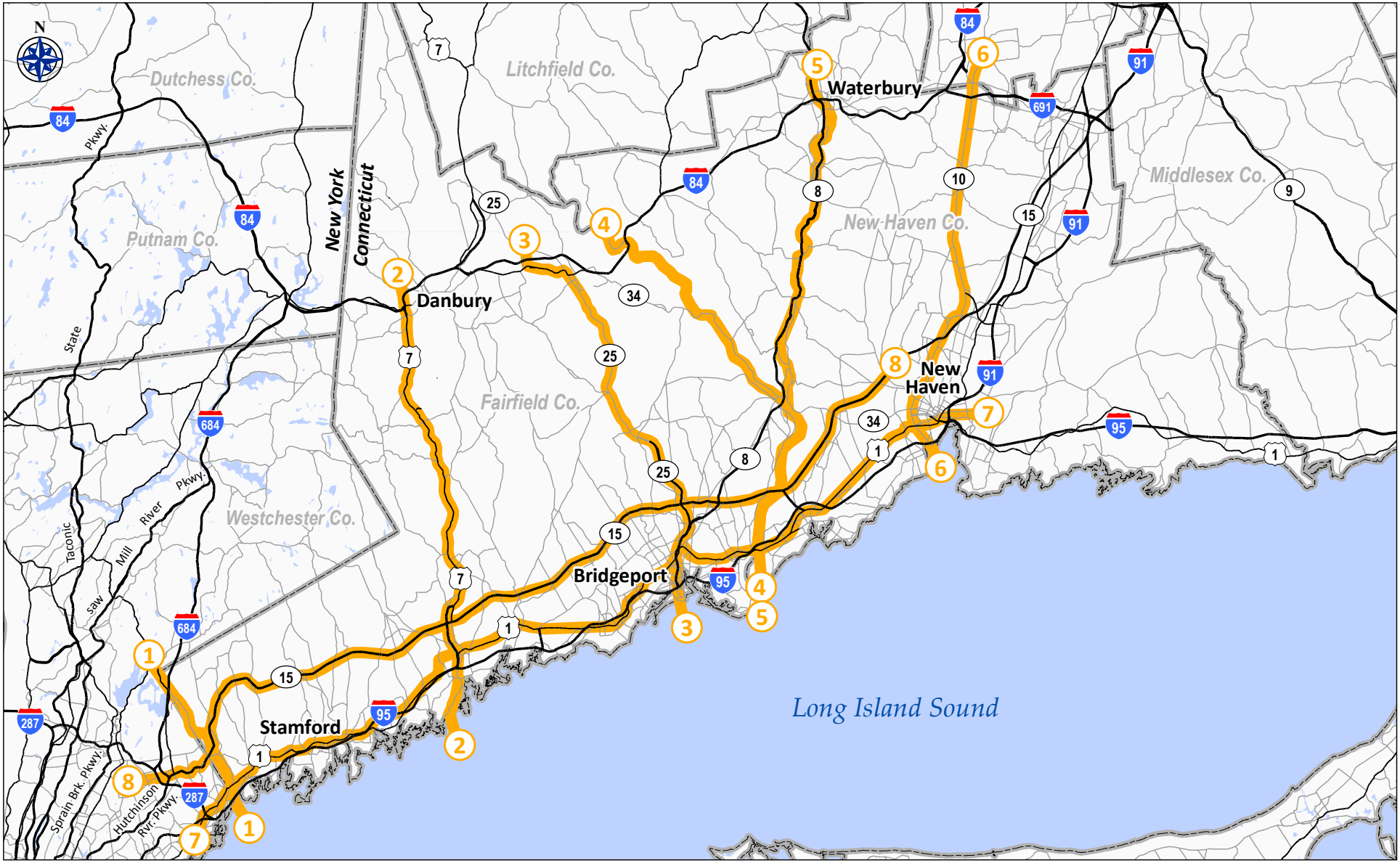
EXPANSION OF MODEL COVERAGE

FIGURE 3-2



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PROJECT SCREENLINE LOCATION MAP

FIGURE 3-3

Table 3-8 displays the total average weekday counts across the individual 8 screenlines versus the 2012 base year model assignment volumes from the final calibration run of the time of day model. The net difference and percent difference for each screenline comparison is shown. Screenline volumes across all time periods were calibrated to within acceptable variance tolerances.

Table 3-8
Screenline Comparison for ConnDOT's Model Enhancement
Comparison of 2012 Traffic Counts and Model Assignment Volume

		Model Screenlines							
		North-south Screenlines						East-west Screenlines	
Time of Day		1	2	3	4	5	6	7	8
AM	Count	56,800	109,100	111,100	98,400	158,400	141,600	265,300	151,700
	Volume	56,400	109,500	111,800	100,600	156,300	138,800	241,700	134,500
	Difference	(400)	400	700	2,200	(2,100)	(2,800)	(23,600)	(17,200)
	% Difference	-0.7%	0.4%	0.6%	2.2%	-1.3%	-2.0%	-8.9%	-11.3%
MD	Count	62,700	134,600	156,200	110,500	194,000	177,900	335,400	158,600
	Volume	61,500	133,500	144,600	113,300	197,700	178,000	340,900	155,800
	Difference	(1,200)	(1,100)	(11,600)	2,800	3,700	100	5,500	(2,800)
	% Difference	-1.9%	-0.8%	-7.4%	2.5%	1.9%	0.1%	1.6%	-1.8%
PM	Count	66,400	133,800	156,000	108,800	195,000	177,600	331,000	175,400
	Volume	64,500	133,000	137,700	113,000	190,600	170,700	314,100	163,900
	Difference	(1,900)	(800)	(18,300)	4,200	(4,400)	(6,900)	(16,900)	(11,500)
	% Difference	-2.9%	-0.6%	-11.7%	3.9%	-2.3%	-3.9%	-5.1%	-6.6%
NT	Count	50,500	91,300	106,300	85,800	136,100	117,800	216,700	93,700
	Volume	53,000	99,500	108,200	87,900	142,800	122,900	245,700	106,400
	Difference	2,500	8,200	1,900	2,100	6,700	5,100	29,000	12,700
	% Difference	5.0%	9.0%	1.8%	2.4%	4.9%	4.3%	13.4%	13.6%
Total Day	Count	236,400	468,800	529,700	403,500	683,500	614,800	1,148,400	579,300
	Volume	235,400	475,500	502,300	414,800	687,300	610,400	1,142,300	560,500
	Difference	(1,000)	6,700	(27,400)	11,300	3,800	(4,400)	(6,100)	(18,800)
	% Difference	-0.4%	1.4%	-5.2%	2.8%	0.6%	-0.7%	-0.5%	-3.2%

Note:
Screenline Number/Location Name
1: CT / NY Border
2: West of US 7
3: West of Route 25
4: Housatonic River
5: Naugatuck River
6: East of Route 10
7: North of Route 1 / I-95
8: North of Route 15 / Merritt Parkway

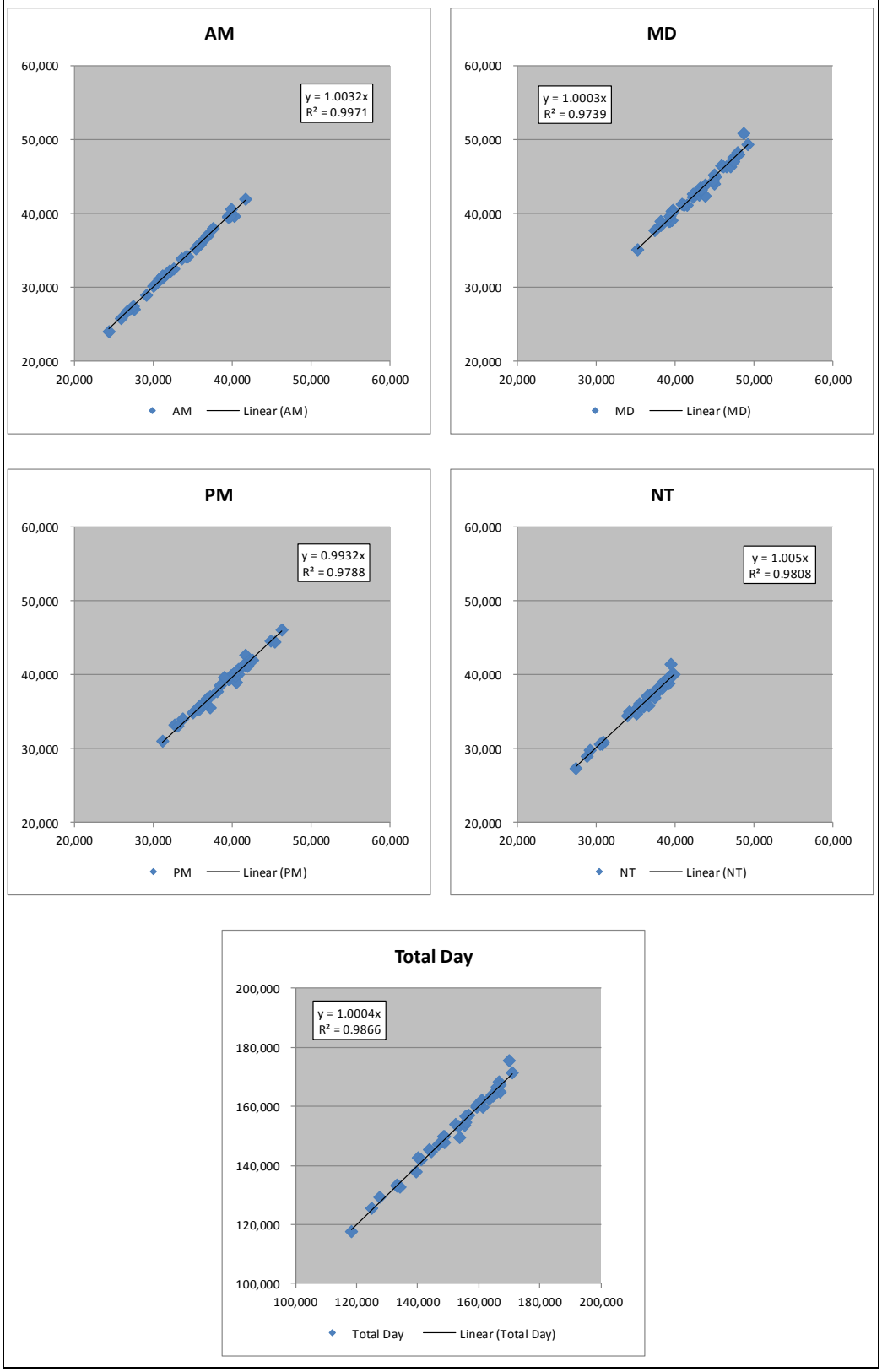
I-95 Mainline Volumes

Significant effort was focused specifically on the I-95, Route 15 and US 1 corridor volumes between the New York Stateline and New Haven. **Table 3-9** compares the I-95 average weekday mainline traffic counts between interchanges against the 2012 base year modeled assignment volumes. Calibration efforts resulted in all time periods performing well within acceptable levels of variance. On a total daily basis, the model is within 5 percent for all mainline segments and within 2 percent for most of the segments. To demonstrate how well these I-95 segments are calibrated, scatter plots by time period were developed and are shown in **Figure 3-4**.

Table 3-9
I-95 Corridor Traffic Comparison for ConnDOT's Time Of Day Model Enhancement
Comparison of 2012 Traffic Counts and Model Assignment Volume

I-95 Mainline	AM			MD			PM			NT			Total Day		
Location North	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.
NY Stateline	35,700	35,800	0.3%	38,200	38,400	0.5%	38,000	37,700	-0.8%	35,000	35,100	0.3%	146,800	146,900	0.1%
Ritch Ave	36,800	37,100	0.8%	39,600	40,300	1.8%	39,500	39,300	-0.5%	36,600	37,200	1.6%	152,500	153,900	0.9%
Arch St	39,400	39,500	0.3%	42,300	42,300	0.0%	40,100	40,100	0.0%	37,500	37,700	0.5%	159,300	159,600	0.2%
Indian Field Rd	40,200	39,600	-1.5%	43,100	42,500	-1.4%	40,700	40,100	-1.5%	37,400	37,500	0.3%	161,400	159,700	-1.1%
Park Pl	39,400	39,700	0.8%	43,200	43,500	0.7%	39,900	39,900	0.0%	36,900	37,300	1.1%	159,300	160,500	0.8%
West Ave	41,700	41,900	0.5%	45,900	46,500	1.3%	40,700	40,800	0.2%	38,500	38,900	1.0%	166,800	168,100	0.8%
At Washington Bl\	36,000	36,100	0.3%	41,600	41,100	-1.2%	35,000	34,800	-0.6%	36,100	35,700	-1.1%	148,700	147,700	-0.7%
Canal St	33,600	33,900	0.9%	39,700	40,400	1.8%	32,700	33,200	1.5%	34,200	35,000	2.3%	140,200	142,600	1.7%
Elm St	39,700	39,600	-0.3%	46,600	46,400	-0.4%	39,600	39,300	-0.8%	38,600	38,600	0.0%	164,500	163,800	-0.4%
Brookside Dr	39,800	40,100	0.8%	47,400	47,600	0.4%	40,500	39,800	-1.7%	39,200	39,700	1.3%	166,900	167,300	0.2%
Noroton Ave	39,700	39,700	0.0%	47,500	47,300	-0.4%	40,500	38,900	-4.0%	39,200	38,800	-1.0%	166,900	164,700	-1.3%
Int 11	39,900	40,600	1.8%	48,700	50,800	4.3%	41,700	42,600	2.2%	39,500	41,400	4.8%	169,900	175,300	3.2%
Tokeneke Rd	37,500	38,000	1.3%	46,200	46,300	0.2%	39,000	39,700	1.8%	38,300	38,200	-0.3%	161,000	162,100	0.7%
Int 13	35,900	35,800	-0.3%	43,900	42,400	-3.4%	37,200	35,500	-4.6%	36,700	35,800	-2.5%	153,700	149,500	-2.7%
Fairfield Ave	36,800	36,900	0.3%	48,100	48,000	-0.2%	41,700	41,400	-0.7%	39,400	39,800	1.0%	166,100	166,100	0.0%
Norwalk River	35,300	35,200	-0.3%	47,000	46,300	-1.5%	42,200	41,900	-0.7%	39,000	39,100	0.3%	163,500	162,500	-0.6%
East Ave	30,800	31,100	1.0%	40,900	41,300	1.0%	36,800	36,700	-0.3%	35,500	36,100	1.7%	143,900	145,200	0.9%
Riverside Ave	30,000	30,200	0.7%	39,800	40,200	1.0%	36,300	36,000	-0.8%	35,100	35,400	0.9%	141,200	141,800	0.4%
Sherwood Island (	29,100	29,000	-0.3%	39,400	38,900	-1.3%	35,700	35,200	-1.4%	35,200	34,700	-1.4%	139,400	137,800	-1.1%
Post Rd	30,200	30,500	1.0%	41,200	41,100	-0.2%	37,200	37,000	-0.5%	36,000	36,100	0.3%	144,600	144,800	0.1%
Bronson Rd	31,100	31,600	1.6%	42,300	42,600	0.7%	38,500	38,500	0.0%	36,500	37,000	1.4%	148,400	149,700	0.9%
Mill Plain Rd	32,000	32,100	0.3%	43,800	43,900	0.2%	40,300	39,800	-1.2%	37,500	37,300	-0.5%	153,600	153,200	-0.3%
N Benson Rd	32,000	32,200	0.6%	45,100	45,000	-0.2%	41,600	41,300	-0.7%	37,900	38,300	1.1%	156,600	156,800	0.1%
Meadowbrook Rd	31,600	31,800	0.6%	45,000	45,200	0.4%	41,400	41,300	-0.2%	37,800	38,100	0.8%	155,800	156,500	0.4%
Black Rock Tpke	31,100	31,300	0.6%	45,000	44,000	-2.2%	41,900	41,100	-1.9%	37,400	36,900	-1.3%	155,400	153,400	-1.3%
Fairfield Ave	34,100	34,200	0.3%	47,900	48,300	0.8%	44,900	44,600	-0.7%	39,200	39,500	0.8%	166,000	166,500	0.3%
Wordin Ave	35,800	35,800	0.0%	49,300	49,300	0.0%	46,200	46,100	-0.2%	39,900	40,100	0.5%	171,100	171,300	0.1%
Pequonnock River	34,400	34,200	-0.6%	47,400	47,000	-0.8%	45,400	44,400	-2.2%	37,500	37,700	0.5%	164,700	163,300	-0.9%
E Main ST	32,500	32,500	0.0%	44,900	44,400	-1.1%	42,600	41,900	-1.6%	35,800	35,700	-0.3%	155,800	154,500	-0.8%
Stratford Ave	31,100	31,500	1.3%	43,300	43,200	-0.2%	40,500	40,500	0.0%	34,000	34,400	1.2%	148,900	149,700	0.5%
Surf Ave	27,100	27,200	0.4%	39,300	39,000	-0.8%	35,900	35,800	-0.3%	30,900	30,900	0.0%	133,200	133,000	-0.2%
South Ave	27,600	27,100	-1.8%	39,600	39,100	-1.3%	36,200	35,800	-1.1%	30,800	30,600	-0.6%	134,100	132,600	-1.1%
W Broad St	27,400	27,400	0.0%	39,400	39,700	0.8%	35,800	35,700	-0.3%	30,500	30,600	0.3%	133,100	133,300	0.2%
Housatonic River	24,300	24,100	-0.8%	35,300	35,100	-0.6%	31,100	31,000	-0.3%	27,400	27,300	-0.4%	118,200	117,600	-0.5%
Int 34	25,900	25,800	-0.4%	37,400	37,700	0.8%	33,000	33,000	0.0%	28,800	29,000	0.7%	125,100	125,500	0.3%
Schoolhouse Rd /	26,600	26,800	0.8%	38,200	38,900	1.8%	33,700	34,000	0.9%	29,200	29,800	2.1%	127,700	129,400	1.3%
Plains Rd	27,900	27,500	-1.4%	39,600	39,600	0.0%	35,500	35,200	-0.8%	29,900	29,800	-0.3%	133,000	132,200	-0.6%
Wasson Connectc	30,800	30,400	-1.3%	42,400	42,300	-0.2%	38,300	37,900	-1.0%	31,000	31,100	0.3%	142,500	141,600	-0.6%
Int 39	30,600	30,400	-0.7%	40,500	40,800	0.7%	36,600	36,500	-0.3%	30,000	30,200	0.7%	137,600	137,900	0.2%
Woodmont Rd	29,800	29,900	0.3%	40,000	40,400	1.0%	35,500	35,700	0.6%	29,800	30,200	1.3%	135,200	136,100	0.7%
Marsh Hill Rd	30,800	30,500	-1.0%	40,800	40,800	0.0%	36,200	35,900	-0.8%	30,400	30,600	0.7%	138,100	137,700	-0.3%
Saw Mill Rd	32,000	31,800	-0.6%	42,400	42,100	-0.7%	37,300	36,900	-1.1%	31,300	31,500	0.6%	143,000	142,200	-0.6%
West River	33,500	33,800	0.9%	43,700	43,700	0.0%	38,600	38,500	-0.3%	31,800	32,200	1.3%	147,700	148,200	0.3%
Ella T. Grasso Blvc	37,700	38,400	1.9%	48,400	48,100	-0.6%	43,000	43,100	0.2%	35,300	34,900	-1.1%	164,400	164,500	0.1%
Sargent Dr	37,200	35,900	-3.5%	48,300	46,000	-4.8%	42,200	41,300	-2.1%	35,000	33,800	-3.4%	162,600	157,000	-3.4%
Quinnipiac River	31,000	30,700	-1.0%	39,600	39,200	-1.0%	40,000	39,700	-0.7%	22,700	22,300	-1.8%	133,200	132,000	-0.9%

Figure 3-4
I-95 Corridor Traffic Comparison for ConnDOT's Time Of Day Model Enhancement
Scatter Plot Comparison of 2012 Traffic Counts and Model Assignment Volume



Route 15 Mainline Volumes

Similarly, Route 15 average weekday mainline traffic counts versus the 2012 base year modeled assignment volumes are presented in **Table 3-10** for segments between the New York Stateline and the Hero's Tunnel in New Haven. Calibration efforts resulted in all time periods performing well within acceptable levels of variance. On a total daily basis, all but one of the mainline segments are within 2 percent of the traffic count target. **Figure 3-5** presents scatter plots by time period for the Route 15 calibration results to demonstrate the match between counts and assigned volumes.

Table 3-10
Route 15 Corridor Traffic Comparison for ConnDOT's Time Of Day Model Enhancement
Comparison of 2012 Traffic Counts and Model Assignment Volume

CT-15 Mainline	AM			MD			PM			NT			Total Day		
Location North	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.
King St	12,700	12,400	-2.4%	12,100	12,000	-0.8%	16,400	16,700	1.8%	8,800	8,800	0.0%	49,900	49,900	0.0%
Round Hill Rd	13,200	13,000	-1.5%	12,400	12,500	0.8%	16,900	17,200	1.8%	8,800	9,100	3.4%	51,400	51,700	0.6%
Old Mill Rd Int	13,800	13,700	-0.7%	12,800	12,800	0.0%	17,200	17,500	1.7%	8,900	9,200	3.4%	52,800	53,200	0.8%
North St	15,300	15,100	-1.3%	13,900	13,700	-1.4%	18,800	18,900	0.5%	9,400	9,300	-1.1%	57,400	57,100	-0.5%
Den Rd	15,800	15,800	0.0%	14,500	14,700	1.4%	19,300	19,700	2.1%	9,600	9,900	3.1%	59,200	60,200	1.7%
Long Ridge Rd	16,700	16,400	-1.8%	15,900	15,900	0.0%	20,300	20,400	0.5%	10,100	10,300	2.0%	63,100	62,900	-0.3%
High Ridge Rd	17,000	16,900	-0.6%	16,800	16,800	0.0%	20,900	21,300	1.9%	10,600	10,800	1.9%	65,300	65,800	0.8%
Old Stamford Rd	17,200	17,000	-1.2%	17,000	16,900	-0.6%	21,400	21,700	1.4%	11,000	11,000	0.0%	66,500	66,500	0.0%
South Ave	16,900	16,700	-1.2%	16,000	16,100	0.6%	21,000	21,400	1.9%	10,900	11,100	1.8%	64,800	65,300	0.8%
New Canaan Ave	17,800	17,700	-0.6%	17,400	17,400	0.0%	21,900	22,400	2.3%	11,200	11,400	1.8%	68,400	68,900	0.7%
Route 7	12,600	12,600	0.0%	12,200	12,300	0.8%	15,500	15,900	2.6%	8,300	8,400	1.2%	48,600	49,200	1.2%
At Main Ave	13,900	13,900	0.0%	12,800	12,800	0.0%	15,200	15,600	2.6%	8,700	8,800	1.1%	50,500	51,100	1.2%
Main Ave	14,800	14,900	0.7%	13,600	13,800	1.5%	16,200	16,700	3.1%	9,200	9,400	2.2%	53,800	54,800	1.9%
Route 33	17,500	17,500	0.0%	15,600	15,600	0.0%	18,900	19,400	2.6%	10,600	10,800	1.9%	62,500	63,400	1.4%
Weston Rd	17,100	17,100	0.0%	15,300	15,400	0.7%	18,300	18,900	3.3%	10,300	10,300	0.0%	61,000	61,700	1.1%
Black Rock Tpke	17,600	17,600	0.0%	17,300	17,300	0.0%	19,300	19,900	3.1%	10,800	11,000	1.9%	65,000	65,700	1.1%
Easton Tpke	17,600	17,900	1.7%	17,500	17,700	1.1%	19,600	20,300	3.6%	10,900	11,100	1.8%	65,700	66,900	1.8%
Park Ave	18,100	18,100	0.0%	18,600	18,500	-0.5%	20,300	20,700	2.0%	11,300	11,400	0.9%	68,300	68,700	0.6%
Route 111	19,400	19,400	0.0%	21,700	21,700	0.0%	22,300	22,900	2.7%	13,400	13,300	-0.7%	76,900	77,400	0.7%
Route 25	21,500	21,500	0.0%	22,600	22,800	0.9%	23,700	24,300	2.5%	14,100	14,300	1.4%	81,800	82,800	1.2%
Route 108	18,900	18,900	0.0%	19,100	19,200	0.5%	19,800	20,300	2.5%	12,200	12,200	0.0%	70,000	70,600	0.9%
Route 8	20,500	20,300	-1.0%	20,800	20,800	0.0%	20,500	20,700	1.0%	14,700	14,800	0.7%	76,600	76,600	0.0%
Housatonic River	24,100	24,000	-0.4%	24,000	24,300	1.3%	25,300	25,400	0.4%	17,100	17,300	1.2%	90,600	91,000	0.4%
Between Milford I	14,000	13,900	-0.7%	16,200	15,300	-5.6%	15,500	15,600	0.6%	11,000	10,600	-3.6%	56,700	55,400	-2.3%
Wheelers Farms R	14,900	15,100	1.3%	15,700	15,900	1.3%	17,100	17,100	0.0%	11,200	11,300	0.9%	58,800	59,400	1.0%
Grassy Hill Rd	14,500	14,600	0.7%	15,600	15,600	0.0%	16,700	16,700	0.0%	10,900	10,900	0.0%	57,700	57,800	0.2%
Derby Ave	15,400	15,500	0.6%	16,900	16,800	-0.6%	18,100	18,200	0.6%	11,600	11,500	-0.9%	62,000	62,000	0.0%
Heroes Tunnel	15,600	15,900	1.9%	18,700	18,700	0.0%	20,000	20,100	0.5%	12,200	12,200	0.0%	66,600	66,900	0.5%

I-95 and Route 15 Mainline Speeds versus INRIX

In addition to traffic volumes, significant modeling effort was also placed on replicating travel speeds on I-95 and Route 15 between the New York Stateline and New Haven. This is important given the nature of the study which is focused on evaluating solutions that will provide congestion relief to the corridor. **Table 3-11** displays the I-95 mainline average travel speeds from the INRIX data (left portion of table) versus output speeds (right portion of table) from the time of day model. Color coding is used to indicate free flow speeds (green), moderate congestion (yellow), and relatively severe congestion (red). In general, the refined model is performing reasonably well in estimating actual travel speeds and on segments of I-95 that experience significant congestion. Similarly, the average travel speeds for Route 15 mainline segments from the INRIX data versus output speeds from the travel model is presented in **Table 3-12**.

Figure 3-5
Route 15 Corridor Traffic Comparison for ConnDOT's Time Of Day Model Enhancement
Scatter Plot Comparison of 2012 Traffic Counts and Model Assignment Volume

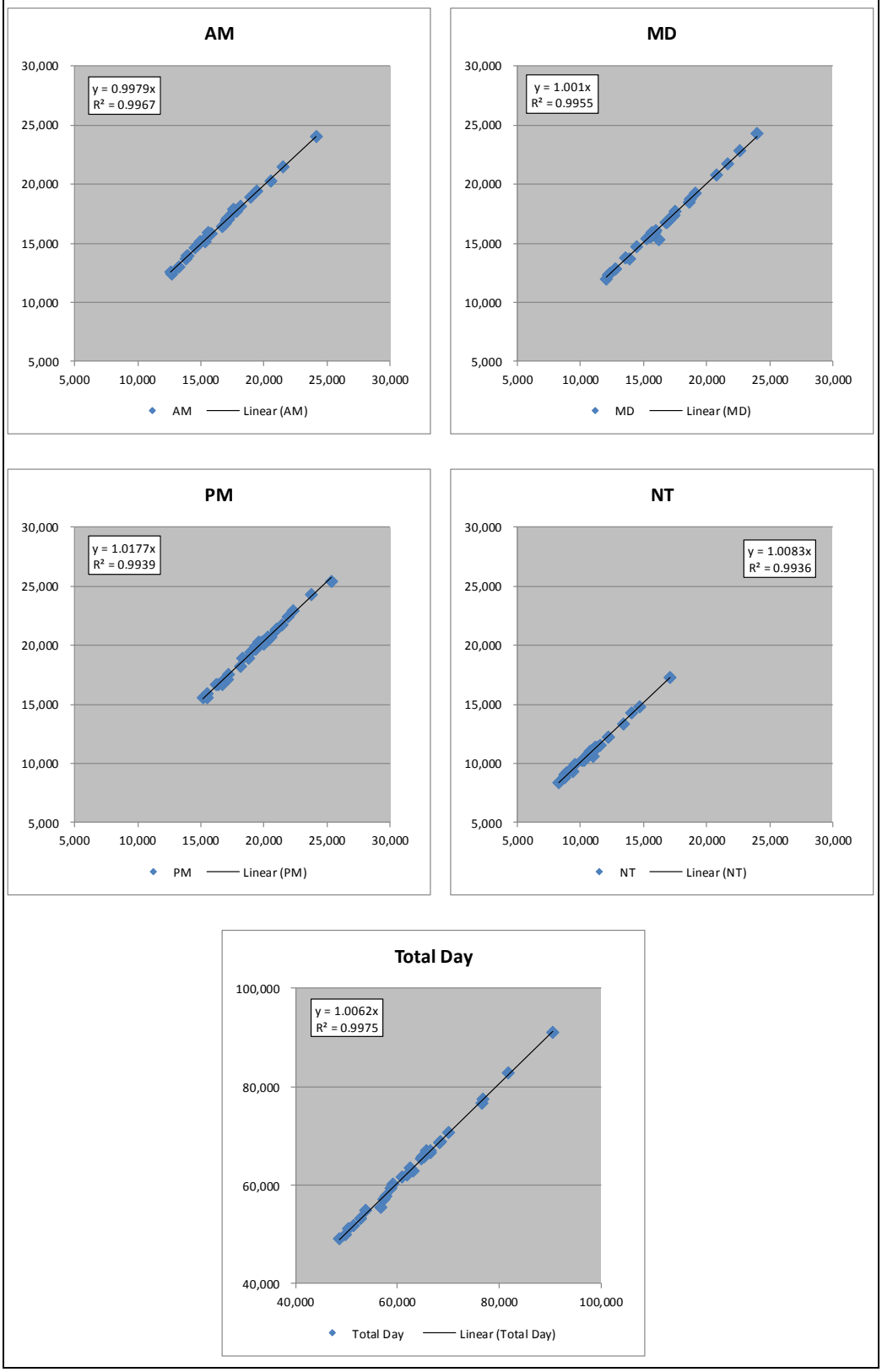


Table 3-11
I-95 Corridor Congested Speed Comparison for ConnDOT's Time Of Day Model Enhancement
Comparison of 2012 Observed Speed and Model Assignment Speed

I-95 Mainline	I-95 Southbound					
	Observed Speed			Model Speed		
Location North of	AM	MD	PM	AM	MD	PM
Quinnipiac River	47	52	47	46	51	50
Sargent Dr	57	57	46	60	65	52
Ella T. Grasso Blvd	59	58	44	50	55	46
At Ella T. Grasso Blvd	59	57	47	56	58	48
West River	60	60	46	57	58	50
Saw Mill Rd	63	62	56	59	59	57
Marsh Hill Rd	66	66	65	59	59	58
Woodmont Rd	67	66	65	59	59	59
Int 39	65	64	63	59	59	59
Wasson Connector	65	64	62	59	59	58
Plains Rd	64	64	63	62	62	61
Schoolhouse Rd / BIC Dr	63	62	61	62	63	62
Int 34	63	63	62	63	63	63
Housatonic River	62	61	61	64	64	64
W Broad St	61	61	61	60	62	62
South Ave	62	63	63	60	62	63
Surf Ave	62	64	64	60	63	63
Stratford Ave	61	64	63	63	64	64
E Main ST	55	60	60	60	64	64
Pequonnock River	52	61	61	53	63	61
Wordin Ave	48	60	61	43	64	64
Fairfield Ave	44	62	64	41	62	64
Black Rock Tpke	38	60	63	35	60	62
Meadowbrook Rd / King's Hw	39	60	64	37	59	63
N Benson Rd	39	60	64	38	59	64
Mill Plain Rd	44	59	62	46	60	63
Bronson Rd	49	61	64	47	61	63
Post Rd	51	60	63	50	62	64
Sherwood Island Connector	49	60	65	48	63	64
Riverside Ave	44	55	64	47	56	64
East Ave	43	52	62	46	53	63
Norwalk River	37	47	58	36	37	62
Fairfield Ave	37	46	57	32	49	53
Int 13	47	57	62	44	58	60
Tokeneke Rd	55	60	62	43	59	61
Int 11	59	62	63	57	64	64
Noroton Ave	61	63	63	58	64	64
Brookside Dr	61	62	62	60	65	65
Elm St	58	61	60	56	64	64
Canal St	53	61	51	51	59	51
At Washington Blvd	51	58	45	54	61	48
West Ave	53	58	45	45	58	43
Park Pl	56	62	46	52	63	42
Indian Field Rd	62	63	55	54	63	54
Arch St	61	64	54	55	63	53
Ritch Ave	64	63	52	61	62	53

Table 3-11 (continued)
I-95 Corridor Congested Speed Comparison for ConnDOT's Time Of Day Model Enhancement
Comparison of 2012 Observed Speed and Model Assignment Speed

I-95 Mainline	I-95 Northbound					
	Observed Speed			Model Speed		
Location South of	AM	MD	PM	AM	MD	PM
Delavan Ave / Ritch Ave	57	63	63	56	64	64
Field Point Rd	60	62	61	56	61	62
Indian Field Rd	63	63	59	57	62	61
Mianus River	62	62	55	57	62	58
Harvard Ave	63	62	52	58	61	52
Greenwich Ave	61	61	46	57	59	48
Washington Blvd	63	61	46	63	62	48
Elm St	63	61	42	64	61	45
E Main St	62	60	38	62	59	37
Noroton Ave	62	60	38	60	58	40
Boston Post Rd	64	63	34	62	57	36
Tekeneke Rd	62	60	32	62	55	32
Old Kings Hwy	62	59	31	61	60	31
Scribner Ave	62	59	32	62	54	35
US 7	63	61	41	60	58	45
Norwalk River	60	59	45	60	57	48
Riverside Ave	63	62	48	63	61	46
Sherwood Island Connector	65	65	51	64	62	49
Center St	65	65	46	64	63	47
Bronson Rd	64	64	46	64	62	44
Mill Plain Rd	65	65	45	64	61	45
Round Hill Rd	64	64	45	63	60	46
Meadowbrook Rd	64	64	47	63	59	48
Int 24	63	62	50	63	59	49
Commerce Dr / Fairfield Ave	65	64	55	63	61	51
Wordin Ave	64	64	53	64	61	55
Park Ave	63	63	45	63	54	40
Pequonnock River	63	63	59	64	62	58
Seaview Ave	63	63	61	65	63	60
Hollister Ave	63	64	62	62	61	55
Honeyspot Rd	65	65	64	64	63	60
W Broad St	64	64	63	64	63	61
Route 130	63	63	62	64	63	59
Housatonic River	62	62	62	65	62	61
Schoolhouse Rd / BIC Dr	62	62	62	64	60	61
Plains Rd	65	65	65	64	58	63
Zion Hill Rd / High St	64	64	63	64	58	62
Int 39	64	64	63	59	58	58
Woodmont Rd	64	64	64	59	58	58
Marsh Hill Rd	63	64	62	59	58	59
Saw Mill Rd	63	64	58	59	58	56
Campbell Ave	61	63	50	59	58	53
West River	59	61	45	58	57	48
Long Wharf Dr	55	57	43	52	54	40
I-91 Split	55	55	42	53	48	43
Quinnipiac River	55	55	44	54	54	44

Table 3-12
Route 15 Corridor Congested Speed Comparison for ConnDOT's Time Of Day Model Enhancement
Comparison of 2012 Observed Speed and Model Assignment Speed

Route 15 Mainline	Route 15 Southbound					
	Observed Speed			Model Speed		
Location North of	AM	MD	PM	AM	MD	PM
Heroes Tunnel	66	67	64	62	63	62
Derby Ave	67	67	65	62	63	62
Grassy Hill Rd	67	68	66	62	63	63
Wheelers Farms Rd	67	68	67	61	63	63
At Milford Pkwy Int.	65	66	64	63	63	63
Housatonic River	66	68	66	57	62	58
Route 8	65	66	64	59	63	62
Route 108	62	65	64	61	63	62
Route 25	61	64	62	56	57	55
Route 111	55	63	62	53	58	57
Park Ave	50	63	63	48	58	58
Easton Tpke	47	65	65	46	58	58
Black Rock Tpke	45	65	65	41	58	58
Weston Rd	45	64	66	42	58	58
Route 33	50	64	66	45	58	58
Main Ave	58	63	65	55	58	58
At Main Ave	53	65	64	55	58	58
Route 7	52	65	64	54	58	58
New Canaan Ave	51	63	63	50	56	57
South Ave	52	62	63	50	57	58
Old Stamford Rd	54	63	63	50	56	57
High Ridge Rd	58	65	67	56	58	58
Long Ridge Rd	67	68	68	57	58	57
Den Rd	64	65	65	57	58	58
North St	64	65	65	57	58	58
Old Mill Rd Int	64	65	65	58	58	58
Round Hill Rd	70	69	69	58	58	58
King St	66	66	66	58	58	58

Route 15 Mainline	Route 15 Northbound					
	Observed Speed			Model Speed		
Location South of	AM	MD	PM	AM	MD	PM
Round Hill Rd	65	64	63	58	58	58
Old Mill Rd Int	67	66	64	58	58	58
North St	67	66	63	58	58	58
Den Rd	67	66	60	58	58	56
Long Ridge Rd	66	65	55	58	58	55
High Ridge Rd	67	66	52	58	58	45
Old Stamford Rd	66	65	49	58	58	51
White Birch Rd / South Ave	63	62	48	58	58	50
New Canaan Ave	65	61	51	58	58	49
US 7	67	65	49	58	58	48
Main Ave	64	63	52	58	58	47
At Main Ave	64	63	50	58	58	47
Route 33	65	64	47	58	58	49
Weston Rd	67	67	41	58	58	40
Black Rock Tpke	66	65	49	58	58	50
Easton Tpke	66	65	49	58	58	49
Park Ave	63	62	54	58	58	53
Route 111	62	61	54	58	58	50
Route 25	64	64	55	57	57	52
Route 108	62	63	49	57	57	47
Route 8	64	64	61	62	63	60
Route 110	66	65	64	61	62	60
Housatonic River	67	68	64	62	61	59
At Milford Pkwy	65	65	64	63	63	63
Wheelers Farms Rd	65	65	64	63	63	62
Grassy Hill Rd	66	66	64	63	63	62
Derby Ave	67	67	64	63	63	63
Route 69	67	67	64	63	63	62
Heroes Tunnel	67	67	64	63	63	61

Future Year Socioeconomic Model Assumptions

The Connecticut Statewide model includes population and employment forecasts for a 2040 horizon year. The population and employment for 2010, and the forecast year of 2040 for the CT Statewide Model area are displayed in **Table 3-13**, along with corresponding average annual growth rates. In general, growth assumptions are very modest, with population and employment in the I-95 Corridor region forecasted to grow by 0.3 percent per year between 2010 and 2040.

Table 3-13
Connecticut Population and Employment Trends Assumed in ConnDOT's Model

	Population				Employment		
County	2010	2020	2040	County	2010	2020	2040
Fairfield	916,829	954,647	1,017,473	Fairfield	397,513	416,883	445,661
Hartford	894,014	929,423	995,414	Hartford	481,772	505,411	544,738
Litchfield	189,927	200,140	219,739	Litchfield	59,230	61,173	64,254
Middlesex	165,676	176,678	197,912	Middlesex	63,902	67,392	73,643
New Haven	862,477	891,986	948,674	New Haven	345,705	357,581	378,356
New London	274,055	285,446	307,012	New London	123,963	134,278	152,093
Tolland	152,691	164,052	185,984	Tolland	39,989	43,687	50,182
Windham	118,428	126,263	141,388	Windham	37,328	39,260	42,697
Total	3,574,097	3,728,635	4,013,596	Total	1,549,402	1,625,665	1,751,623
I-95 Corridor Subtotal [1]	1,779,306	1,846,633	1,966,147	I-95 Corridor Subtotal [1]	743,218	774,464	824,017

	% Change Per Year				% Change Per Year		
County	2010-2020	2020-2040	2010-2040	County	2010-2020	2020-2040	2010-2040
Fairfield	0.4%	0.3%	0.3%	Fairfield	0.5%	0.3%	0.4%
Hartford	0.4%	0.3%	0.4%	Hartford	0.5%	0.4%	0.4%
Litchfield	0.5%	0.5%	0.5%	Litchfield	0.3%	0.2%	0.3%
Middlesex	0.6%	0.6%	0.6%	Middlesex	0.5%	0.4%	0.5%
New Haven	0.3%	0.3%	0.3%	New Haven	0.3%	0.3%	0.3%
New London	0.4%	0.4%	0.4%	New London	0.8%	0.6%	0.7%
Tolland	0.7%	0.6%	0.7%	Tolland	0.9%	0.7%	0.8%
Windham	0.6%	0.6%	0.6%	Windham	0.5%	0.4%	0.4%
Total	0.4%	0.4%	0.4%	Total	0.5%	0.4%	0.4%
I-95 Corridor Subtotal [1]	0.4%	0.3%	0.3%	I-95 Corridor Subtotal [1]	0.4%	0.3%	0.3%

Note:
[1] I-95 Corridor reflects total for Fairfield and New Haven Counties in the Southwest Connecticut.
Source:
ConnDOT's Statewide Daily Model

Future Year Network Improvements

The ConnDOT's statewide model includes 2020 and 2040 horizon year networks. These networks were reviewed and compared against CT DOT's Air Quality and Conformity Determination Document which incorporates FY 2015-18 TIP and 2011 LRTPs from CT RPOs. CDM Smith included projects in the modeled network from a fiscally constrained plan where funding is identified for the projects over the next 30 years with the 30-year revenue stream. **Table 3-14** lists the projects included in the modeled study area.

Table 3-14
I-95 Model Area Future Year Model/Network Asumptions
List of Regionally Significant Highway Projects from Conformity Document August 2014

No.	Year	Town	Road Name	Description	Project Name	Lanes From	Lanes To
1	2015	Orange	Edison Road	New Road	Project to extend Edison Road from its current terminus to Marsh Hill Road, a length of approximately 2,200 feet	0/0	1/1
2	2015	Norwalk	I-95	Operational Lanes	Add auxiliary lanes between Int. 14 and 15 (NB and SB) on I-95	3/3	4/4
3	2015	Mansfield	Hillside Road	New Road	Extension of existing Hillside Road to Route 44.	0/0	1/1
4	2018	Danbury	SR 806 / Newtown Rd	Widening	State Route 806 (Newtown Road) from Old Newtown to Plumtrees & from Eagle to Industrial Plaza, Danbury - Widening from 1 lane each direction to 2 lanes each direction	1/1	2/2
5	2018	New Haven	I-95	Bridge Replacement	Q Bridge Replacement and demolition; Contract B, B2 and E	3/3	5/5
6	2020	West Hartford	I-84	Operational Lanes	Add an Operational Lane WB between Interchanges 42 & 39A; Add an Operational Lane EB between Interchanges 40 & 41	3/3	4/4
7	2020	Bridgeport	Route 130	Widening	Reconstruct and widen Route 130 from Stratford Avenue bridge to Yellow Mill bridge	1/1	2/2
8	2020	Waterbury	I-84	Widening	Interstate 84 CCD 11/2020, TIP	2/2	3/3
9	2020	Shelton	Route 714	Widening	Between Huntington Avenue and Constitution Boulevard	1/1	2/2
10	2030	Plainville	New Britain Avenue	Widening	Cooke Street to Hooker Street	1/1	2/2
11	2030	Waterbury	I-84	Widening	Reconstruct Expressway and Operational Improvements including Interchanges. Hamilton Avenue to opposite Pierpoint	2/2	3/3
12	2030	Middlebury/Waterbury	I-84, Routes 63/64	Widening	Add auxiliary lanes at Int. 17 and on Routes 63/64	1/1	2/2
13	2030	Brookfield	US 202	Widening	South of Old State Road to Route 133	1/1	2/2
14	2030	Danbury	Route 6	Widening	From Kenosia Avenue easterly to I-84 (Exit 4)	1/1	2/2
15	2030	Danbury	Route 6	Widening	From I-84 (Exit 2) East to Kenosia Avenue	1/1	2/2
16	2030	Danbury	Route 37	Widening	From Route I-84 (Exit 6) Northerly to Jeanette Street	1/1	2/2
17	2030	Danbury / Newtown / Southbury	I-84	Widening	Between Interchanges 3 and 4. Between Interchanges 12 and 13	3/3	4/4
18	2030	Danbury	Backus Avenue	Widening	Widen Backus Avenue from Kenosia Avenue to Miry Brook Road	1/1	2/2
19	2030	Danbury	Route 53	Widening	From South Street northerly to Boughton Street	1/1	2/2
20	2030	Danbury	Route 37	Widening	From Route 53 (Main Street) northerly to I-84 (Exit 6)	1/1	2/2
21	2030	Branford	Route 1	Widening	East Haven Town Line to Alps Road (Echlin Road Private)	2/2	2/3
22	2030	Branford	Route 1	Widening	Route 146 to Cedar Street	2/2	2/3
23	2030	Branford	Route 1	Widening	Cedar Street to East Main	1/1	1/2
24	2030	Branford	Route 1	Widening	East Main to 1-95 Exit 55	1/1	1/2
25	2030	Branford	Route 1	Widening	I-95 Exit 55 to Leetes Island Road	1/1	1/2
26	2030	Guilford	Bullard Rd	New Road	Bullard Road extension to Route 77	0/0	1/1
27	2030	Guilford	Route 1	Widening	State Street to Tanner Marsh Road	1/1	1/2
28	2030	Hamden	Route 10	Widening	Washington Avenue to Route 40	2/2	2/3
29	2030	Hamden	Route 10	Widening	Route 40 to Todd Street	2/2	2/3
30	2030	Hamden	Route 10	Widening	Todd Street to Shepard Avenue	1/1	2/2
31	2030	Hamden	Route 10	Widening	River Street to Cheshire Town Line	1/1	2/2
32	2030	Hamden / North Haven	Route 5	Widening	Olds Street (Hamden) to Sackett Point Road	1/1	2/2
33	2030	Meriden	Route 5	Widening	Wallingford Town Line to Olive Street (Route 71)	1/1	2/2
34	2030	Milford	Route 162	Widening	From West of Old Gate Lane to Gulf Street/Clark Street to Route 1	1/1	2/2
35	2030	New Haven / Woodbrid	Route 69	Widening	From Route 63 to Landin Street	1/1	2/2
36	2030	New Haven / Woodbrid	Route 63	Widening	From Dayton Street (NH) to Landin Street (Wdbg)	1/2	2/3
37	2030	North Branford	Route 80	Widening	From East Haven Town Line to Doral Farms Road and Route 22 to Guilford Town Line	1/1	1/2
38	2030	Orange	Route 162	Widening	From West Haven Town Line to US 1	1/1	2/2
39	2030	Wallingford	Route 5	Widening	From South Orchard Street. to Ward Street and Christian Road to Meriden Town Line	1/1	2/2
40	2030	Wallingford	Route 150	Widening	From Route 71 overpass South of Old Colony Road to Route 68	1/1	1/2
41	2030	West Haven	Route 122	Widening	Route 1 to Elm Street	1/1	2/2
42	2030	Darien / Stamford	I-95	Operational Lanes	Add Lane from Stamford Exit 8 to Darien Exit 10, Operational Lane	3/3	4/4
43	2030	Norwalk	East Ave #1	Widening	East Avenue from the vicinity of the I-95 Ramps southerly to the vicinity of Van Zant Street	1/1	2/2

Future Year Model Results

The year 2040 ConnDOT's statewide model was run and traffic volumes were summarized for the same screenlines, and the I-95 and Route 15 mainline locations prepared for calibration. **Table 3-15** presents the estimated traffic volumes for the base year 2012 and horizon year 2040 along the six north-south screenlines identified earlier in **Figure 3-3**. Traffic growth along Screenlines 2 through 6 are forecasted to grow at an annual rate of 0.6 to 0.8 percent. At Screenline 1, located at the southwestern end of the state, traffic growth is expected to be about 0.2 percent per annum for the same period.

Table 3-15
Screenline Comparison for ConnDOT's Model Enhancement
Comparison of 2012 and 2040 Model Assignment Volumes

		Model Screenlines					
		North-south Screenlines					
Time of Day		1	2	3	4	5	6
AM	2012	56,400	109,500	111,800	100,600	156,300	138,800
	2040	61,000	128,000	132,500	124,500	190,400	169,000
	Difference	4,600	18,500	20,700	23,900	34,100	30,200
	% Change	8.2%	16.9%	18.5%	23.8%	21.8%	21.8%
	AAPC	0.3%	0.6%	0.6%	0.8%	0.7%	0.7%
MD	2012	61,500	133,500	144,600	113,300	197,700	178,000
	2040	66,400	159,600	177,900	144,000	250,300	222,700
	Difference	4,900	26,100	33,300	30,700	52,600	44,700
	% Change	8.0%	19.6%	23.0%	27.1%	26.6%	25.1%
	AAPC	0.3%	0.6%	0.7%	0.9%	0.8%	0.8%
PM	2012	64,500	133,000	137,700	113,000	190,600	170,700
	2040	66,500	153,300	167,100	145,800	240,400	213,900
	Difference	2,000	20,300	29,400	32,800	49,800	43,200
	% Change	3.1%	15.3%	21.4%	29.0%	26.1%	25.3%
	AAPC	0.1%	0.5%	0.7%	0.9%	0.8%	0.8%
NT	2012	53,000	99,500	108,200	87,900	142,800	122,900
	2040	55,500	116,700	127,700	104,400	173,700	146,800
	Difference	2,500	17,200	19,500	16,500	30,900	23,900
	% Change	4.7%	17.3%	18.0%	18.8%	21.6%	19.4%
	AAPC	0.2%	0.6%	0.6%	0.6%	0.7%	0.6%
Total Day	2012	235,400	475,500	502,300	414,800	687,300	610,400
	2040	249,500	557,600	605,200	518,700	854,800	752,400
	Difference	14,100	82,100	102,900	103,900	167,500	142,000
	% Change	6.0%	17.3%	20.5%	25.0%	24.4%	23.3%
	AAPC	0.2%	0.6%	0.7%	0.8%	0.8%	0.7%

Note:
Screenline Number/Location Name
1: CT / NY Border
2: West of US 7
3: West of Route 25
4: Housatonic River
5: Naugatuck River
6: East of Route 10
7: North of Route 1 / I-95
8: North of Route 15 / Merritt Parkway

Chapter 4

Stated Preference Survey

Between November 14, 2014 and December 11, 2014, Resource Systems Group, Inc. (RSG) conducted a stated preference survey for passenger and commercial vehicle drivers who travel in the I-95 corridor between New York and New Haven, CT. The purpose of the survey was to collect quantitative data to understand how travelers will likely change their behavior in response to congestion pricing strategies being considered in the corridor. The questionnaires collected data on current travel behaviors, presented respondents with information about the proposed congestion pricing strategies, and used stated preference experiments to collect data that were used to estimate travelers' willingness to pay for travel time savings and behavioral response to congestion pricing in the corridor.

Stated preference surveys are commonly used for a wide range of situations where new transportation alternatives are being considered in regions that do not currently have those alternatives. For more than 20 years, stated preference surveys have been used to estimate values of travel time and other parameters related to the effects of tolls and road pricing.

This chapter summarizes the stated preference survey report. The complete report and set of survey screen captures, response tabulations, and respondents' comments about the project are provided in **Appendixes B** of this document.

Survey Approach

The survey mode was a computer-assisted self-interview (CASI) using the Survey platform developed by RSG. This web-based platform allows the survey to be customized for each respondent by presenting questions and modifying wording based on respondents' previous answers. These dynamic survey features provide an accurate and efficient means of data collection and allow the presentation of realistic future conditions that correspond with respondents' reported experiences. The customized software was programmed for in-person administration using laptop computers and for online administration to targeted audiences.

A sampling plan was developed to capture key travel market segments in the study corridor, including local and long-distance trips, work and non-work trips, peak and off-peak trips, and representation from different household and demographic characteristics. Respondents were recruited into the survey using a multi-method approach. The passenger vehicle survey was administered to respondents through in-person intercepts at selected locations along I- 95 and Route 15, through a local employer outreach effort to organizations and businesses located along the corridor, and to a panel of respondents residing along the corridor through coordination with an online market research firm. The commercial survey was administered entirely through in-person intercepts at truck stops and service plazas along I-95. In total, 1,437 valid passenger vehicle surveys and 235 valid commercial vehicle surveys were obtained. Data from these travelers were analyzed using advanced statistical methods to estimate travelers' willingness to pay for travel time savings and potential changes to travel behavior in response to the congestion pricing alternatives under consideration.

Survey Questionnaire

RSG developed two separate stated preference questionnaires, one for passenger vehicle drivers and one for commercial vehicle drivers. The survey questionnaires were designed to collect the information necessary to estimate behavioral choice models for two congestion pricing strategies:

1. Implementing new express lanes on I-95
2. Implementing congestion pricing on all travel lanes of I-95 or I-95 and Route 15

The survey asked respondents to focus on their most recent trip in the corridor while they answered a series of questions that were grouped into five main sections:

1. Introduction and qualification questions
2. Trip detail questions to collect information about a recent trip in or through the study corridor
3. Stated preference questions designed to reveal respondents' sensitivities to travel time savings and toll costs
4. Debrief and opinion questions to identify reasons behind the choices made in the stated preference section and to collect opinions and attitudes relevant to the project
5. Demographic questions (passenger vehicle survey only) or company background questions (commercial vehicle survey only)

The complete text of the questionnaire and example survey screens is included in the appendices to the full survey report found in the **Appendix B** of this document.

Passenger Vehicle Questionnaire

Screening and Trip Characteristics

After being presented with basic instructions about how to navigate the computer-based instrument and a brief introduction to the purpose of the survey, respondents answered a set of screening questions. To qualify for the passenger vehicle survey, respondents must have made a recent automobile trip that met the following conditions:

- Used at least part of the I-95 and/or Route 15 between New Haven, CT and the New York State border
- Made within the past month
- Made in a personal vehicle
- Took at least 15 minutes in total door-to-door travel time

Respondents who indicated that they had not made a trip that met all of these criteria were terminated from the survey. Qualifying respondents were asked to focus on their most recent trip that met all of the screening criteria as they continued through the survey. This most recent trip—referred to as the respondent's reference trip—formed the contextual basis for the rest of the survey.

Respondents were instructed to think of the one-way portion of their trip, rather than their entire round trip, and were asked a series of questions regarding the specific details of their reference trip, including:

- Day of week
- Purpose
- Beginning and ending locations
- I-95 and Route 15 entrance and exit ramps
- Trip departure time
- Travel time
- Travel delay due to congestion
- Trip travel time flexibility
- Vehicle occupants
- Trip frequency
- Other alternate routes
- Metro North ridership, frequency, and fare amount
- Ownership of a transponder

In addition, respondents were asked to report where their trip began and ended using a Google Maps™ interface. Respondents provided details about their trip origin and destination by either entering a business name, street intersection, or full address or by using an interactive map.

Stated Preference Questions

After completing the trip details section of the questionnaire, respondents were presented with two sets of stated preference experiments. The purpose of the stated preference section of the survey was to estimate travelers' preferences and potential behavioral response under hypothetical future congestion pricing conditions in the study corridor. Each respondent saw two sets of five stated preference tradeoff experiments corresponding to each of the different pricing strategies:

1. Implementing new express lanes on I-95
2. Implementing congestion pricing on all travel lanes of I-95 and Route 15

The stated preference section was structured so that respondents answered a set of five tradeoff scenarios, a set of debrief questions, and a set of opinion questions for both pricing strategies. Respondents answered all of the tradeoff, debrief and opinion questions for the express lanes pricing strategy before proceeding to the congestion pricing on all lanes strategy. **Figure 4-1** and **Figure 4-2** show example stated preference experiments for the Express Lanes on I-95 and Congestion Pricing on All Lanes scenarios.

Figure 4-1: Example Stated Preference Question for Express Lanes on I-95

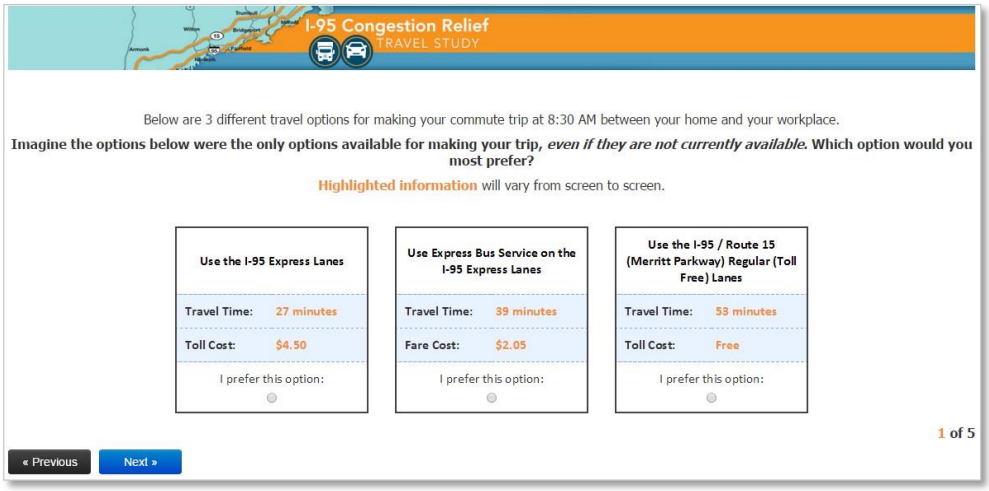
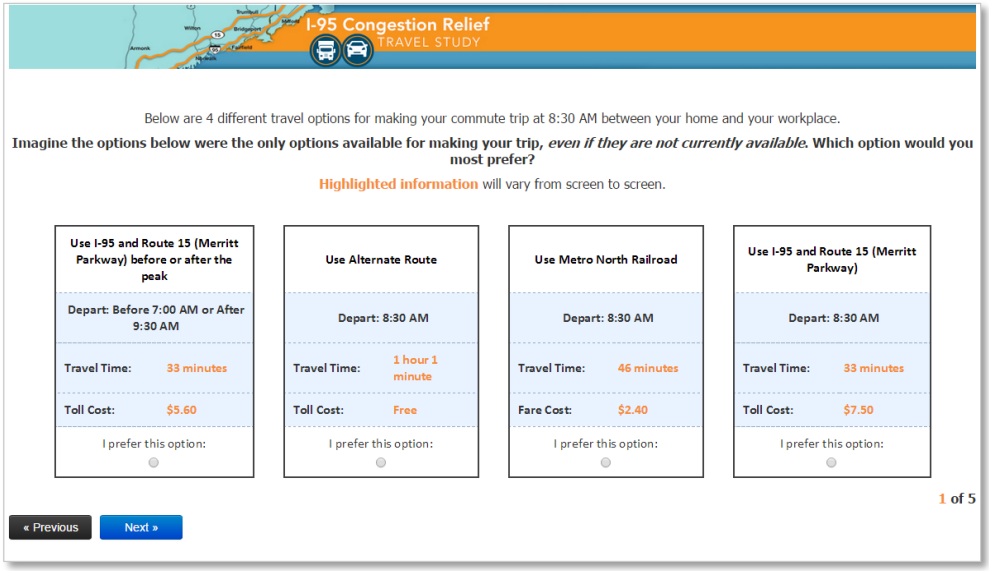


Figure 4-2: Example Stated Preference Question for Congestion Pricing on All Lanes



The attribute values presented in each question varied around a set of base values. To ensure that the scenarios were realistic, trip characteristics of each respondent's reference trip were used to calculate the base values for travel time and toll cost. The base values for the attributes were varied by multiplying one of several factors according to the experimental design for that particular scenario. By varying the travel time and toll cost for each alternative shown in each experiment, the respondent was faced with different time savings for different costs, allowing them to demonstrate their travel preferences across a range of values of time.

Debrief and Opinion Questions

After completing each set of stated preference exercises, respondents were asked a series of debrief questions specific to the congestion pricing strategy they had just evaluated. The debrief questions depended on their choices in the stated preference section of the survey.

Respondents who never selected a tolled express lanes alternative in the stated preference section were asked to indicate the primary reason for their choices. All respondents were asked under what scenarios they would be likely to use the proposed express lanes on I-95 and their opinion of the proposed express lanes strategy. If respondents were somewhat or strongly in favor of the congestion pricing strategy, they were asked in a follow-up question to understand why they were in favor. Similarly, respondents who were somewhat or strongly opposed to the tolling of all lanes were asked to indicate their primary reason for opposing the strategy.

To understand how respondents could change their travel in the future once congestion pricing is implemented on all travel lanes of I-95 and/or Route 15, follow-up questions were asked to understand if, given a certain travel time and toll cost, respondents would change the frequency of their reference trip and, if so, how they would change their trips. All respondents were asked if they would make more trips, fewer trips, or would not make any changes to their travel in the future, given the hypothetical time and cost conditions for the I-95 and/or Route 15 from their fifth stated preference scenario.

Next, respondents were asked a series of debrief questions related to the congestion pricing on all lanes strategy. Respondents who never selected a tolled alternative in the SP section were asked to indicate the primary reason for their choices. If respondents selected at least one time-shift alternative in the SP section, they were prompted to indicate the direction they would prefer to shift their trip, either before or after the peak period. On the other hand, if respondents saw a time-shift alternative in the SP section and never selected it, they were asked to indicate the primary reason why they never chose to shift to the off-peak period. Finally, respondents who never chose the Metro North Railroad alternative in the stated preference section were asked to indicate conditions that would make them more likely to use the rail service for their reference trip.

As with the express lanes strategy, respondents were asked to indicate, based on the information provided in the survey, their opinion of the proposal to implement congestion pricing on all lanes in the project corridor. If respondents were somewhat or strongly in favor of the proposal, they were asked in a follow-up question to understand why they were in favor of the strategy. Similarly, respondents who were somewhat or strongly opposed to the proposal were asked to indicate their primary reason for opposing the strategy.

At the conclusion of the debrief and opinion section of the survey, respondents were asked which of the two congestion pricing alternatives they preferred the most to relieve congestion in the I-95 corridor and how they would like to see the revenue used.

Finally, respondents were asked the extent to which they agreed or disagreed with a series of attitude statements related to tolling and congestion pricing, and the use of the toll revenue to support different transportation initiatives.

Demographic Questions

In the final section of the survey, demographic information was collected in order to classify respondents, identify differences in responses among traveler segments, and confirm that the sample

contained a diverse cross section of the traveling population that is served by the I-95 and Route 15 study corridors. Demographic questions related to gender, age, employment status, household size, vehicle ownership, and annual household income.

Before finishing the survey, respondents were asked if they would be willing to participate in future travel studies in the region. Respondents also had the opportunity to leave any comments about the survey or the proposed pricing scenarios.

Commercial Vehicle Questionnaire

Screening and Trip Characteristics

Similar to the passenger vehicle questionnaire, the commercial vehicle questionnaire was designed to collect information about a recent trip the respondent made using the I-95 corridor and to find out how they might make that same trip if congestion pricing were implemented in the future. However, unlike passenger vehicles, commercial vehicles are not permitted on Route 15 and would not be able to travel on the proposed express lanes on I-95. Therefore, only one pricing strategy was evaluated in the commercial vehicle survey— implementing congestion pricing on all travel lanes of I-95.

After being presented with basic instructions about how to navigate the computer-based instrument and a brief introduction to the purpose of the study, commercial vehicle respondents answered a set of screening questions to determine if they qualified for the survey. To qualify for the survey, commercial vehicle drivers must be responsible for making routing decisions for their vehicle or be able to describe the routing decisions that their dispatcher or manager makes. They must also have made a recent trip in a commercial vehicle that traveled on I-95 between New Haven, CT and the New York State border. Qualifying respondents were instructed to think of their most recent commercial trip that used I-95. For the purposes of this study, a commercial trip was defined as travel from the last commercial stop (for pickup or delivery) before using the study portion of I-95 to the first commercial stop after using the study portion of I-95 in one direction only. This trip, referred to as the respondent's reference trip, formed the basis for the next set of questions in the survey.

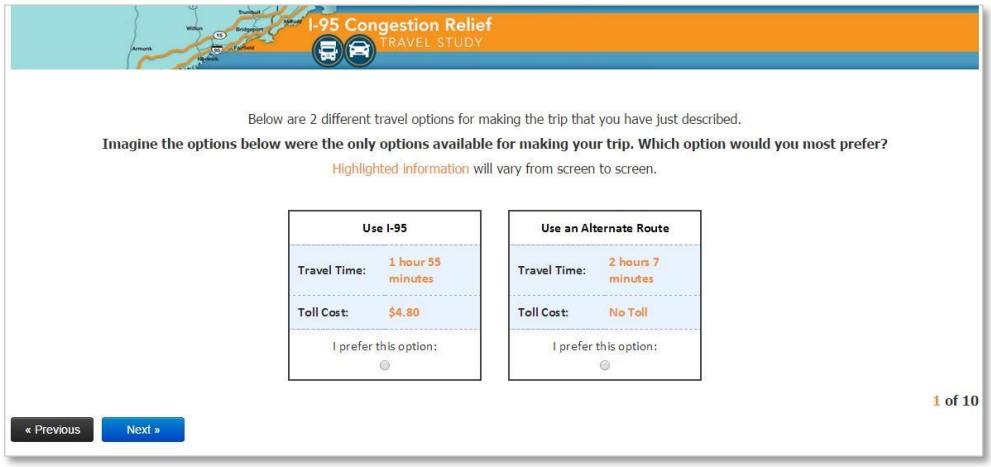
In a similar manner as the passenger vehicle survey, qualifying respondents were asked to describe the details of their reference trip, including the following information:

- Single or multi-day trip
- Day of week
- Origin and destination (city and state)
- Trip distance
- Departure time
- Travel time
- Travel delay due to traffic congestion on I-95
- Tolls paid and toll amount
- Vehicle size (number of axles)
- Trip frequency
- Use of I-84 or other alternate routes
- Ownership of electronic toll collection (ETC) transponders

Stated Preference Questions

As in the passenger vehicle survey, the purpose of the stated preference section was to estimate respondents' travel preferences and behavioral response under hypothetical future travel conditions on I-95 between New Haven and New York. Because commercial vehicles are not permitted to travel on Route 15 and would not be allowed in the proposed express lanes on I-95, commercial vehicle respondents were presented with a single set of 10 stated preference experiments related to the proposed strategy of implementing congestion pricing on all travel lanes of I-95. **Figure 4-3** presents an example stated preference experiment from the commercial vehicle survey for a four-axle vehicle.

Figure 4-3: Example Stated Preference Question for Commercial Vehicles



Survey Administration

RSG worked closely with the project team to design an administration plan to produce a generally representative sample of passenger and commercial vehicle travelers in the study region. The sampling plan was designed to capture key travel market segments in the study corridor, including local and long-distance trips, work and non-work trips, peak and off-peak trips, and representation from different demographic and company characteristics for both passenger and commercial vehicle travelers. By collecting data from a range of travelers and trip types, it is possible to identify the ways in which different characteristics affect choice behavior. These differences can then be reflected in the structure and coefficients of the resulting choice models that are estimated using the stated preference survey data.

Passenger vehicle travelers were recruited to take part in the survey using one of three methods:

1. In-person intercepts at selected locations near the I-95 study corridor
2. Email invitations through outreach to local employers in the study region
3. Email invitations to members of an online market research panel residing in the study area

Commercial vehicle travelers were recruited exclusively through in-person intercepts at travel centers and service plazas along the I-95 corridor. RSG began administration on November 14, 2014 and concluded on December 11, 2014. A total of 1,511 passenger vehicle surveys and 291 commercial vehicle surveys were completed during this time. The administration methods and number of complete surveys are presented in **Table 4-1**.

Table 4-1: Number of Responses by Administration Method

Data Source	Completed Surveys	
	Passenger Vehicles	Commercial Vehicles
In-person intercept	540	291
E-mail invitation to area businesses / organizations	567	N/A
Online research panel	404	N/A
Total	**1,511**	**291**

Passenger Vehicle Survey Results

One-thousand and five-hundred eleven (1,511) respondents completed the passenger vehicle survey during the data collection phase of the project. The number of records was reduced after completing the data checks and outlier analysis during the model estimation work. Based on this analysis, 1,437 respondents were included in the final passenger vehicle dataset and used to estimate the models.

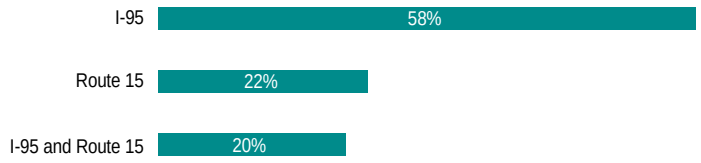
Several variables were used for screening purposes, including an examination of the geographical coordinates of the reported trip, inconsistent or irrational choice behavior, implied speed of the reported trip, stated preference and total survey duration, and overall reported trip distance.

The descriptive analysis of the passenger vehicle survey data presented in this section of the report is based on the 1,437 valid respondents and is provided in four sections: trip detail, stated preference, debrief and opinion, and demographic questions.

Screening and Trip Detail

In order to qualify for the survey, travelers must have used at least a portion of the I-95 or Route 15 study corridors between New Haven and New York. **Figure 4-4** below shows the distribution of trips made using one or both roads. Fifty-eight percent of respondents reported using I-95 only on their most recent trip, 22% reported using Route 15 only, and approximately 20% of respondents used both I-95 and Route 15 on their most recent trip. Sixty percent of respondents who used I-95 indicated that they could have reasonably used Route 15 for their trip, while 84% of respondents who used Route 15 indicated that they could have reasonably used I-95 for their trip.

Figure 4-4: Road(s) Used



The distribution of trip purposes by time of day is shown in **Figure 4-5**. The peak trip segment contains travelers who indicated their trip began on a weekday either during the AM peak period (6:00-9:59 AM) or in the PM peak period (3:00-6:59 PM), while off-peak trips occurred at all other times, including weekends. The sample contains almost an even split between peak and off-peak trips. About 58% of trips in the peak period were commute or work related, while another 13% were business-related trips. The most-commonly reported trip purpose in the off-peak was social or recreational (40%).

Trip origins and destinations, stratified by distance traveled, are displayed in **Figure 4-6** and **Figure 4-7**. **Figure 4-6** shows that respondents' trip origins are scattered along the length of the study corridor, with many short-distance trips originating in cities along I-95, including New Haven, Fairfield, Norwalk, and Stamford. This distribution reflects the fact that many respondents were traveling to and from surrounding communities to their regular jobs or for other non-work trips along the corridor.

Figure 4-5: Trip Purpose by Time of Day

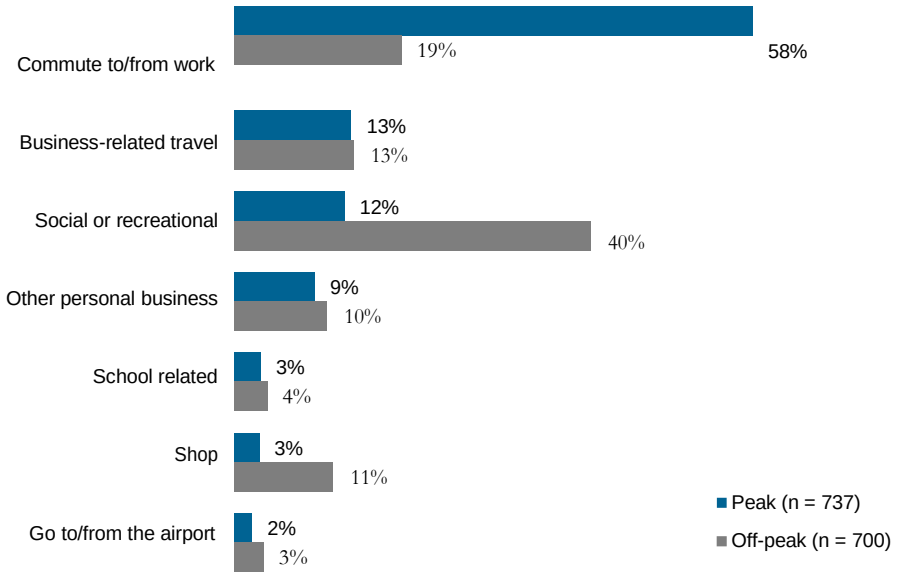
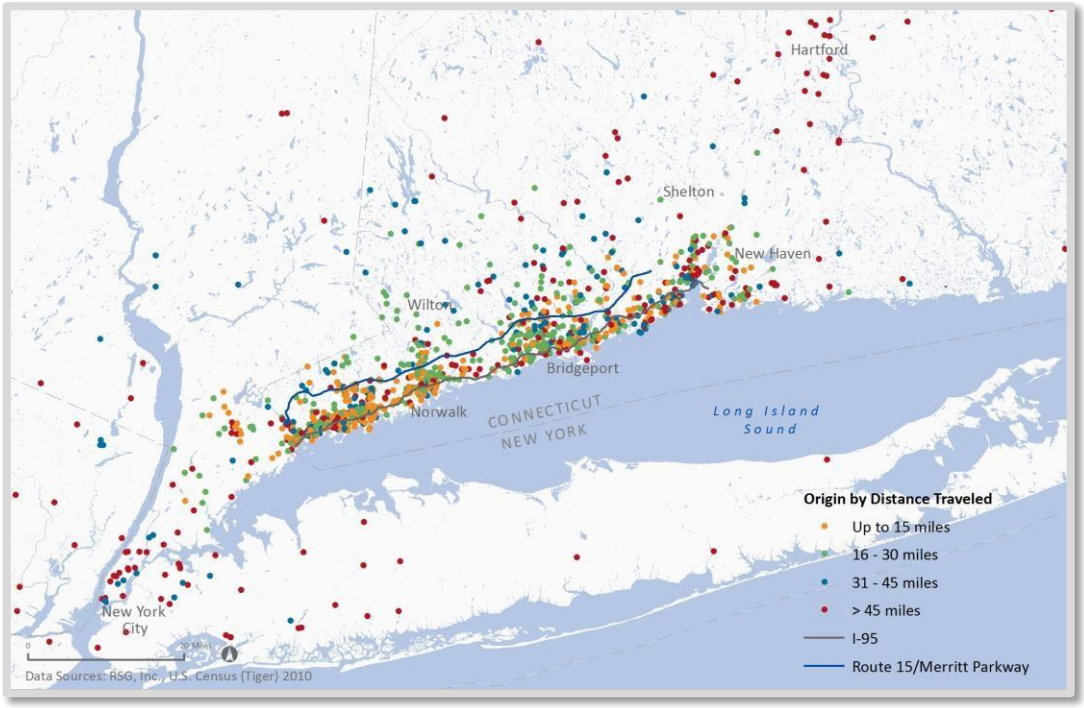
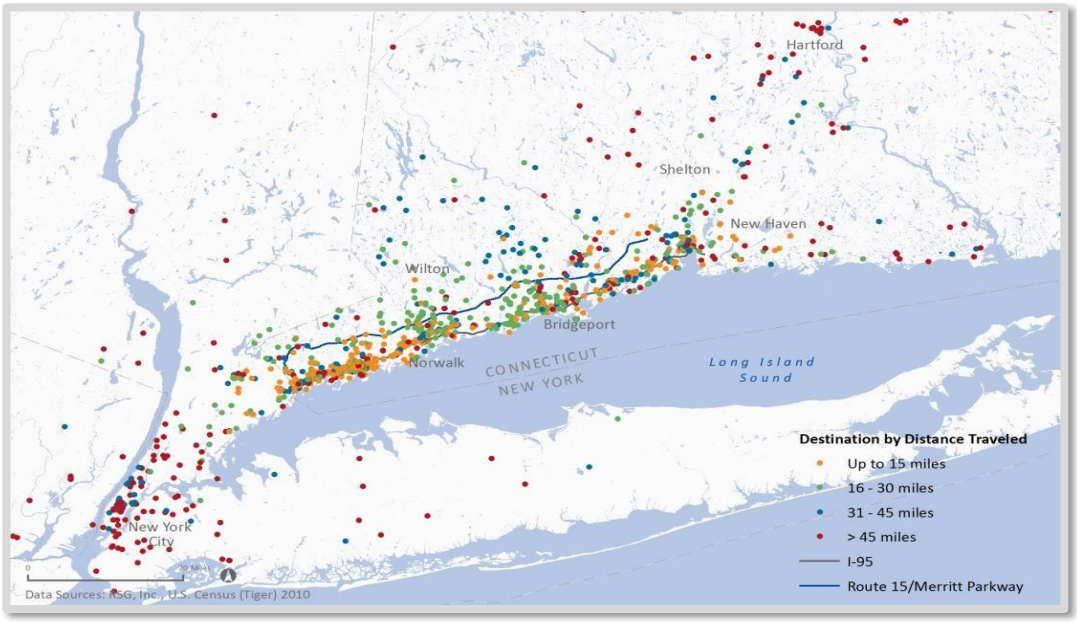


Figure 4-6: Map of Trip Origins by Trip Distance



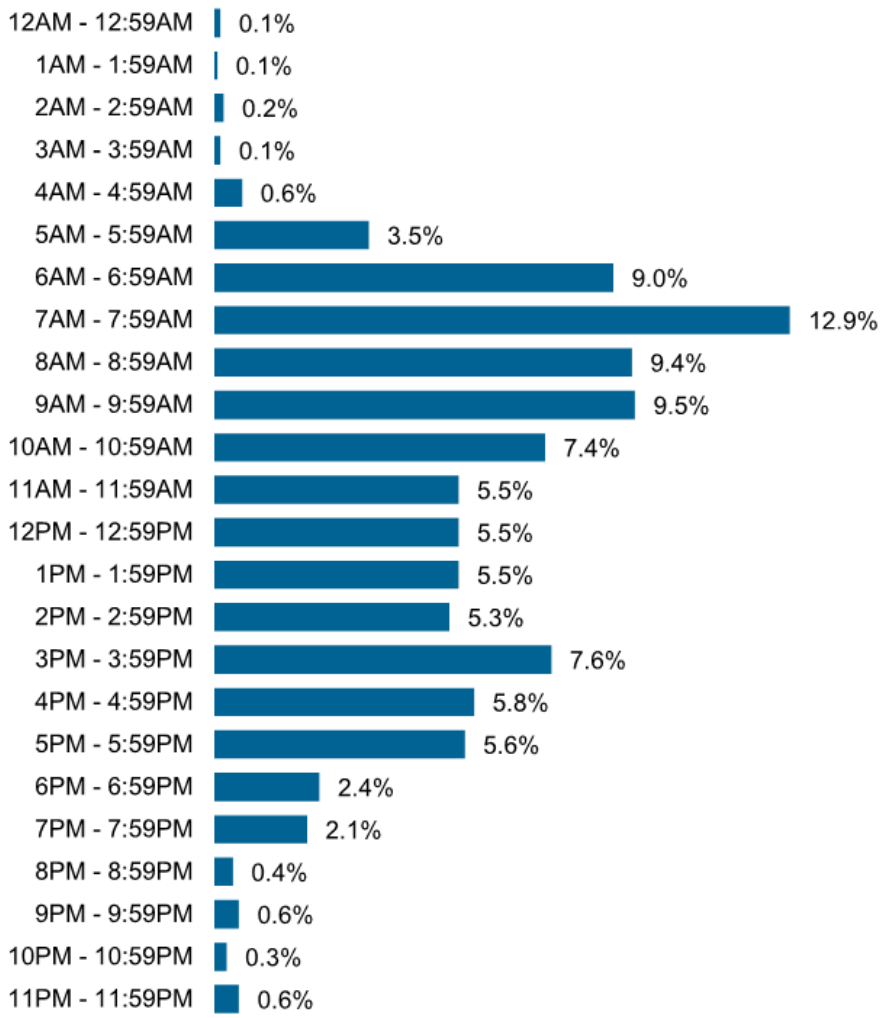
The trip destinations presented in **Figure 4-7** show a similar distribution of trips, with a greater proportion ending in Manhattan and other parts of NYC. As shown, trips with origins and destinations outside the corridor would tend to be longer distance in nature (blue and red dots), particularly those destined to NYC.

Figure 4-7: Map of Trip Destinations by Trip Distance



After reporting the time their trip began (**Figure 4-8**), respondents were asked if they started their trip at a certain time to minimize the impact of congestion. **About one-half** of respondents indicated they change their departure time to avoid delays on the road.

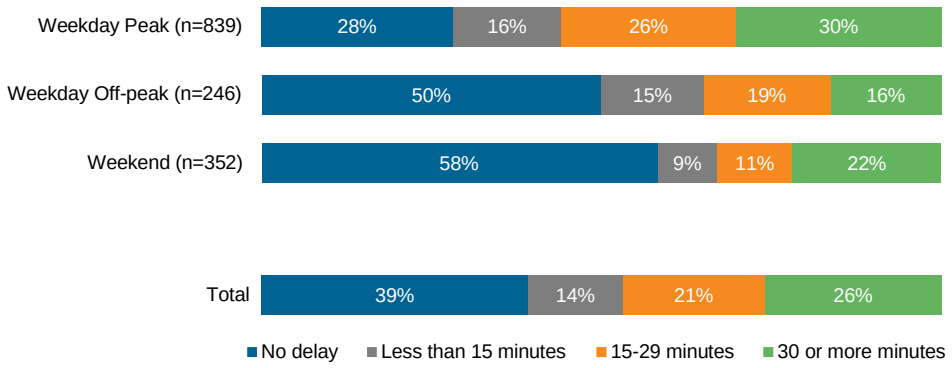
Figure 4-8: Departure Time



Respondents were asked to report the amount of traffic congestion they experienced on I-95 and/or Route 15 during their reference trip. The amount of delay due to traffic congestion is presented for weekday peak, weekday off-peak, and weekend periods in **Figure 4-9**. Overall, about 39% of respondents did not experience any delay during their trip; however, a majority of respondents (72%) who traveled during weekday peak periods reported at least some delay. Twenty-six percent of peak trips reported 15 to 29 minutes of delay and as many as 30% reported more than 30 minutes of delay

caused by congestion. Off-peak and weekend travelers experienced lower amounts of delay than peak period travelers did.

Figure 4-9: Amount of Delay for Weekday Peak, Weekday Off-Peak, and Weekend Periods



Respondents were asked about their perception toward the level of congestion in the study corridor during their trip (**Figure 4-10**). Overall, respondents indicated high levels of perceived congestion in the corridor, with about 89% indicating they experienced some level of congestion. The levels of congestion are worse during the weekday peak periods where as many as 93% of respondents reported some level of congestion and about one-fifth (21%) reported extreme congestion in the corridor.

Figure 4-10: Perceived Congestion

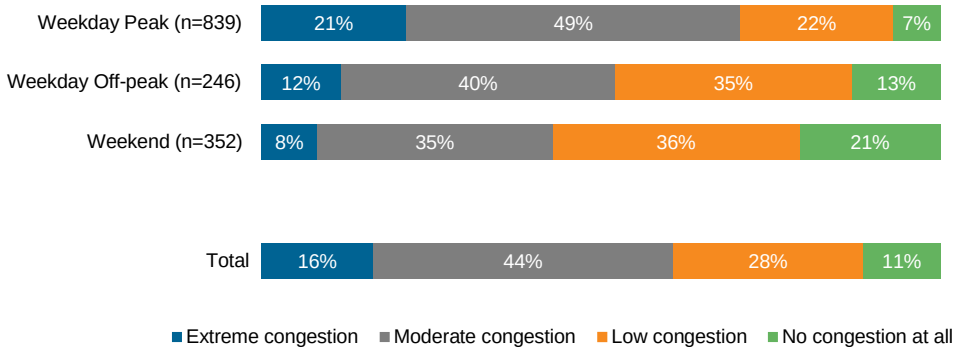
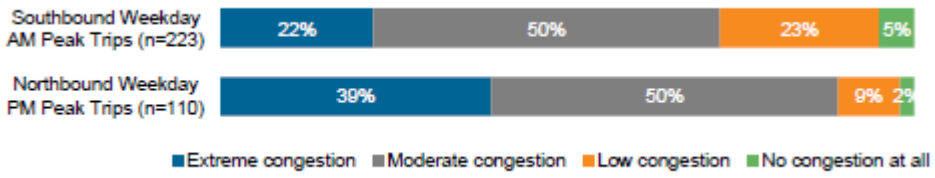


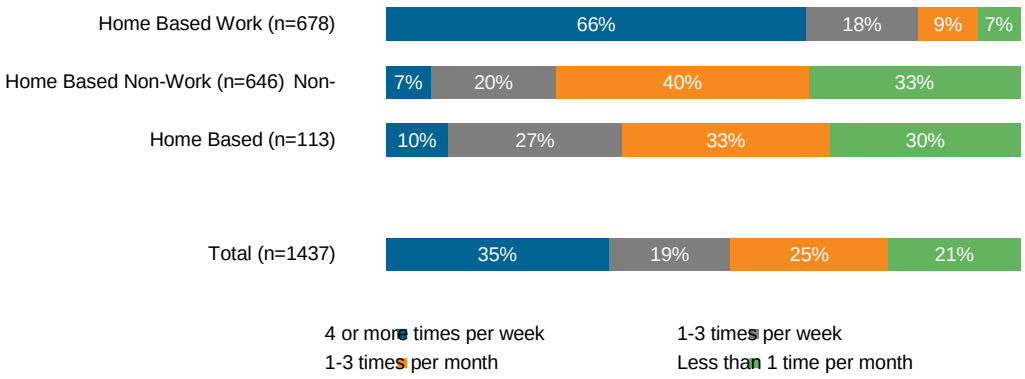
Figure 4-11 shows the directional congestion, as perceived by the travelers who used I-95 during the AM and PM peak period. As evident in the figure, approximately 89% of the northbound weekday PM peak trips perceived moderate to extreme congestion on I-95. For the southbound weekday AM peak trips, perceived congestion levels are less severe with about 72% of these travelers reporting moderate to extreme congestion levels on I-95.

Figure 4-11: Perceived Congestion in the Peak Travel Direction



The frequency of trips is illustrated in **Figure 4-12**. Thirty-five percent of all reported trips are made four or more times per week, although there are significant variations across the different trip purposes. As expected, home-based work trips were the most frequent with 66% percent travelers in this segment indicating they make the same trip at least four times per week.

Figure 4-12: Trip Frequency



Fifty-nine percent of the respondents reported owning an E-ZPass transponder. The E-ZPass ownership rate was quite similar (~60%) across home- based work trips, home-based non-work trips, and non-home-based trips.

Stated Preference Questions – Express Lanes on I-95

Out of the 34,230 total choice experiments administered in the survey, respondents in this study chose the tolled express lanes alternative 5,489 times, which represents 16 percent of all choices. Analysis of the stated preference data is described in more detail later in this chapter.

After completing the trip details portion of the survey, respondents were shown two sets of stated preference exercises, one for each of the congestion pricing strategies being evaluated in the I-95 corridor. The first alternative involved building additional tolled express lanes along I-95. Since the express lanes are proposed to be built only on I-95, this pricing alternative was only seen by respondents who used or could have used I-95 for their reference trip (n=1,385). Respondents then answered five stated preference tradeoff exercises, each tailored to their reported trip. Overall, respondents were more likely to choose the toll-free general purpose lanes alternative, which consisted of 73% of the total 6,925 choices made. The express lanes were chosen 22 percent of the

time, while the express bus option on the I-95 express lanes was only chosen in five percent of scenarios.

Debrief and Opinion Questions

After completing the stated preference scenarios, respondents were asked to answer a series of debrief questions to understand the underlying reasons for their choices during the hypothetical trade-offs. The opinion questions and attitude statements were included to help identify those respondents in the sample who may have responded to the stated preference scenarios in a strategic fashion that does not necessarily reflect how they would actually behave if the express lanes were completed. It is important to note that this is not a public opinion survey and was not designed to be a public opinion survey. As a result, the responses to these statements are not necessarily representative of the general population in the study region and have not been weighted for this purpose.

Opinion of Proposed Express Lanes

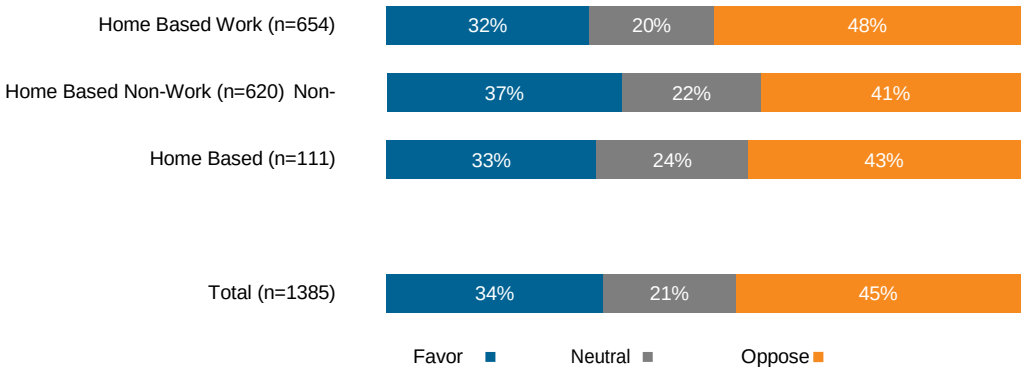
The 46% of respondents who never chose the express lanes alternative were asked to provide the primary reason for their choices. Of these respondents, over half (54%) said the time savings presented were not worth the toll cost and 19% said the toll cost on the express lanes was too high. Next, respondents were asked under what scenario(s) they would be likely to use the tolled express lanes on I-95. Nearly half of the respondents said they will use the express lanes if they are worried about arriving somewhere on time, such as going to airport, etc. The other frequently cited reasons include, "going to an important meeting or event," "running late for work," and "running late to an appointment or meeting." As shown in **Table 4-2**, 19% said they would never use the express lanes.

Next, respondents provided their opinion of the proposed express lanes on I-95. More respondents were opposed to the project than in favor of it, with 45% overall opposing the project and 34% indicating support. Twenty-one percent indicated a neutral opinion. Support was highest (but still modest) among the home-based non-work segment and lowest for home-based work respondents **(Figure 4-13)**. Of those travelers who favored the Express Lanes on I-95, the most frequently cited reason for favoring the project was faster travel times in the proposed Express Lanes (73% of 478 respondents). Of the travelers who opposed the project, the most frequently cited reason for opposing the project was "opposed to paying tolls on I-95 in general" (56% of 619 respondents).

Table 4-2: Reasons for Using the Express Lanes

Reason	Count	Percent
Worried about arriving somewhere on time like going to the airport, etc.	683	49%
Going to an important meeting or event	515	37%
Running late for work	471	34%
Running late to an appointment or meeting	464	34%
I will never use the Express Lanes	265	19%
Other	147	11%
Running late for day care	97	7%
Total	**1,385**	**N/A**

Figure 4-13: Opinion of Express Lanes on I-95



Stated Preference Questions – Congestion Pricing on All Lanes

All respondents were shown stated preference experiments related to the second congestion pricing option that involved all electronic tolling across all lanes on I-95 and/or Route 15. Similar to the express lanes experiments, respondents answered five stated preference tradeoff exercises, each tailored to their reported trip. Respondents saw up to five alternatives based on the road(s) used, trip departure time, and whether they could use the Metro North Railroad for their reported trip. Overall, respondents were more likely to choose the toll free alternative, which consisted of 59% of the total 7,185 choices made. 23 percent of the time the toll option was chosen for their current route (I-95 or Route 15), while the Metro North Railroad alternative was only chosen in six percent of experiments where it was available. **Table 4-3** shows the number of times each alternative was presented in the stated preference experiments and the number of times each alternative was selected.

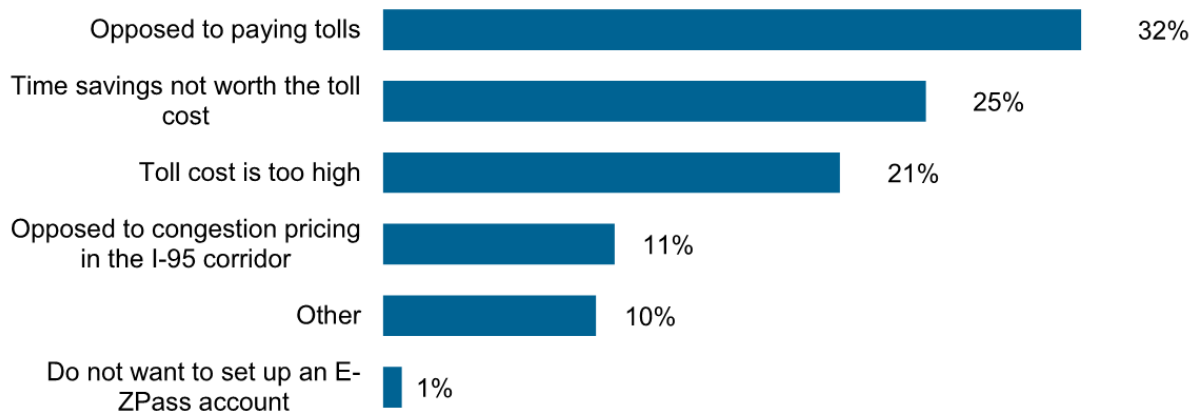
Table 4-3: Stated Preference Choices by Alternative – Congestion Pricing on All Lanes

Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1: I-95/Route 15 (Current route – tolled)	7,185	1,673	23%
Alternative 2: Route 15 (Alternate route – Tolled)	2,505	157	6%
Alternative 3: I-95/Route 15 before or after the peak	4,020	740	18%
Alternative 4: Alternate toll-free route	7,185	4,250	59%
Alternative 5: Metro North Railroad	6,275	365	6%

Opinion of Proposed Congestion Pricing on All Lanes

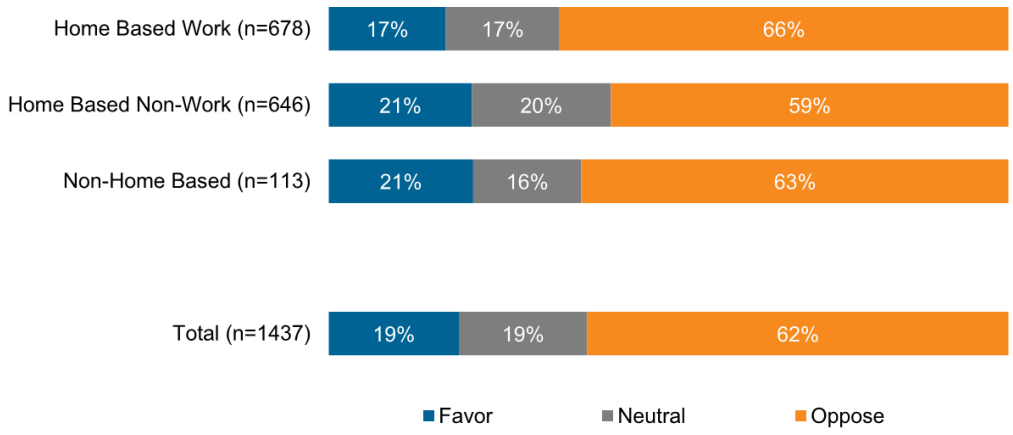
If a respondent never chose the tolled I-95 or Route 15 alternative in the stated preference scenarios, they were asked to indicate the primary reason for not selecting it. The option most frequently cited (32% of 694 respondents who never selected the tolled I-95 or Route 15 alternative) was "Opposed to paying tolls" (**Figure 4-14**).

Figure 4-14: Primary Reason for Not Selecting Tolled Route Alternative



Next, respondents provided their opinion about implementing congestion pricing on all lanes in the I-95 corridor. Opposition to this pricing strategy was comparatively higher (62%) than the opposition for the express lanes strategy, with only 19% of respondents indicating support for the tolling all lanes alternative. **Figure 4-15** shows the project opinion for the different market segments. This reaction is not surprising given that most folks would assume they would be tolled while still sitting in congestion under the tolling all lanes option, while in reality the purpose of congestion pricing would be to provide some level of congestion relief. Acceptance of express toll lanes is typically always higher since this provided drivers with an option of doing what they do today or driving in a new toll lane, while tolling existing lanes is viewed as taking something away from what drivers have today.

Figure 4-15: Project Opinion – Congestion Pricing on All Lanes



Respondents reported how they would change the number of trips they make in the future if pricing were implemented in the I-95 corridor given a certain travel time and toll cost. Overall, 35% of respondents indicated that they would reduce the number of trips they make in the future and 59% indicated that they would not change their current number of trips (**Figure 4-16**). Home-based work trips were less likely to be reduced than trips for home-based non-work and non-home-based trips. A regression analysis was conducted using the trip suppression data to identify trip reduction rates under different travel time and toll cost conditions. Chapter 5 discusses how this methodology was implemented and reflected in the model trip tables.

Debrief and Opinion Questions - General

All respondents were asked what type of improvements they would like to see from the toll revenue generated from the I-95 corridor if congestion pricing were implemented. As presented in **Table 4-4**, a majority of the respondents (64%) preferred improvements to I-95, 35% preferred improvements to Route 15, and 32% preferred improvements to Metro North Railroad.

After respondents had completed both sets of exercises, they were asked which of the two alternatives they would prefer to relieve congestion in the I-95 corridor. Forty-six percent of respondents who saw both pricing alternatives indicated that they would prefer adding express lanes to I-95, whereas only 11% were in favor of tolling all lanes on I-95 and/or Route 15. An additional, 30% indicated that they do not like either of the two pricing alternatives (**Figure 4-17**).

Figure 4-16: Trip Suppression/Induction – Congestion Pricing on All Lanes

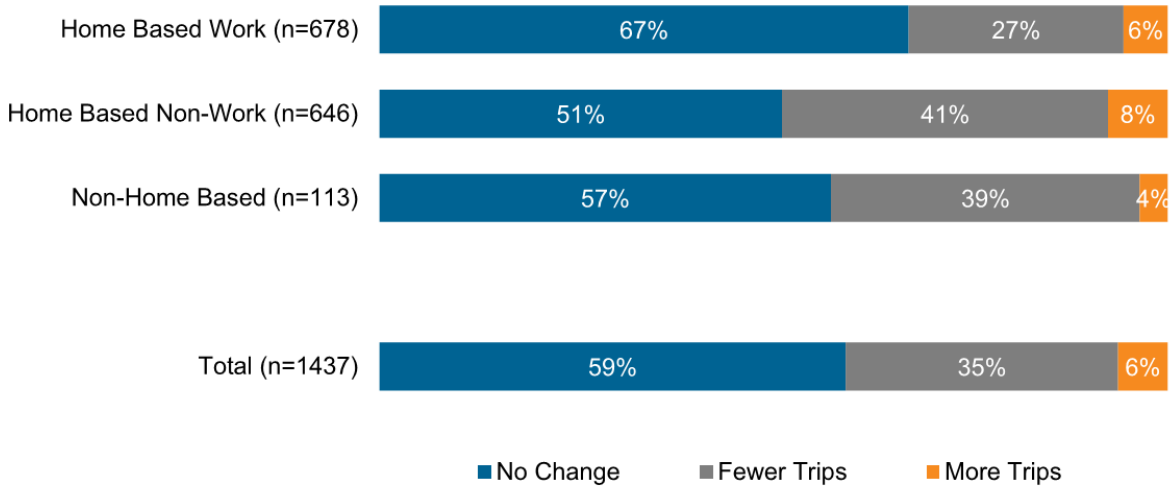
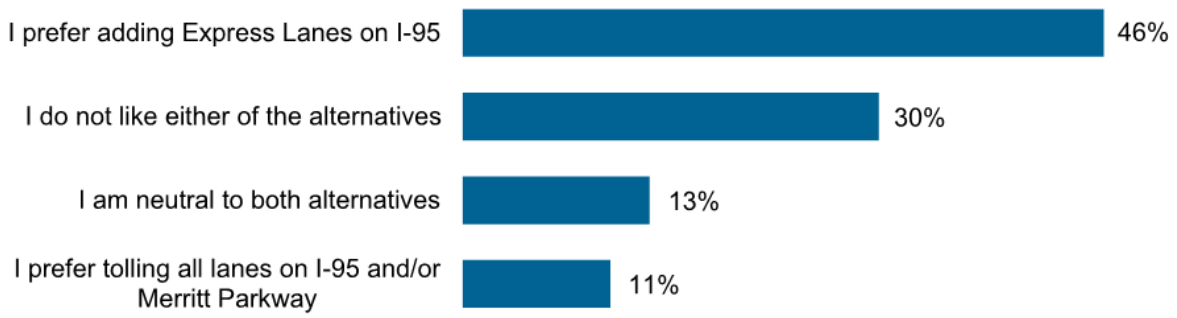


Table 4-4: Preferred Types of Improvements from Toll Revenue (Select all that Apply)

Options	Count	Percent
Improvements to I-95	924	64%
Improvements to Route 15	511	35%
Improvements to Metro North Rail road service and parking	467	32%
I don't have a preference	240	17%
Improvements to bus service (including Express Bus service)	177	12%
Total	**1,437**	**N/A**

Figure 4-17: Preferred Congestion Pricing Alternative



The debrief section concluded with a series of statements related to respondents' attitudes toward highway tolling in general, and toward the use of toll revenue in particular. Respondents were asked to indicate the level with which they agree or disagree with the statements on a five-point scale. **Figure 4-18** shows their attitudes related to highway tolling. Fifty-six percent of respondents indicated they would use a toll route if the tolls were reasonable and they saved time, while 27% disagreed with the statement. Fifty-three percent indicated that they would be willing to pay a reasonable toll if it guarantees a travel time and 46% indicated they support the use of tolls to pay for highway improvements. Respondents' attitudes were less favorable towards increased or new taxes to pay for highway or transit improvements. A minority (26%) agreed that they would support increased or new taxes to pay for highway and/or transit improvements.

Figure 4-18: Attitudes Toward Tolls and Taxes

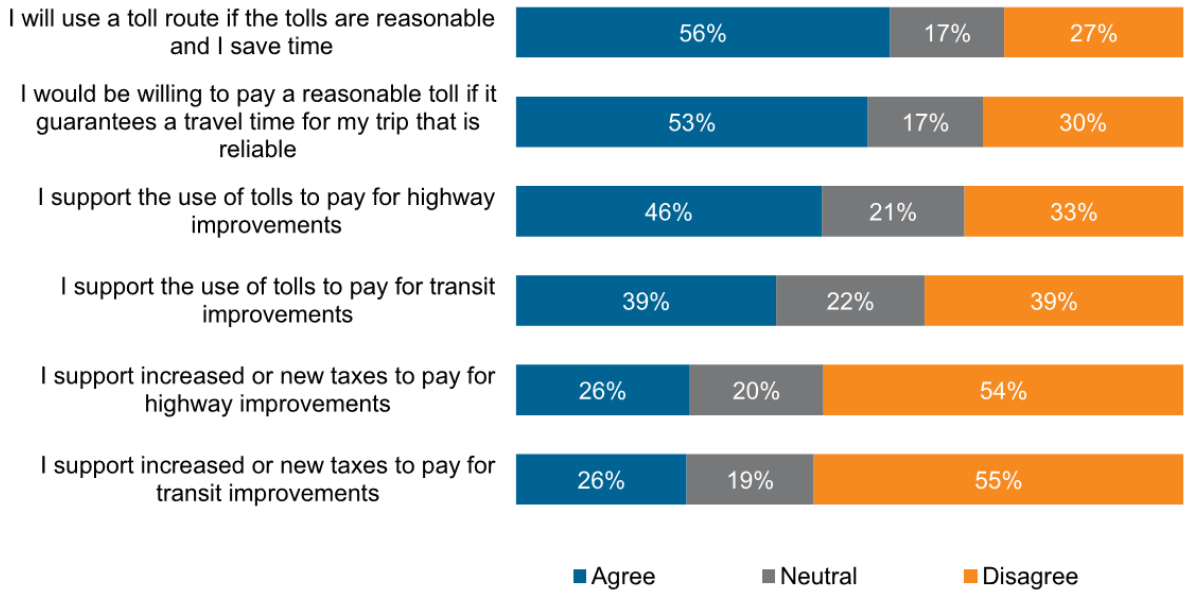
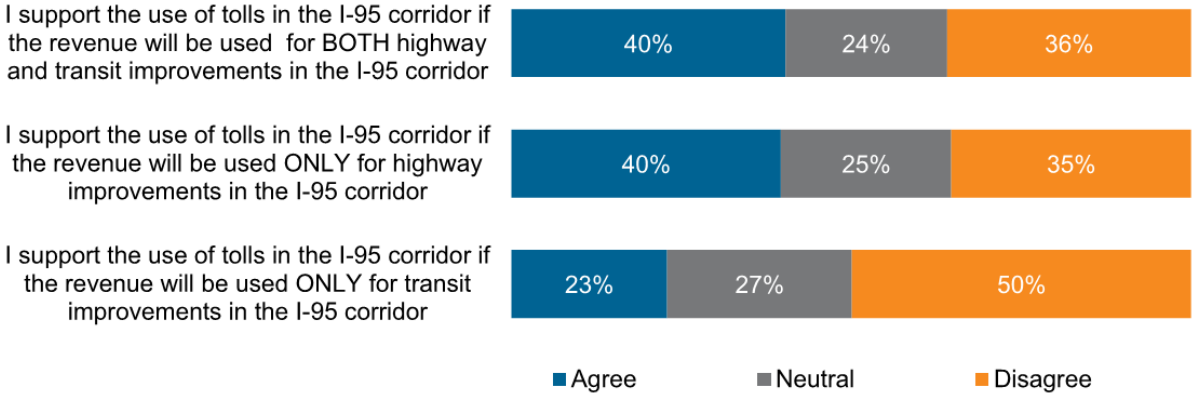


Figure 4-19 shows the attitudes toward use of toll revenue in the I-95 corridor. Respondents agreed more (40%) with the statement related to the use of toll related revenue from the I-95 corridor for both highway and transit improvements in the corridor as opposed to using the revenue only for transit improvements.

Figure 4-19: Attitudes Toward Use of Toll Revenue



Demographic Questions

The last section of the survey collected traveler demographics such as home ZIP code, gender, age, employment status, and household income. The dataset covers a wide range of ages, with most

respondents in the 45-54 year-old group. There was an even split between male and female respondents. Thirty-seven percent of respondents live in a two-person household (the most commonly-selected category) and 48% of all respondents have two household vehicles. About 64% of respondents were employed full time while another 9% were employed part time. **Figure 4-20** shows the distribution of annual household income for respondents who reported it; the median household income falls into the $100,000-124,999 range.

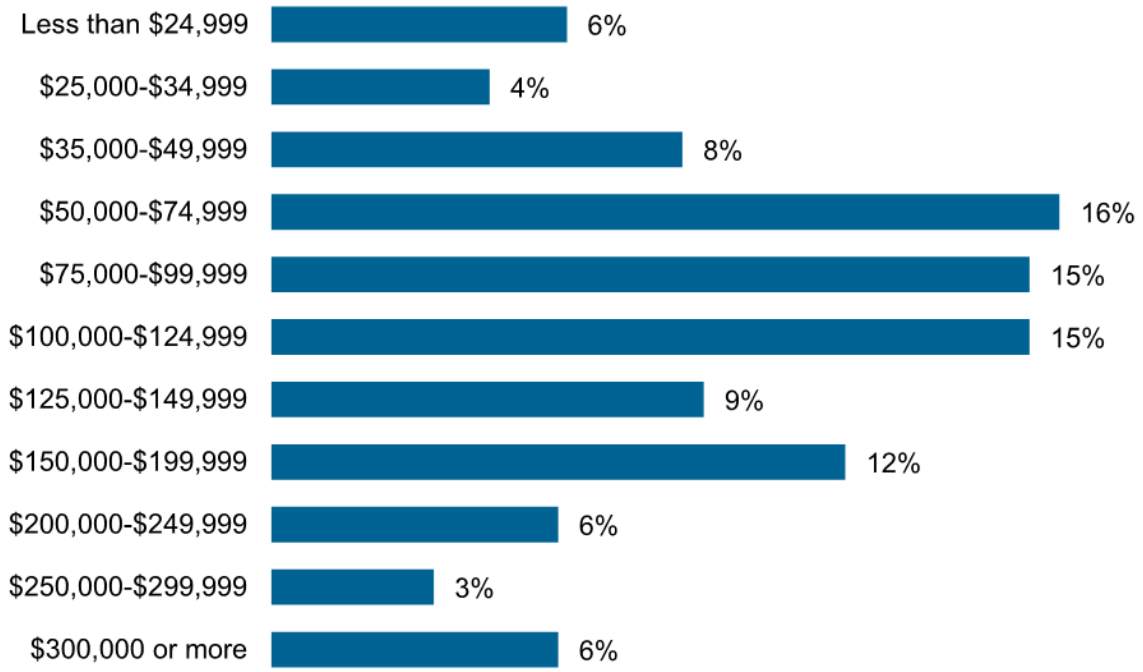
Commercial Vehicle Survey Results

A total of 291 respondents completed the commercial vehicle survey. The number of records was reduced to 235 after completing data checks and outlier analysis as described above. The descriptive analysis of the data presented here is based on the 235 respondents who were included in the final model estimation. The results are presented in four parts: trip detail questions, stated preference questions, debrief and opinion questions, and company information questions.

Screening and Trip Detail

In order to qualify for the survey, travelers must have used at least a portion of the I-95 study corridor between New Haven and New York. Fifty-two percent of all commercial vehicle respondents were fleet drivers and a further 27% were owner-operators. A majority (60%) made their own routing decisions, while about 26% made some, but not all routing decisions. Eighty-five percent of trips were single-day trips and 83% of all trips were less than 500 miles in total length. Over half (59%) of all trips were at least six hours in total travel time.

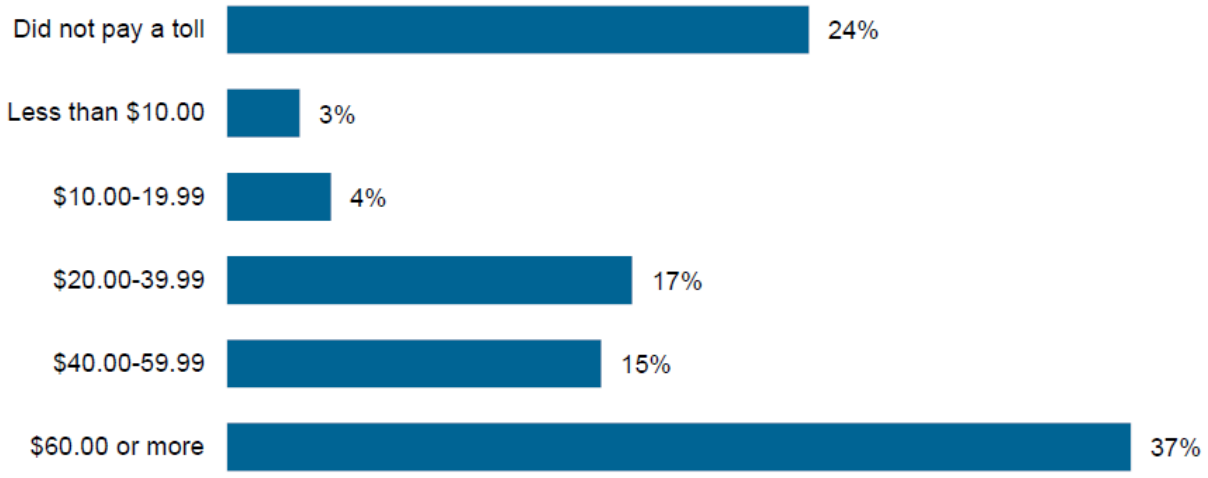
Figure 4-20: Annual Household Income



Respondents were asked what time of day their trip originated. Approximately 38% of respondents reported a peak period trip i.e., a trip in the AM peak period (6:00-9:59 AM) or in the PM peak period (3:00-6:59 PM), while a majority (62%) trips originated during off-peak periods or during weekends. When asked about whether commercial respondents experienced any delay due to traffic congestion on I-95 during their reference trip, nearly three-fourth (73%) of respondents said yes, indicating a considerable amount of congestion in the corridor.

Most truck drivers reported to paying a toll on their trip (76%). Of those who reported paying a toll, the average amount paid was $60.00 with a median amount of $58.00. **Figure 4-21** shows the amount all drivers paid in tolls. Thirty-seven percent of drivers reported paying $60.00 or more on their reference trip. This is not surprising as many respondents reported a long distance trip through states with numerous toll facilities.

Figure 4-21: Toll Amount Paid



The large majority of respondents reported driving a 5-axle vehicle (72%). Respondents were asked how often they make this particular trip; 61% of drivers reported they make the same trip as their reference trip one or more times per week. When asked if they use any alternate routes to I-95 when making the same trip, 65% reported using I-84, but a much small number (6%) indicated using local city streets instead of I-84 or I-684 (**Table 4-5**). Most drivers indicated that they have an electronic transponder to pay for tolls (73%).

Table 4-5: Use of Alternate Routes to I-95 (Select all that Apply)

Alternate Routes	Count	Percent
I sometimes use I-84 to make this same trip	152	65%
I do not use any alternate routes	69	29%
I sometime use I-684 to make this same trip	48	20%
I sometimes use local or city streets to make this same trip	13	6%
Total	**235**	**N/A**

Stated Preference Questions

After completing the trip information portion of the survey, respondents answered ten stated preference tradeoff exercises, each tailored to their reported trip. Overall, respondents were more likely to choose the toll free alternative, comprising approximately 65 percent of the 2,350 choices made. Thirty-nine percent of respondents chose both the toll free and the tolled option at least once during the ten exercises. Thirty-nine percent always chose the toll free route and the final twenty-two percent always chose the tolled option.

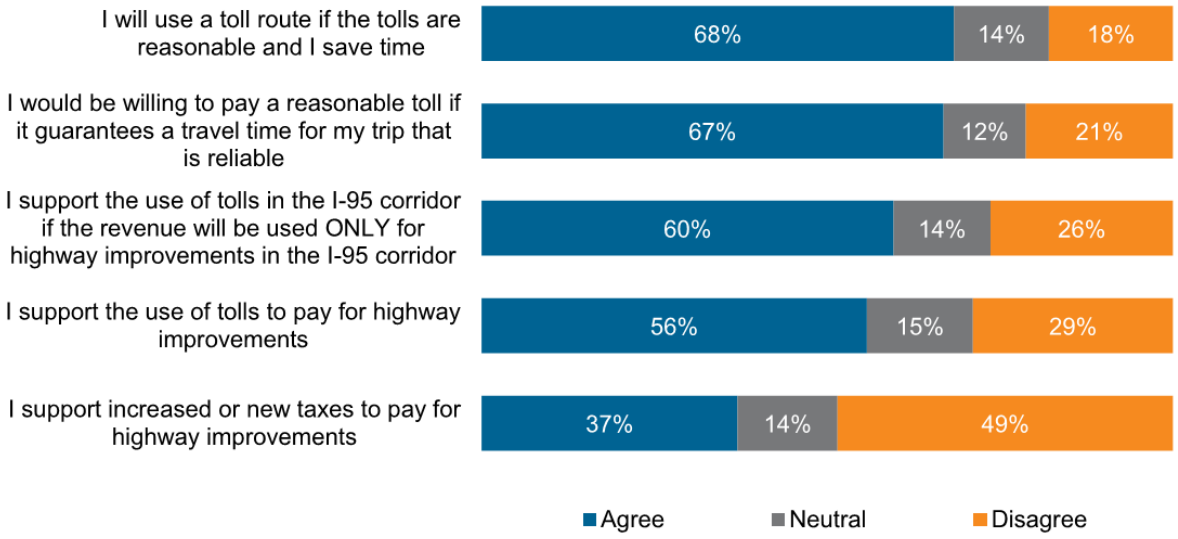
Debrief and Opinion Questions

After completing the stated preference tradeoff exercises, respondents were asked to answer a set of debrief questions aimed at better understanding the reasoning behind their choices. The 92 respondents (39% of the sample) who never chose the I-95 alternative were asked to provide the primary reason for never selecting it. 28% indicated that the toll cost is too high as their primary reason. A further 22% indicated that time savings are not worth the toll cost as their primary reason. Next, respondents provided their opinion of the tolling of I-95. Nearly two-third (62%) of respondents were somewhat or strongly opposed, while about one-fifth (18%) were somewhat or strongly in favor.

The most common reason for favoring the I-95 project was 'less congestion' and 'shorter travel time' (56% and 44%, respectively). Almost 45% who opposed the tolling cited that they are fine with the current traffic situation as the primary reason.

Finally, when presented with a series of questions regarding their attitudes concerning tolls, respondents were most likely to indicate that they would use a toll route if the tolls are reasonable and they will save time. Conversely, respondents were most likely to disagree to supporting increased or new taxes to pay for highway improvements (**Figure 4-22**).

Figure 4-22: Attitudes Toward Tolls and Taxes



Company Information Questions

The last section of the commercial vehicle survey collected company information. Fifty-four percent of travelers indicated that their company's base of operations is located outside Connecticut, but within the U.S. Respondents were asked to provide an estimate of average trip length. Typical trip length for their trips was at least 500 miles for 56% of the sample.

Drivers were employed by companies which varied in size; 29% of respondents worked for trucking companies that were large in scale with 500 or more vehicles, while 20% worked for companies operating fleets of 19 or less vehicles.

Respondents reported how much flexibility they have in their delivery schedule. Three-quarters reported having a flexible delivery schedule with over one-fourth (27%) of those respondents reporting having six or more hours of flexibility. Fifty-three percent did not have any form of incentive or penalty time structure for deliveries. Finally, respondents reported how toll costs, if incurred, are paid. Seventy-two percent reported that their companies pay tolls directly using EZTAG or other electronic transponder. Twelve percent of respondents reported that they paid for tolls themselves directly out-of-pocket.

Model Estimation

The primary objective of the SP survey was to estimate the values of time (VOT) for passenger and commercial vehicle travelers who make trips in the I-95 corridor between New Haven, CT and New York. These VOT estimates will support estimates of traffic and revenue for both of the proposed congestion pricing strategies in the corridor. The choice observations for each respondent were compiled into datasets to support the estimations of VOT for the different vehicle classifications and tolling scenarios.

The statistical estimation and specification testing were completed using a conventional maximum likelihood procedure that estimated a set of coefficients for a multinomial logit (MNL) model. Separate models were estimated for passenger vehicle respondents and commercial vehicle respondents. The

model coefficients provide information about the respondents' sensitivities to the attributes that were tested in the tradeoff scenarios, such as travel time and toll cost. The sensitivities will serve as inputs into a regional travel demand model to forecast behavioral response, traffic, and revenue for the proposed pricing scenarios.

Value of Time

One way to evaluate the sensitivities that are estimated in the MNL models is to calculate the marginal rates of substitution for different attributes of interest. In basic economic theory, the marginal rate of substitution is the amount of one good (e.g., money) that a person would exchange for a second good (e.g., travel time), while maintaining the same level of utility, or satisfaction. In this analysis, the marginal rate of substitution of the travel time and toll cost coefficients provides the implied toll value that travelers would be willing to pay for a given travel time savings offered on the proposed express lanes.

Table 4-6 through Table 4-8 present the passenger vehicle values of time for the strategy of adding express lanes on I-95 for home-based work, home-based non-work, and non-home-based trips by household income and trip distance. **Table 4-9 through Table 4-11** show the estimated passenger vehicle values of time for the congestion pricing on all lanes strategy for home-based work, home-based non-work, and non-home-based trips by household income and trip distance. **Table 4-12** presents the commercial vehicle values of time for the tolling all lanes scenario by vehicle size (number of axles).

Table 4-6: Passenger Vehicle Express Lanes VOT ($/hour) – Home-Based Work Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$13.97	$15.45	$16.38	$17.08	$17.64	$18.12
$30,000	$14.98	$16.56	$17.57	$18.31	$18.92	$19.42
$42,500	$15.48	$17.12	$18.16	$18.93	$19.56	$20.08
$62,500	$16.05	$17.74	$18.82	$19.62	$20.26	$20.81
$87,500	$16.53	$18.28	$19.39	$20.22	$20.88	$21.44
$112,500	$16.90	$18.69	$19.82	$20.66	$21.34	$21.91
$137,500	$17.19	$19.01	$20.16	$21.02	$21.71	$22.29
$175,000	$17.54	$19.40	$20.57	$21.45	$22.15	$22.75
$225,000	$17.91	$19.80	$21.00	$21.89	$22.61	$23.22
$275,000	$18.20	$20.12	$21.34	$22.25	$22.98	$23.60
$350,000	$18.55	$20.51	$21.75	$22.68	$23.42	$24.05

Table 4-7: Passenger Vehicle Express Lanes VOT ($/hour) – Home-Based Non-Work Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$14.85	$16.43	$17.42	$18.16	$18.76	$19.26
$30,000	$15.93	$17.61	$18.68	$19.47	$20.11	$20.65
$42,500	$16.46	$18.20	$19.31	$20.13	$20.79	$21.35
$62,500	$17.06	$18.86	$20.01	$20.86	$21.54	$22.12
$87,500	$17.58	$19.44	$20.62	$21.49	$22.20	$22.79
$112,500	$17.97	$19.87	$21.07	$21.97	$22.69	$23.30
$137,500	$18.28	$20.21	$21.43	$22.35	$23.08	$23.70
$175,000	$18.65	$20.62	$21.87	$22.80	$23.55	$24.18
$225,000	$19.04	$21.05	$22.33	$23.28	$24.04	$24.69
$275,000	$19.35	$21.39	$22.69	$23.66	$24.43	$25.09
$350,000	$19.72	$21.81	$23.13	$24.11	$24.90	$25.57

Table 4-8: Passenger Vehicle Express Lanes VOT ($/hour) – Non-Home-Based Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$16.47	$18.21	$19.31	$20.13	$20.79	$21.35
$30,000	$17.65	$19.52	$20.70	$21.58	$22.29	$22.89
$42,500	$18.25	$20.18	$21.40	$22.31	$23.05	$23.66
$62,500	$18.91	$20.91	$22.17	$23.12	$23.88	$24.52
$87,500	$19.49	$21.55	$22.85	$23.82	$24.61	$25.27
$112,500	$19.92	$22.02	$23.35	$24.35	$25.15	$25.82
$137,500	$20.26	$22.40	$23.76	$24.77	$25.58	$26.27
$175,000	$20.67	$22.86	$24.24	$25.27	$26.11	$26.80
$225,000	$21.10	$23.33	$24.75	$25.80	$26.65	$27.36
$275,000	$21.45	$23.71	$25.15	$26.22	$27.08	$27.81
$350,000	$21.86	$24.17	$25.63	$26.73	$27.60	$28.34

Table 4-9: Passenger Vehicle Congestion Pricing on All Lanes VOT ($/hour) – Home-Based Work Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$9.22	$10.82	$11.87	$12.68	$13.35	$13.92
$30,000	$10.22	$11.98	$13.16	$14.06	$14.80	$15.43
$42,500	$10.76	$12.62	$13.85	$14.80	$15.58	$16.25
$62,500	$11.39	$13.36	$14.66	$15.67	$16.49	$17.20
$87,500	$11.97	$14.04	$15.41	$16.47	$17.34	$18.08
$112,500	$12.43	$14.57	$16.00	$17.09	$17.99	$18.76
$137,500	$12.80	$15.01	$16.48	$17.61	$18.53	$19.33
$175,000	$13.27	$15.56	$17.08	$18.25	$19.21	$20.03
$225,000	$13.77	$16.15	$17.73	$18.94	$19.94	$20.79
$275,000	$14.18	$16.63	$18.26	$19.51	$20.54	$21.42
$350,000	$14.70	$17.24	$18.92	$20.22	$21.28	$22.19

Table 4-10: Passenger Vehicle Congestion Pricing on All Lanes VOT ($/hour) – Home-Based Non-Work Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$9.86	$11.57	$12.70	$13.56	$14.28	$14.89
$30,000	$10.93	$12.81	$14.07	$15.03	$15.82	$16.50
$42,500	$11.50	$13.49	$14.81	$15.82	$16.66	$17.37
$62,500	$12.18	$14.28	$15.68	$16.75	$17.64	$18.39
$87,500	$12.80	$15.01	$16.48	$17.61	$18.54	$19.33
$112,500	$13.29	$15.58	$17.11	$18.28	$19.24	$20.06
$137,500	$13.69	$16.05	$17.62	$18.83	$19.82	$20.67
$175,000	$14.18	$16.64	$18.26	$19.51	$20.54	$21.42
$225,000	$14.72	$17.27	$18.95	$20.25	$21.32	$22.23
$275,000	$15.17	$17.79	$19.53	$20.86	$21.96	$22.90
$350,000	$15.72	$18.43	$20.24	$21.62	$22.76	$23.73

Table 4-11: Passenger Vehicle Congestion Pricing on All Lanes VOT ($/hour) – Non-Home-Based Trips

Income	Distance (miles)					
	15	30	45	60	75	90
$15,000	$10.24	$12.00	$13.18	$14.08	$14.82	$15.46
$30,000	$11.34	$13.30	$14.60	$15.60	$16.42	$17.12
$42,500	$11.94	$14.00	$15.37	$16.43	$17.29	$18.03
$62,500	$12.64	$14.83	$16.28	$17.39	$18.31	$19.09
$87,500	$13.29	$15.58	$17.11	$18.28	$19.24	$20.06
$112,500	$13.79	$16.18	$17.76	$18.97	$19.97	$20.83
$137,500	$14.21	$16.66	$18.29	$19.54	$20.57	$21.45
$175,000	$14.72	$17.27	$18.96	$20.25	$21.32	$22.23
$225,000	$15.28	$17.92	$19.67	$21.02	$22.13	$23.07
$275,000	$15.74	$18.46	$20.27	$21.65	$22.79	$23.77
$350,000	$16.31	$19.13	$21.00	$22.44	$23.62	$24.63

Table 4-12: Commercial Vehicle Congestion Pricing on All Lanes VOT ($/hour)

Number of Axles	VOT ($/hr.)
2	$22.29
3	$37.75
4	$46.79
5	$53.20
6	$58.18
7	$62.24
8	$65.68

Trip Suppression

In addition to the multinomial logit models, linear regression models were estimated to forecast trip reduction rates for passenger vehicles under the proposed congestion pricing on all lanes strategy. These models were estimated for the same traveler segments as the MNL models: home-based work, home-based non-work, and non-home-based trips.

Table 4-13 through Table 4-15 present the resulting trip suppression rates by travel time and toll cost differences at an annual household income of $114,000 and a trip distance of 51 miles, the average values for the sample. The regression results show no trip reduction if current conditions are maintained (i.e. the facility remains toll-free and travel conditions do not change). However, as toll costs increase, trip reduction rates increase. The amount of reduction varies by trip type; home- based work trips show the least amount of reduction while home-based non-work trips show the greatest amount of reduction. This trip reduction is offset somewhat if the congestion pricing results in a reduction in delay and improvement in travel times in the corridor. For example, given the

combination of a $2.00 toll and a 15-minute reduction in travel time, the regression results indicate there would be no reduction in the total number of vehicle trips in the I-95 corridor.

Table 4-13: Home-Based Work Trip Suppression

Toll Difference	Travel Time Difference (min)			
	0	-10	-15	-20
$0	0.0%	0.0%	0.0%	0.0%
$2	2.8%	0.0%	0.0%	0.0%
$4	5.5%	1.7%	0.0%	0.0%
$6	8.3%	4.5%	2.6%	0.7%
$8	11.1%	7.3%	5.4%	3.5%

Values calculated at a household income of $114,000 and trip distance of 51 miles

Table 4-14: Home-Based Non-Work Trip Suppression

Toll Difference	Travel Time Difference (min)			
	0	-10	-15	-20
$0	0.0%	0.0%	0.0%	0.0%
$2	4.8%	0.0%	0.0%	0.0%
$4	9.6%	2.6%	0.0%	0.0%
$6	14.4%	7.4%	3.8%	0.3%
$8	19.3%	12.2%	8.6%	5.1%

Values calculated at a household income of $114,000 and trip distance of 51 miles

Table 4-15: Non-Home-Based Work Trip Suppression

Toll Difference	Travel Time Difference (min)			
	0	-10	-15	-20
$0	0.0%	0.0%	0.0%	0.0%
$2	3.6%	0.0%	0.0%	0.0%
$4	7.1%	1.7%	0.0%	0.0%
$6	10.7%	5.3%	2.5%	0.0%
$8	14.3%	8.8%	6.1%	3.4%

Values calculated at a household income of $114,000 and trip distance of 51 miles

Summary of Stated Preference Survey Findings

RSG successfully developed and implemented two stated preference survey questionnaires that gathered information from 1,437 passenger vehicle travelers and 235 commercial vehicle travelers who use I-95 and/or Route 15 between New Haven, CT and the New York State border. The questionnaires collected data on current travel behavior, presented respondents with information about the proposed congestion pricing scenarios in the corridor, and engaged the travelers in a series of stated preference experiments.

Choice models were developed to produce estimates of values of time for travelers in the region. Separate models were estimated for passenger and commercial vehicle travelers, and for both congestion pricing strategies being evaluated in the corridor. The magnitude and signs of the sensitivity estimates are reasonable and intuitively correct, and the values of time that were estimated are within the ranges found in other major metropolitan areas across the country, although on the higher end of the range. For passenger vehicle travelers, average values of time varied by the type of congestion pricing, trip type, trip distance, and household income, and generally fell within a range of $9/hour to $28/hour. For commercial vehicles, the value of time fell within a range of $22/hour to $66/hour depending on vehicle size.

The estimated VOTs presented here for passenger vehicle travelers are somewhat higher than the VOTs estimated on other tolled highway corridors in the United States. However, the I-95 corridor has several unique characteristics that intuitively support the higher VOT estimates, including the long-distance nature of the corridor with exceptionally high levels of congestion along the entire length, high income levels in many towns along the corridor, and high value of time trips traveling to/from New York City for business or leisure purposes.

Overall, the survey and choice model results indicate that travel time savings and toll costs can have a significant impact on individuals' travel behaviors, including shifting route, mode, and time-of-day, and an overall reduction in trip making.

The results of this SP survey were implemented into the calibrated time of day travel demand model to enhance the evaluation of a range of tolling scenarios and travel conditions related to the proposed implementation of congestion pricing in the corridor. Those toll modeling enhancements are discussed in Chapter 5.

Chapter 5

Model Refinement for Pricing

This chapter provides a summary of the model refinements instituted to reflect the likely behavior responses to value pricing alternatives along the I-95 corridor. The incorporation of the results from the Stated Preference Survey into the updated Connecticut Statewide Travel Demand Model allowed the study team to evaluate a wide range of behavioral responses to various pricing alternatives. The Value of Time, Time of Day Shift, Mode Shift and Trip Suppression results from the Stated Preference Survey were utilized as inputs to the pricing analysis.

Value of Time

The multinomial logit model developed from the stated preference survey is used to calculate the value of time for the different population segments. The marginal rate of substitution of the travel time and toll cost coefficients, in the logit model, provides the implied value that travelers place on their time in terms of their willingness to pay a toll for travel time savings. Value of time was also found to be sensitive to annual household income and travel distance.

Figure 5-1 presents the estimated value of time for congestion pricing across all lanes on I-95. These are categorized for home-based work, home-based non-work, and non-home based trips by household income and trip length.

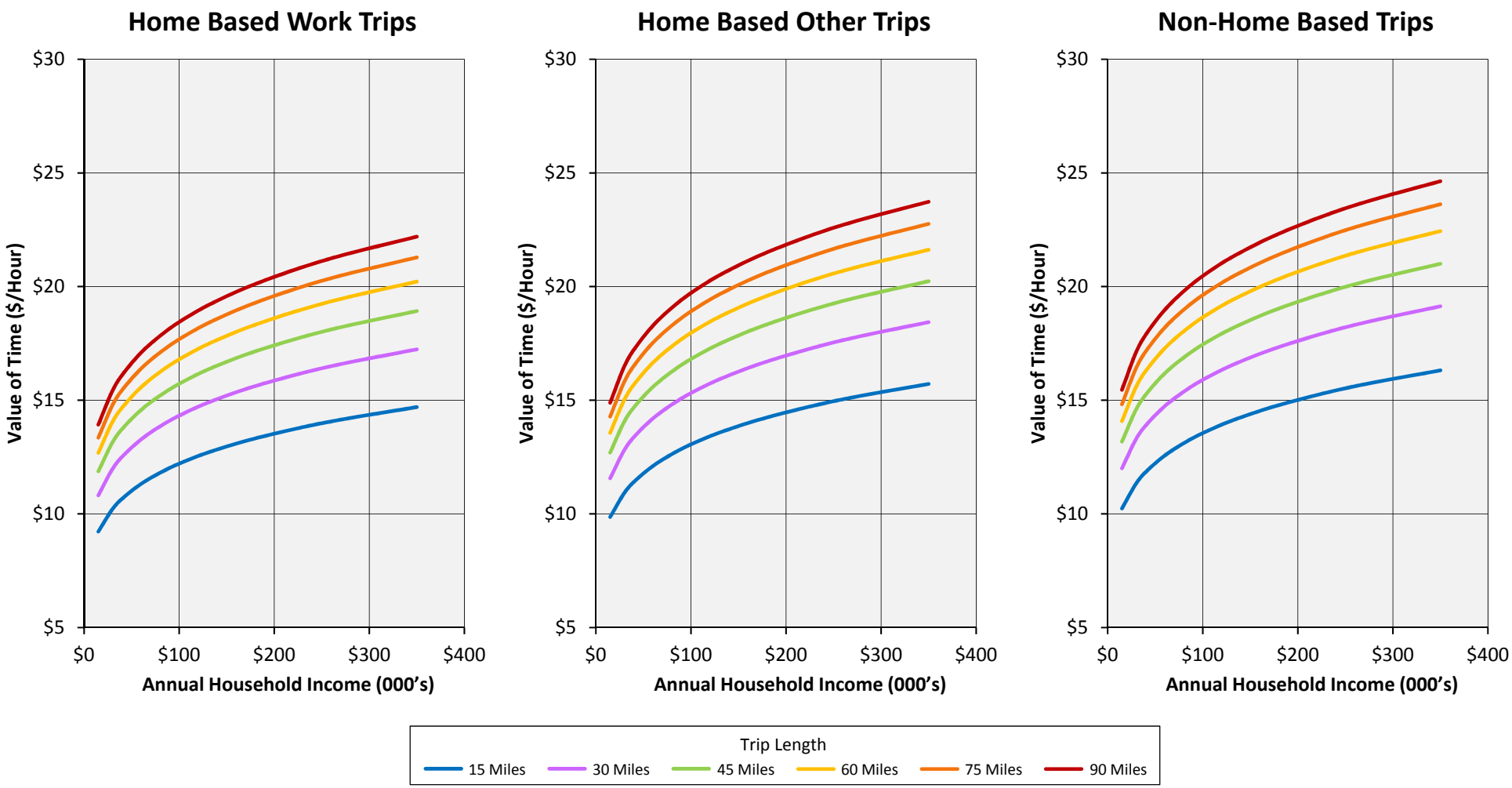
The value of time ranges from a low of $6 per hour for a 15 mile long typical work trip for a low income traveler, to a high of $24 per hour for a 90 mile typical long business trip for a high income traveler. Overall, the value of time for all work trips and all other trips on the I-95 Corridor averaged to $12.50 per hour and $13.50 per hour respectively.

Behavioral Responses to Congestion Pricing Strategies

The congestion pricing strategy across all lanes of a roadway has a set of potential behavioral responses associated with it. Under the priced conditions, travelers may make a number of changes to reduce the amount of the toll that they would have to pay or avoid the toll altogether. For this study, the following five behavioral responses were incorporated into the analysis:

1. Make no change to the trip and pay the toll;
2. Change the departure time and pay a lower toll during the off-peak (Time of Day Shift);
3. Shift the mode (e.g., transit) to avoid the toll (Mode Shift);
4. Change route to avoid the toll (Route Diversion); and
5. Do not make the trip or reduce the frequency of the trip to avoid or reduce the frequency of the toll paid (Trip Suppression).

The behavioral response options for any given pricing strategy depend on the type of pricing and the specific details of the pricing implementation (e.g., differential pricing by time of day). Since all the Alternatives presented in this report assume congestion pricing across all lanes of I-95, or across all



VALUE OF TIME VS. ANNUAL HOUSEHOLD INCOME BY TRIP LENGTH

CDM Smith

FIGURE 5-1

lanes of I-95 and Route 15, all of the behavioral responses mentioned above were incorporated into the traffic and toll revenue modeling.

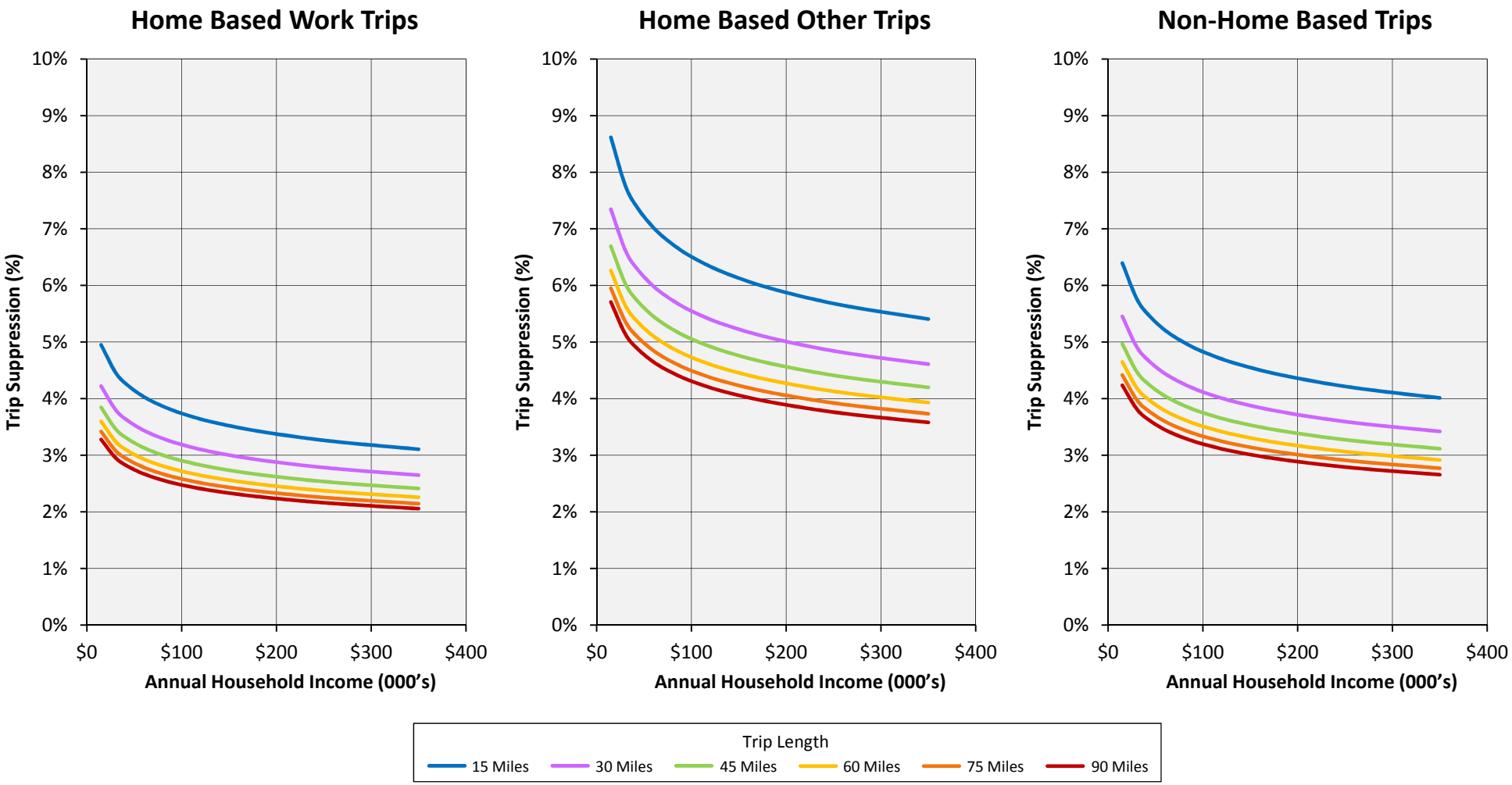
Trip Suppression

Trip suppression recognizes the potential reduction in trips associated with travelers that forgo a trip, combine trips, or eliminate trips by reducing frequency. In order to estimate the potential magnitude of trip suppression in the I-95 corridor, the Stated Preference Survey asked a follow-up question about a respondent's ability to make the same, fewer, or more trips to their destination. If the respondent changed the number of trips, a follow-up question asked to enter the number of trips either reduced or increased. Respondents who changed the number of trips were asked other questions, including what they would do in order to make fewer trips (e.g., change destinations, combine trips, or stay at home). These changes (reductions or increases) were converted to an overall impact in the average number of trips per day that would be reduced along the I-95 corridor under a pricing situation.

Using regression analysis of the responses, the model compared the change in trips made against the change in utility of each trip. The amount of trip reduction depends on the toll and travel time changes that might occur as a result of pricing and distance traveled. As the toll increases, more trips would be suppressed. However, conversely, significant travel time savings from congestion pricing would increase demand for certain types of trips. These trip suppression factors were applied to the trip tables prior to the traffic assignment step of the model.

Figure 5-2 presents computed trip suppression percentages versus median household income categorized for each of three trip purposes for various ranges of trip lengths. As illustrated, home based non-work trips tend to be the most discretionary type of trip and have the highest ability to be reduced when subjected to pricing. Home based work trips exhibit a lower ability to reduce trip making due to pricing than non-work trips. Similar to work trips, non-home based trips (i.e. business trips) when subject to a toll, are also less prone to reduce trip making as compared to the non-work trip purpose.

Table 5-1 presents the estimated I-95 corridor trips during four time periods and by three trip purposes for year 2020. These trips cover the geographical limits between New Haven and New York. Under the toll free condition, there are total of about 664,400 trips estimated for an average weekday. For an average weekday, about one in every three trips is assumed to be a work trip and about half of all trips are assumed to be home-based-other trips. About 50% of the trips are conducted either in the morning or evening peak periods. About 30% trips are made in mid-day hours and about 20% trips are made in the overnight hours.



Note: Trip suppression impact estimates assume $2.00 toll and no improvement in time savings.

TRIP SUPPRESSION VS. ANNUAL HOUSEHOLD INCOME BY TRIP LENGTH

CDM Smith

FIGURE 5-2

Table 5-1
Year 2020 I-95 Estimated Behavior Responses to Congestion Pricing
Trip Suppression Impact
(I-95 Tolling at $0.125 Per Mile Rate During Peak Periods)

I-95 Corridor Trips

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	99,300	42,100	80,500	11,000	232,900
Home Based Other	42,700	113,000	83,300	105,900	344,900
Non-Home Based	8,400	41,600	22,000	14,600	86,600
Total	150,400	196,700	185,800	131,500	664,400

Trip Suppression Net Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	(1,300)	(500)	(1,100)	(200)	(3,100)
Home Based Other	(900)	(1,900)	(1,700)	(2,100)	(6,600)
Non-Home Based	(100)	(500)	(300)	(200)	(1,100)
Total	(2,300)	(2,900)	(3,100)	(2,500)	(10,800)

Trip Suppression Percent Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	-1.3%	-1.2%	-1.4%	-1.8%	-1.3%
Home Based Other	-2.1%	-1.7%	-2.0%	-2.0%	-1.9%
Non-Home Based	-1.2%	-1.2%	-1.4%	-1.4%	-1.3%
Total	-1.5%	-1.5%	-1.7%	-1.9%	-1.6%

For illustrative purposes, the estimated trip suppression impact for a 12.50 cents per mile toll rate for peak periods and 8.75 cents per mile toll for off-peak periods on I-95 is also presented in **Table 5-1**. The home-based-work trips and non-home-based trips show the lowest propensity for trip suppression with a 1.3 percent reduction in trip making, while home-based-other trips showed the highest propensity for trip suppression (1.9% fewer trips). On a time period basis, trip suppression ranges from about -1.5 percent to about -1.9 percent, and averages -1.6 percent an average weekday basis.

Time of Day Shift

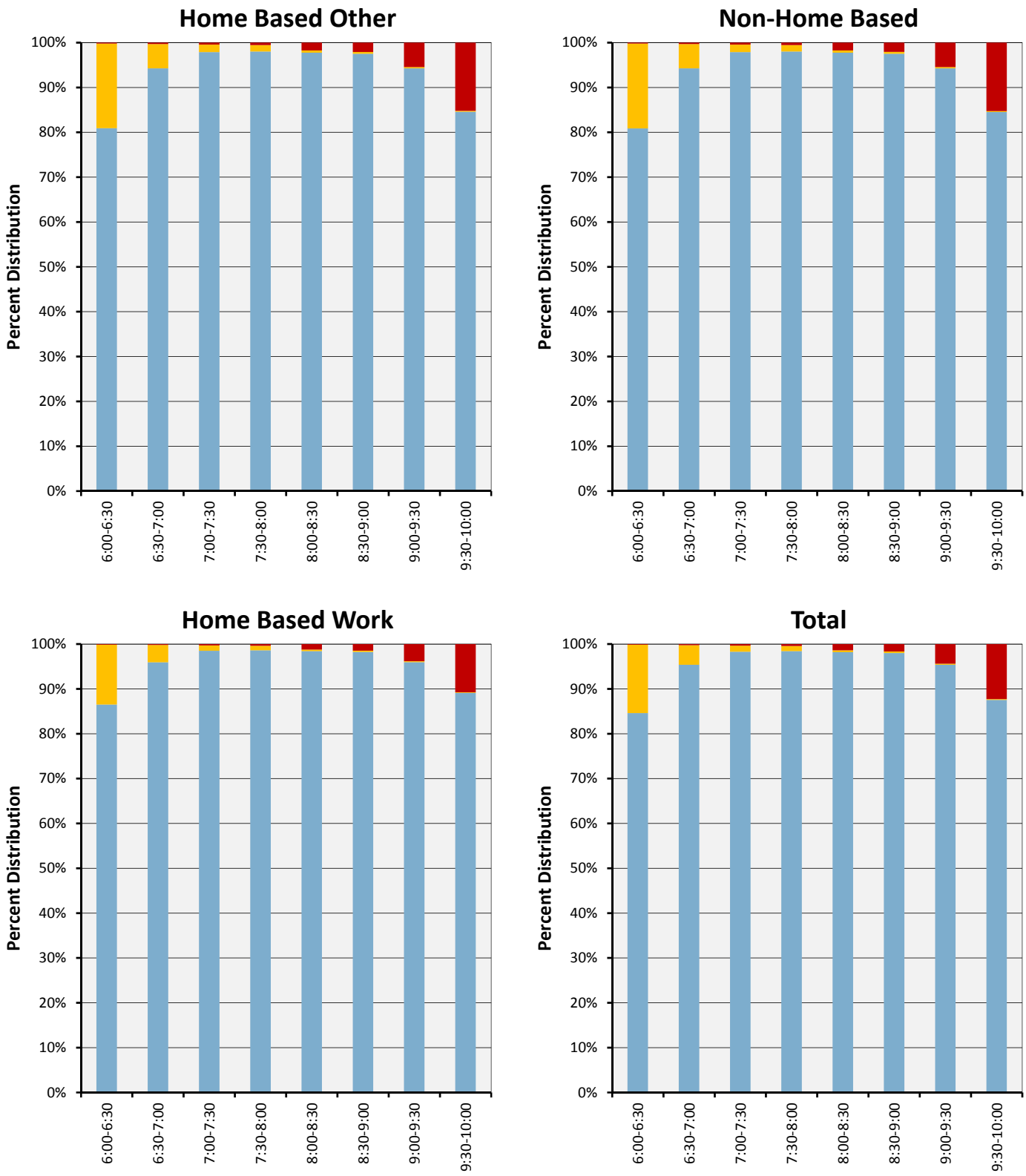
Data from the stated preference survey was used to create time-of-day shift models to estimate drivers' reaction to different hypothetical pricing scenarios. The time-of-day shift models developed for this study have a multinomial logit formulation with utility functions for each travel choice. Variables that were determined to be statistically significant to time-of-day changes in reaction to pricing include:

- Travel Time/Duration – Travel time in the current interval and travel time in an earlier or later interval with lower roadway costs;
- Cost – Roadway costs associated with the pricing scenario (adjusted by income for some trip purposes);
- Time Shift Early – The amount of time needed to shift from the midpoint of the analysis interval to an earlier lower cost period;
- Time Shift Late – The amount of time needed to shift from the midpoint of the analysis interval to a later lower cost period; and
- Constants – Constants for shifting earlier and shifting later

The model recognizes the ability of travelers to shift their time of travel to a lower priced time interval. The ability to shift was developed from the survey responses and recognized the aggregate ability of travelers to shift earlier vs. later.

Figure 5-3 presents a summary of the estimated time-of-day shift using the formulation derived from the stated preference survey for each half-hour interval in the AM Peak period and for all three trip purposes. The shift to pre-morning ("Shift to Night") is presented in orange and shift to late-morning ("Shift to Midday") is presented in red. Home based work trips show the least amount of shift among all trip purposes. Non-work trips show a higher propensity to shift. Across all three trip purposes, the highest shift was estimated from the first half-hour interval to early hours and similarly in the last half-hour to the midday hours. The percent of traffic with an ability to shift out of the peak period declines significantly as the amount of shift time increases.

Similarly, time-of-day shifts were estimated for each half-hour interval in the PM Peak period (**Figure 5-4**). The shift to the mid-day time period is presented in red and shift to the night time period is presented in orange. Similar to the AM peak period, home-based-work trips have the least propensity to shift.

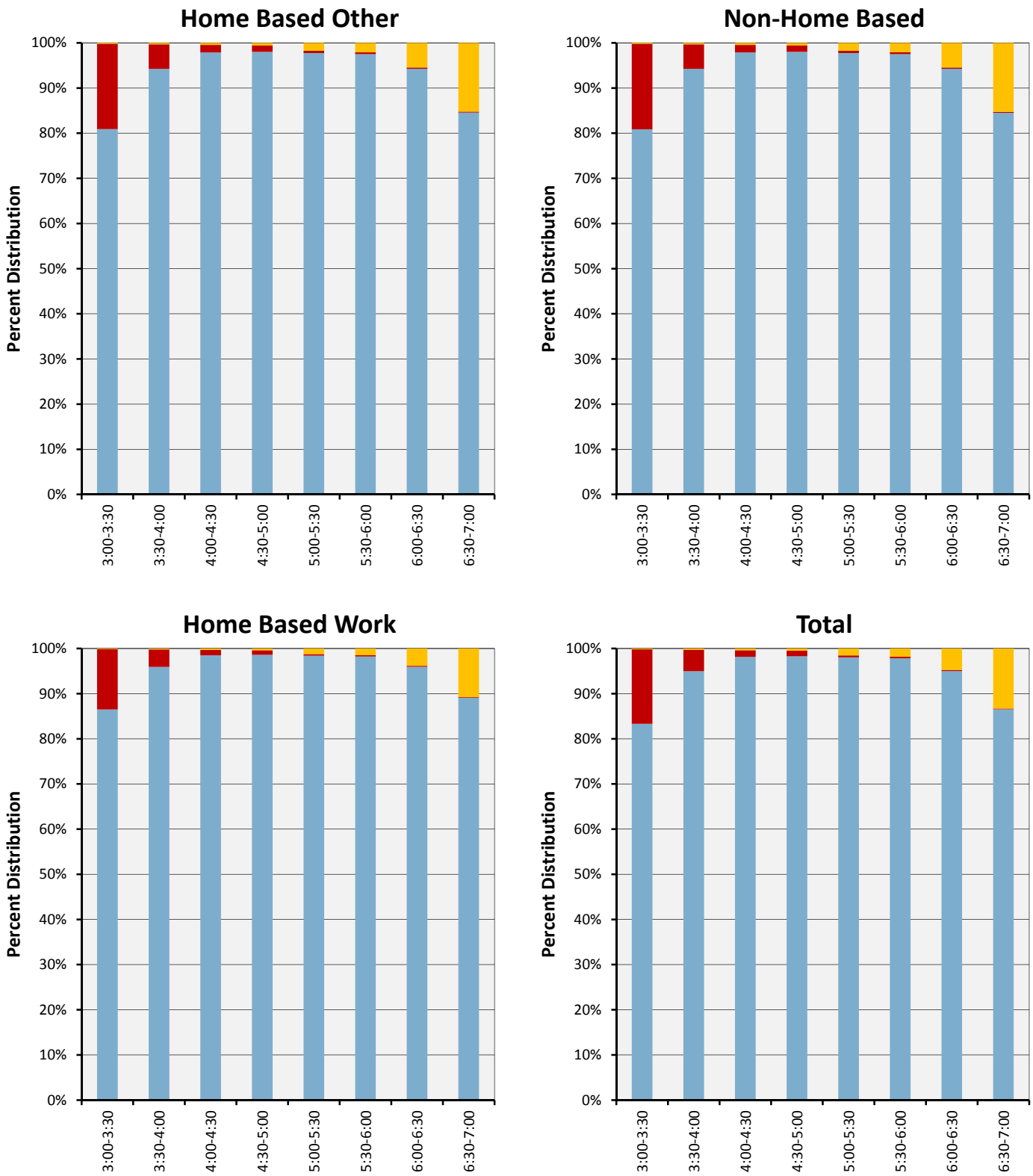


Note: Time shift impact estimates assume 12.50¢ per mile peak period toll and 8.75¢ off peak toll.

ESTIMATED I-95 TIME SHIFT DISTRIBUTION 6:00 AM - 10:00 AM

CDM Smith

FIGURE 5-3



Note: Time shift impact estimates assume 12.50¢ per mile peak period toll and 8.75¢ off peak toll.

ESTIMATED I-95 TIME SHIFT DISTRIBUTION 3:00 PM - 7:00 PM

CDM Smith

FIGURE 5-4

Table 5-2 presents, for illustrative purposes, the estimated time-of-day shift impacts for a 12.50 cents per mile peak period toll and 8.75 cents per mile off peak toll rate on I-95 corridor. Overall, the time-of-day shift was estimated at 4.7 percent and 5.3 percent in the morning and evening peak periods, respectively. Shifted trips from the peak periods were equally distributed to mid-day and night-time off peak periods.

Table 5-2
Year 2020 I-95 Estimated Behavior Responses to Congestion Pricing
Time-of-Day Shift Impact
(I-95 Tolling at $0.125 Per Mile Rate During Peak Periods)

I-95 Corridor Trips

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	99,300	42,100	80,500	11,000	232,900
Home Based Other	42,700	113,000	83,300	105,900	344,900
Non-Home Based	8,400	41,600	22,000	14,600	86,600
Total	150,400	196,700	185,800	131,500	664,400

Time-of-Day Shift Net Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	(3,900)	3,700	(3,500)	3,700	-
Home Based Other	(2,600)	3,800	(5,000)	3,800	-
Non-Home Based	(500)	900	(1,300)	900	-
Total	(7,000)	8,400	(9,800)	8,400	-

Time-of-Day Shift Percent Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	-3.9%	8.8%	-4.3%	33.6%	0.0%
Home Based Other	-6.1%	3.4%	-6.0%	3.6%	0.0%
Non-Home Based	-6.0%	2.2%	-5.9%	6.2%	0.0%
Total	-4.7%	4.3%	-5.3%	6.4%	0.0%

Mode Shift

For estimating a mode shift of passenger vehicles on I-95 in response to a toll, the Regional Transit Forecasting Model (RTFM) was applied. The RTFM is a computerized ridership forecasting model of regional travel in the New York metropolitan area, including NYC subway and bus riders, commuters using Metro-North Railroad (MNRR), Long Island Rail Road, New Jersey Transit, automobile travelers, and people using other travel modes, including taxi, bicycle, and walking. For this study, the RTFM was used to provide estimates of drivers of passenger vehicles that would switch to the Metro-North Railroad in reaction to a pricing scenario.

For estimating the mode shift in reaction to the pricing scenarios, the first step was to generate travel time skims for the peak periods under the existing toll-free conditions on the I-95 and Route 15 travel corridors using the Connecticut Statewide Travel Demand Model specifically developed for this study. For each tolling scenario, the travel time and toll cost for the peak periods were skimmed from the highway network. The travel time skims and toll cost skims for both the existing conditions and for the pricing scenarios from the Connecticut Statewide Travel Demand Model were used as input for the RTFM model.

Based on changes in the toll cost, travel time, and travel distance of the highway mode under a pricing scenario, the RTFM model estimates the share of MNRR and auto modes for the trips that are currently within the I-95, Route 15 and MNRR corridors. Based on these mode shares, vehicle trip output were generated for both current conditions, as well as for each of the pricing scenarios.

For each trip purpose, the vehicle trip output from the RTFM model were compared between the existing toll-free condition and for each pricing scenario. The net change in the trips due to a pricing scenario were redistributed to the Connecticut Statewide Travel Demand Model zonal structure for each of the four modeled time periods. This net change in the vehicle trips reflects the mode-shift to transit as a reaction to a particular pricing scenario. To remove any noise from the model output, the mode-shift was kept limited to vehicle trips that were on either I-95 or Route 15 under the toll-free existing condition.

Table 5-3 presents, for illustrative purposes, the estimated mode shift impact for a 12.50 cents per mile toll rate during the peak periods on I-95 corridor. The off-peak period rates are assumed 30% lower than the peak period rates. The home-based-work trips show the highest propensity for mode-shift to transit, and most of the shift was estimated in the morning and evening peak periods. The home-based-other trips showed the lowest propensity for mode-shift to transit and did not show significant variation across time periods. Overall for this given illustrative scenario, there is a 0.5 percent shift in vehicles to the transit mode. The average trip length using the transit mode along the I-95 corridor is much higher than the average auto trip length on I-95. Considering this fact, the total reduction in vehicle miles travelled on I-95 or Route 15 from this mode shift would be higher than the 0.5 percent shift in vehicle trips.

Table 5-3
Year 2020 I-95 Estimated Behavior Responses to Congestion Pricing
Mode Shift Impact
(I-95 Tolling at $0.125 Per Mile Rate During Peak Periods)

I-95 Corridor Trips

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	99,300	42,100	80,500	11,000	232,900
Home Based Other	42,700	113,000	83,300	105,900	344,900
Non-Home Based	8,400	41,600	22,000	14,600	86,600
Total	150,400	196,700	185,800	131,500	664,400

Mode Shift Net Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	(900)	(200)	(600)	-	(1,700)
Home Based Other	(100)	(400)	(300)	(300)	(1,100)
Non-Home Based	-	(200)	(200)	(100)	(500)
Total	(1,000)	(800)	(1,100)	(400)	(3,300)

Mode Shift Percent Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	-0.9%	-0.5%	-0.7%	0.0%	-0.7%
Home Based Other	-0.2%	-0.4%	-0.4%	-0.3%	-0.3%
Non-Home Based	0.0%	-0.5%	-0.9%	-0.7%	-0.6%
Total	-0.7%	-0.4%	-0.6%	-0.3%	-0.5%

Overall Behavioral Impact

As discussed above, travelers will have many different behavioral responses to reduce or eliminate the amount of the toll that they would have to pay under a roadway pricing scenario. **Table 5-4** presents the estimated I-95 corridor trips during four time periods and by three trip purposes for year 2020. The estimated overall behavioral impact for a 12.50 cents per mile toll rate for peak periods and an 8.75 cents per mile toll for off-peak periods is also presented for all three trip purposes.

Table 5-4
Year 2020 I-95 Estimated Behavior Responses to Congestion Pricing
Total Behavioural Impact
(I-95 Tolling at $0.125 Per Mile Rate During Peak Periods)

I-95 Corridor Trips

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	99,300	42,100	80,500	11,000	232,900
Home Based Other	42,700	113,000	83,300	105,900	344,900
Non-Home Based	8,400	41,600	22,000	14,600	86,600
Total	150,400	196,700	185,800	131,500	664,400

Total Behavioural Net Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	(6,100)	3,000	(5,200)	3,500	(4,800)
Home Based Other	(3,600)	1,500	(7,000)	1,400	(7,700)
Non-Home Based	(600)	200	(1,800)	600	(1,600)
Total	(10,300)	4,700	(14,000)	5,500	(14,100)

Total Behavioural Percent Impact

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total
Home Based Work	-6.1%	7.1%	-6.5%	31.8%	-2.1%
Home Based Other	-8.4%	1.3%	-8.4%	1.3%	-2.2%
Non-Home Based	-7.1%	0.5%	-8.2%	4.1%	-1.8%
Total	-6.8%	2.4%	-7.5%	4.2%	-2.1%

On an average weekday, there is an estimated reduction of 2.1% in vehicle trips. The non-home-based trips show the smallest change with a -1.8 percent impact, while home-based-other trips showed the biggest change at -2.2% impact. On a time period basis, the overall impact ranges from -6.8 percent to -7.5 percent, in the AM and PM Periods respectively. The positive impact ranges from 2.4 percent to 4.2 percent, during the mid-day and nighttime periods, respectively. The positive impact is attributed to the time of day shift of trips from peak periods to off peak periods, exceeding the other negative impacts within the off peak periods.

Similarly, **Table 5-5** presents the behavioral impact broken down by three major behavioral reactions to pricing. Out of -2.1% overall daily change, about three quarters of the change in trips is attributed to trip suppression and remaining one fourth is attributed to the mode shift to transit.

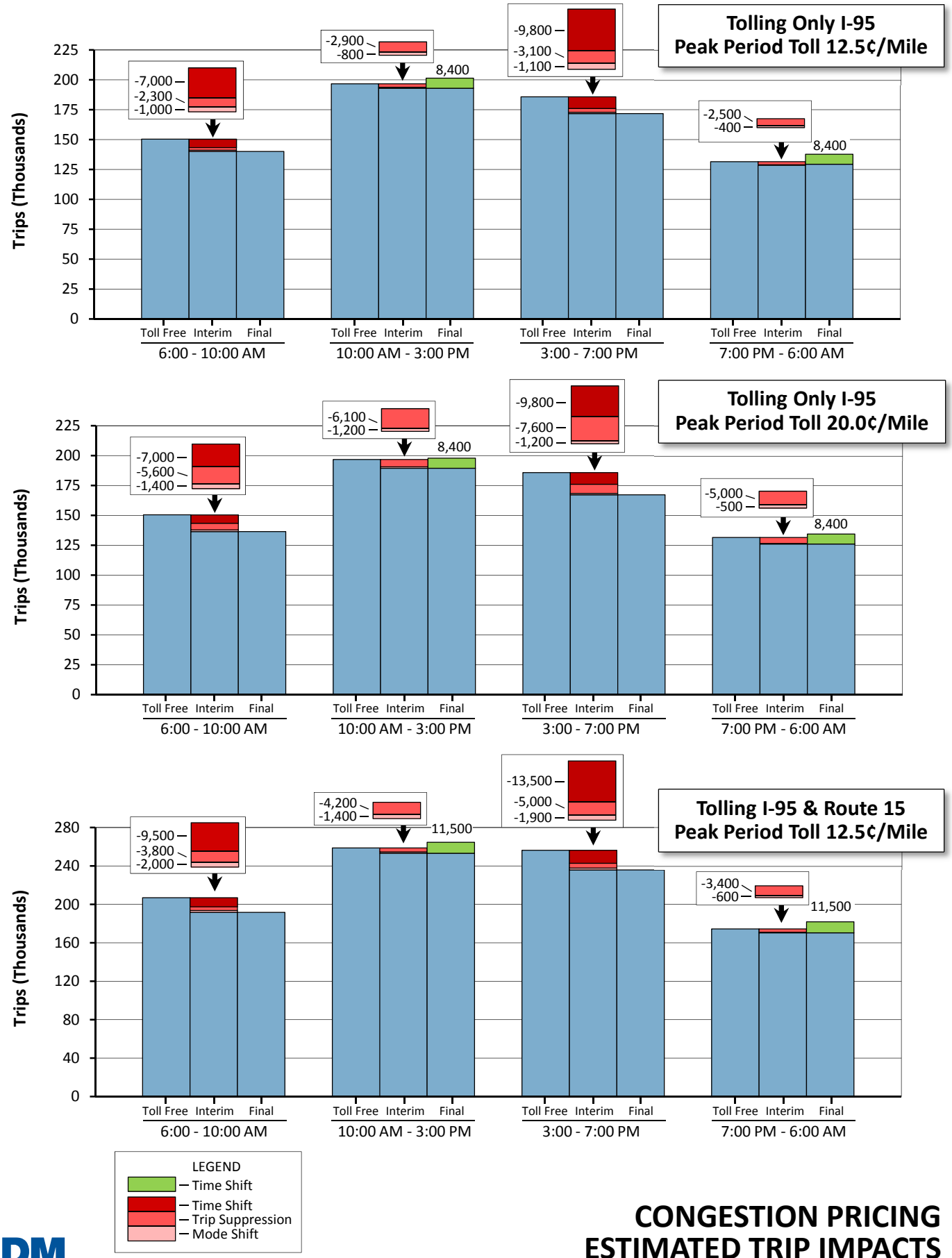
Table 5-5
Year 2020 I-95 Estimated Behavior Responses to Congestion Pricing
Total Behavioural Impact
(I-95 Tolling at $0.125 Per Mile Rate During Peak Periods)

Trip Purpose	AM Period 6 - 10 AM	Mid-Day 10 AM - 3 PM	PM Period 3 - 7 PM	Night-Time 7 PM - 6 AM	Daily Total	% of Corridor Trips
I-95 Corridor Trips	150,400	196,700	185,800	131,500	664,400	100.0%
Total Behavioural Impact						
Mode Shift	(1,000)	(800)	(1,100)	(400)	(3,300)	-0.5%
Trip Suppression	(2,300)	(2,900)	(3,100)	(2,500)	(10,800)	-1.6%
TOD Shift	(7,000)	8,400	(9,800)	8,400	-	0.0%
Total Impact	(10,300)	4,700	(14,000)	5,500	(14,100)	-2.1%
% of Corridor Trips	-6.8%	2.4%	-7.5%	4.2%	-2.1%	

All the trip impacts discussed thus far were estimated for a tolling alternative of I-95 based on 12.5 cents per mile rate during peak periods and 8.75 cents per mile rate during off peak periods. **Figure 5-5** presents these same estimated trip impacts in graphical format. This figure also shows estimated trip impacts for two other pricing alternatives considered in this study. The two other pricing alternatives include tolling I-95 at a higher toll rate and tolling both the I-95 and Route 15 corridors. As shown, overall trip impacts are estimated to be greater under a higher toll alternative where the peak toll rate is increased from 12.5 cent per mile to 20.0 cents per mile. The trip suppression and mode shift impacts are estimated to increase significantly. The time shift impact is estimated to be the same for both pricing levels on I-95 as the off peak toll reduction as a percent of the peak period toll is the same between the various alternatives.

For tolling both I-95 and Route 15, the amount of corridor trips exposed to pricing increases, as it includes trips travelling on either of the roadways. As a result, the overall trip impacts are estimated to be higher compared to the tolling only I-95 alternative.

Overall, this chapter summarizes the various behavior responses that would impact the total vehicle trips within the I-95 travel corridor under a pricing scenario. These trip impacts were applied to the trip tables that were input into the route diversion analysis for each alternative. The estimated route diversion impacts and traffic and toll revenue analysis for each alternative are described in Chapter 6 of this report.



CONGESTION PRICING ESTIMATED TRIP IMPACTS

CDM Smith

FIGURE 5-5

Chapter 6

Traffic and Revenue Estimates

This chapter provides a summary of the final alternatives evaluated, description of assumed tolling locations and toll rates, estimates of traffic and toll revenue, estimates of traffic diversion, and performance measures such as vehicle miles traveled (VMT) and vehicle hours traveled (VHT). Prior to the SP survey being conducted, several initial preliminary alternatives were evaluated to prepare some indicative estimates of traffic and revenue. These preliminary estimates were used to gain some understanding of the range of diversions and revenue that might be expected under various tolling alternatives on I-95. These initial assessments led to the development of a final set of tolling alternatives which are described and discussed in the following sections of this chapter.

Alternatives Description

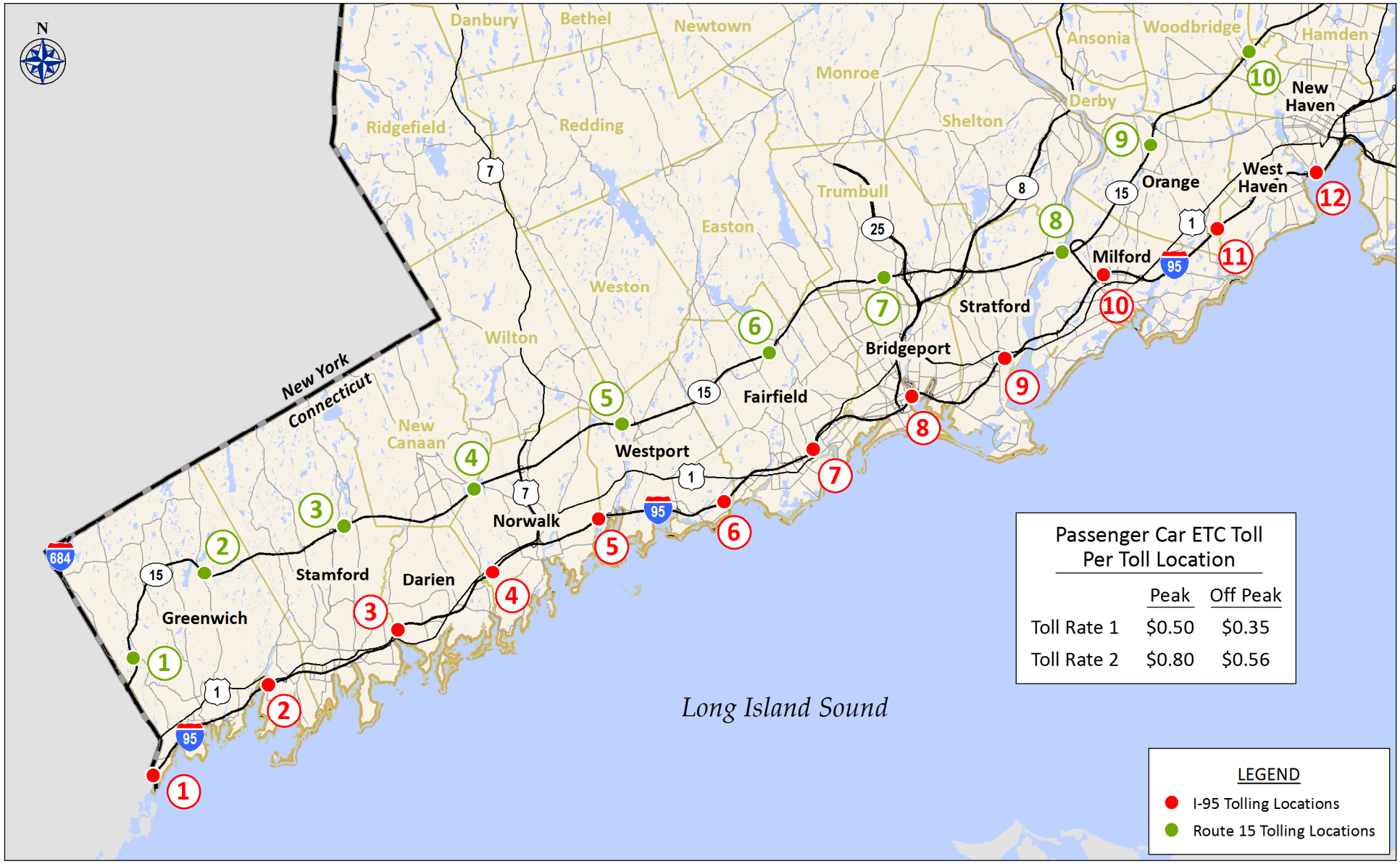
During the first half of this study and prior to the collection of data from the stated preference survey, CDM Smith conducted preliminary analysis of several tolling alternatives, including tolled managed lanes on I-95 between New Haven and New York. The managed lane alternative consisted of adding additional lanes to I-95 and tolling only this new capacity. The existing lanes on I-95 were assumed to remain toll free. This alternative was found to generate a relatively small amount of revenue as compared to the significant capital cost of implementing the unique geometric requirements associated with managed lanes in the corridor. While managed lanes could provide congestion relief to the corridor, the relatively small amount of revenue generation as compared to the cost of construction and as compared to the revenue generated from tolling all the lanes resulted in this alternative being dropped from the final set of alternatives carried forward.

The final set of alternatives considered in this study assumed all electronic tolling (AET) across all lanes on I-95 or on both I-95 and Route 15 between New Haven and the New York border. The final set of alternatives also included a scenario where I-95 would be expanded with an additional general purpose lane in each direction between Bridgeport and Stamford; which is the most congested stretch of I-95. Twelve (12) AET locations were assumed on I-95 and 10 AET locations on Route 15.

Figure 6-1 displays the assumed tolling locations on I-95 and Route 15 and the toll rates (2014 dollars) assumed in this study. Under any tolling scenario within the VPPP, time of day congestion pricing would be required. For this study, off-peak toll rates were assumed to be 30 percent lower than peak period toll rates. A brief description of the Alternatives is provided below.

- **Alternative 1 (I-95 only)** – Toll existing lanes with no widening of I-95. Includes 12 AET locations along the existing lanes of I-95 between New Haven and the New York border. Tolls at each tolling location for passenger vehicles equipped with a transponder were assumed to be $0.50 and $0.35 for peak and off peak time periods, respectively. A full length trip between New Haven and New York would be $6.00, or roughly $0.125 per mile during peak periods, and $4.20 (roughly $0.09 per mile) during off peaks.

- **Alternative 2 (I-95 only)** - Toll existing lanes with no widening of I-95. Includes 12 AET locations along the existing lanes of I-95 between New Haven and the New York border under a higher toll rate level than Alternative 1. Tolls at each tolling location for passenger vehicles



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I-95 AND ROUTE 15 ASSUMED TOLLING LOCATIONS

FIGURE 6-1

equipped with a transponder were assumed to be $0.80 and $0.56 for peak and off peak time periods, respectively. A full length trip between New Haven and New York would be $9.60, or roughly $0.205 per mile during peak periods, and $6.72 (roughly $0.145 per mile) during off peaks.

- **Alternative 3 (I-95 & Rt 15)** – Toll existing lanes with no widening of I-95. Includes 12 AET locations along the existing lanes of I-95 and 10 AET locations along Route 15 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 1 and were applied to both I-95 and Route 15. A full length trip between New Haven and New York on Route 15 would be $5.00 during peak periods and $3.00 during off peaks.
- **Alternative 4 (I-95 only)** – Includes widening of I-95 between Bridgeport and Stamford to accommodate 1 additional general purpose lane in each direction in combination with 12 AET locations along I-95 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 1.
- **Alternative 5 (I-95 & Rt 15)** – Includes widening of I-95 between Bridgeport and Stamford in combination with 12 AET locations along I-95 and 10 AET locations along Route 15 between New Haven and the New York border. Toll rate levels were assumed to be the same as discussed in Alternative 3 and were applied to both I-95 and Route 15.

These five alternatives were run utilizing the travel demand toll model specifically enhanced and refined for this study at 2020 and 2040 conditions. In addition, toll free runs were prepared for the current configuration (No Build), as well as for the widened alternative. These toll free runs serve as the baseline to compare the tolled alternatives against in terms of traffic diversion at the specific tolling locations and along the corridor in general. **Table 6-1** provides a summary of the runs conducted, which routes are tolled, and at what toll rate. Output from the travel demand model runs were analyzed and summarized for each of these alternatives.

Traffic Estimates

Travel demand model runs were run, analyzed, and summarized for each of the alternatives. The following tables show estimated average weekday volumes along the mainline segments of I-95 and Route 15 between New Haven and the New York Stateline for the AM Peak Period (6-10AM), the PM Peak Period (3-7PM), and for the total average weekday condition. Estimated traffic impacts (net and percent) along the mainline segments are also displayed.

Alternative 1

Table 6-1 shows 2020 estimated volumes in thousands along the mainline segments of I-95 in the southbound and northbound directions for toll free no build conditions. To the right of the toll free estimates are results from Alternative 1 (I-95 No Build Tolling). The net impact (comparing the tolled traffic versus toll free traffic) is then shown by time period and direction as well as the percent reduction that can be anticipated from tolling. At the bottom of the table, a summation and average of volumes at both the tolling locations and at the non-tolling locations is shown to give an overall assessment of traffic losses along the entire stretch of I-95. In the southbound direction during the AM Peak Period, traffic is estimated to reduce between 12 and 27 percent depending on the toll location, with an overall average of 17 percent. As would be expected, the segments along I-95 without actual

Table 6-1
Year 2020 I-95 Traffic Comparisons
Toll Free No Build vs Alternative 1 - No Build Toll I-95 ($0.50 Peak/$0.35 Off Peak)

	2020 No Build Toll Free							2020 Alternative 1 - No Build Toll I-95 ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Delavan Ave.	**17.1**	**20.4**	**76.3**	**19.4**	**17.8**	**73.7**	**150.0**	**14.6**	**16.4**	**63.1**	**16.1**	**15.4**	**62.6**	**125.8**	**-2.5**	**-4.1**	**-13.1**	**-3.3**	**-2.4**	**-11.1**	**-24.2**	**-14%**	**-20%**	**-17%**	**-17%**	**-14%**	**-15%**	**-16%**
Field Point Rd.	17.6	21.7	80.1	20.3	18.3	77.7	157.8	15.9	18.6	70.2	17.3	16.3	67.4	137.6	-1.7	-3.0	-9.9	-3.1	-2.0	-10.3	-20.2	-10%	-14%	-12%	-15%	-11%	-13%	-13%
Indian Field Rd.	20.3	20.6	82.3	20.1	20.0	81.1	163.4	18.3	17.1	71.4	16.8	17.9	70.1	141.5	-2.0	-3.5	-10.9	-3.2	-2.1	-11.0	-21.9	-10%	-17%	-13%	-16%	-11%	-14%	-13%
Mianus River	**20.6**	**20.3**	**82.5**	**19.8**	**20.4**	**80.9**	**163.4**	**17.7**	**15.9**	**67.8**	**16.0**	**17.6**	**68.4**	**136.3**	**-2.9**	**-4.4**	**-14.6**	**-3.8**	**-2.8**	**-12.5**	**-27.1**	**-14%**	**-22%**	**-18%**	**-19%**	**-14%**	**-15%**	**-17%**
Harvard Ave.	21.2	20.4	83.8	19.7	20.3	81.5	165.4	19.6	18.4	75.5	16.7	18.5	72.3	147.9	-1.6	-1.9	-8.3	-3.0	-1.8	-9.2	-17.5	-8%	-9%	-10%	-15%	-9%	-11%	-11%
Greenwich Ave.	22.9	20.4	87.5	20.3	21.4	85.9	173.4	21.2	18.0	78.9	17.3	19.9	77.1	156.0	-1.7	-2.4	-8.6	-3.0	-1.6	-8.7	-17.3	-7%	-12%	-10%	-15%	-7%	-10%	-10%
Washington Blvd.	21.1	16.3	76.9	16.1	19.2	75.0	151.8	19.2	13.5	67.4	13.6	18.1	67.4	134.8	-1.9	-2.7	-9.5	-2.5	-1.1	-7.6	-17.1	-9%	-17%	-12%	-16%	-6%	-10%	-11%
Elm St.	21.8	16.0	77.8	13.5	18.6	70.0	147.8	19.8	13.0	67.4	10.4	17.2	60.9	128.3	-2.1	-3.0	-10.4	-3.1	-1.4	-9.2	-19.5	-9%	-19%	-13%	-23%	-8%	-13%	-13%
E. Main St.	25.9	19.4	89.5	15.5	22.0	82.1	171.6	23.2	15.6	77.2	12.2	20.4	71.7	148.9	-2.7	-3.8	-12.2	-3.3	-1.6	-10.5	-22.7	-10%	-20%	-14%	-21%	-7%	-13%	-13%
Noroton Ave.	**25.6**	**20.7**	**91.9**	**16.4**	**21.2**	**82.9**	**174.8**	**20.7**	**14.0**	**70.1**	**11.3**	**18.8**	**66.3**	**136.5**	**-4.9**	**-6.6**	**-21.8**	**-5.1**	**-2.4**	**-16.6**	**-38.4**	**-19%**	**-32%**	**-24%**	**-31%**	**-11%**	**-20%**	**-22%**
Boston Post Rd.	24.9	20.6	90.2	16.8	19.9	81.9	172.1	20.4	14.5	70.4	11.7	19.1	67.7	138.1	-4.5	-6.1	-19.8	-5.1	-0.8	-14.2	-34.0	-18%	-30%	-22%	-30%	-4%	-17%	-20%
Tekeneke Rd.	25.6	21.9	96.1	17.0	22.9	87.7	183.8	23.2	17.5	83.2	13.9	21.7	78.4	161.6	-2.4	-4.3	-12.9	-3.1	-1.2	-9.3	-22.2	-9%	-20%	-13%	-18%	-5%	-11%	-12%
Old Kings Hwy.	24.3	20.3	89.6	15.7	21.1	79.9	169.5	22.0	16.0	76.5	12.6	19.9	70.4	146.9	-2.2	-4.3	-13.1	-3.1	-1.2	-9.5	-22.6	-9%	-21%	-15%	-20%	-6%	-12%	-13%
Scribner Ave.	**22.8**	**18.4**	**82.1**	**14.6**	**18.6**	**73.6**	**155.7**	**19.4**	**13.3**	**65.5**	**9.9**	**16.9**	**59.0**	**124.5**	**-3.4**	**-5.1**	**-16.6**	**-4.7**	**-1.7**	**-14.6**	**-31.2**	**-15%**	**-28%**	**-20%**	**-32%**	**-9%**	**-20%**	**-20%**
US 7	24.0	21.3	92.0	15.8	22.5	83.6	175.6	21.4	16.5	77.8	12.2	20.7	71.7	149.5	-2.6	-4.7	-14.2	-3.6	-1.8	-11.9	-26.2	-11%	-22%	-15%	-23%	-8%	-14%	-15%
Norwalk River	20.7	19.7	81.6	16.7	24.5	88.2	169.8	19.0	15.1	69.7	12.4	22.1	74.5	144.1	-1.7	-4.6	-11.9	-4.2	-2.3	-13.8	-25.7	-8%	-23%	-15%	-25%	-10%	-16%	-15%
Riverside Ave.	**18.3**	**16.9**	**72.7**	**15.0**	**22.2**	**80.6**	**153.3**	**16.2**	**11.7**	**57.6**	**10.4**	**19.3**	**64.3**	**122.0**	**-2.1**	**-5.2**	**-15.1**	**-4.6**	**-2.9**	**-16.3**	**-31.4**	**-12%**	**-31%**	**-21%**	**-31%**	**-13%**	**-20%**	**-20%**
Sherwood Is. Conn.	18.6	16.4	71.8	14.2	22.5	79.3	151.1	16.9	12.1	59.5	10.2	20.3	65.6	125.2	-1.7	-4.3	-12.2	-4.0	-2.2	-13.7	-25.9	-9%	-26%	-17%	-28%	-10%	-17%	-17%
Center St.	**18.5**	**15.6**	**70.1**	**13.3**	**22.3**	**76.9**	**147.0**	**16.2**	**11.0**	**55.9**	**9.2**	**19.5**	**62.0**	**117.9**	**-2.3**	**-4.6**	**-14.2**	**-4.0**	**-2.8**	**-14.9**	**-29.1**	**-13%**	**-30%**	**-20%**	**-30%**	**-13%**	**-19%**	**-20%**
Bronson Rd.	19.4	16.3	73.8	14.2	24.0	82.1	156.0	18.2	12.7	63.3	10.9	21.9	70.9	134.2	-1.2	-3.6	-10.5	-3.2	-2.1	-11.2	-21.7	-6%	-22%	-14%	-23%	-9%	-14%	-14%
Mill Plain Rd.	20.0	16.9	76.2	14.5	24.9	84.8	161.1	18.6	13.1	65.3	11.2	22.6	72.9	138.2	-1.3	-3.8	-10.9	-3.4	-2.3	-11.9	-22.8	-7%	-22%	-14%	-23%	-9%	-14%	-14%
Round Hill Rd.	20.4	17.6	77.8	15.0	25.4	87.2	164.9	18.2	13.5	65.7	11.3	23.6	74.2	139.9	-2.2	-4.0	-12.1	-3.7	-1.8	-13.0	-25.1	-11%	-23%	-16%	-25%	-7%	-15%	-15%
Meadowbrook Rd.	**19.8**	**18.1**	**78.7**	**15.3**	**26.3**	**89.0**	**167.7**	**17.0**	**12.5**	**61.4**	**10.1**	**21.6**	**67.7**	**129.1**	**-2.8**	**-5.6**	**-17.3**	**-5.2**	**-4.8**	**-21.2**	**-38.6**	**-14%**	**-31%**	**-22%**	**-34%**	**-18%**	**-24%**	**-23%**
Int. 24	18.7	18.5	78.6	15.4	26.1	88.7	167.3	17.9	13.9	66.1	11.8	23.9	76.3	142.4	-0.8	-4.6	-12.5	-3.6	-2.2	-12.4	-24.9	-4%	-25%	-16%	-24%	-8%	-14%	-15%
Commerce Dr./Fairfield Ave.	18.5	18.8	78.8	15.1	25.4	84.7	163.5	17.5	14.9	68.0	11.7	23.6	74.0	142.0	-1.1	-3.9	-10.9	-3.4	-1.8	-10.7	-21.6	-6%	-21%	-14%	-23%	-7%	-13%	-13%
Wordin Ave.	19.6	20.7	84.7	17.0	27.0	92.3	177.0	19.0	17.3	75.9	13.4	25.1	81.6	157.6	-0.6	-3.4	-8.8	-3.5	-1.9	-10.7	-19.4	-3%	-17%	-10%	-21%	-7%	-12%	-11%
Park Ave.	21.4	21.4	88.2	17.5	28.2	95.0	183.2	20.2	17.4	77.5	14.0	25.6	83.4	160.9	-1.2	-4.0	-10.7	-3.5	-2.6	-11.6	-22.3	-6%	-19%	-12%	-20%	-9%	-12%	-12%
Pequonnock River	**19.4**	**21.3**	**83.6**	**16.7**	**26.2**	**89.1**	**172.7**	**16.4**	**15.0**	**63.5**	**12.1**	**22.4**	**72.0**	**135.6**	**-2.9**	**-6.3**	**-20.1**	**-4.6**	**-3.9**	**-17.0**	**-37.1**	**-15%**	**-30%**	**-24%**	**-27%**	**-15%**	**-19%**	**-21%**
Seaview Ave.	18.5	20.0	79.7	15.7	24.9	83.6	163.3	16.1	14.5	61.7	11.7	21.7	69.1	130.8	-2.4	-5.6	-18.0	-4.0	-3.2	-14.5	-32.5	-13%	-28%	-23%	-26%	-13%	-17%	-20%
Hollister Ave.	18.6	19.1	77.3	15.2	24.6	81.9	159.3	17.4	15.4	66.1	12.3	22.1	71.5	137.6	-1.2	-3.7	-11.2	-2.8	-2.6	-10.4	-21.6	-6%	-19%	-15%	-19%	-10%	-13%	-14%
Honeyspot Rd.	16.6	16.7	68.9	12.9	22.3	73.0	142.0	15.5	13.3	58.2	10.2	19.8	62.6	120.9	-1.1	-3.4	-10.7	-2.7	-2.5	-10.4	-21.1	-7%	-21%	-16%	-21%	-11%	-14%	-15%
W. Broad St.	17.2	16.9	70.0	12.8	21.7	71.7	141.7	15.6	13.3	58.3	9.7	19.0	60.2	118.6	-1.5	-3.5	-11.7	-3.2	-2.7	-11.4	-23.1	-9%	-21%	-17%	-25%	-12%	-16%	-16%
Route 130	**17.3**	**18.0**	**72.6**	**13.6**	**21.4**	**72.5**	**145.1**	**14.5**	**13.4**	**56.6**	**9.6**	**17.7**	**57.6**	**114.2**	**-2.8**	**-4.6**	**-16.0**	**-4.0**	**-3.7**	**-15.0**	**-30.9**	**-16%**	**-25%**	**-22%**	**-29%**	**-17%**	**-21%**	**-21%**
Housatonic River	15.3	16.0	64.3	12.5	18.7	64.7	129.0	13.6	12.6	52.8	9.1	16.2	53.1	105.9	-1.7	-3.3	-11.5	-3.4	-2.5	-11.6	-23.2	-11%	-21%	-18%	-27%	-13%	-18%	-18%
Schoolhouse Rd./BIC Dr.	16.3	17.9	70.0	13.5	19.4	68.8	138.7	14.6	14.3	58.2	11.1	17.5	60.5	118.6	-1.7	-3.6	-11.8	-2.4	-1.8	-8.3	-20.1	-10%	-20%	-17%	-18%	-9%	-12%	-14%
Plains Rd.	16.4	18.1	70.9	14.0	19.9	71.0	141.9	15.2	15.1	60.8	11.7	18.4	63.4	124.1	-1.2	-3.1	-10.2	-2.2	-1.4	-7.6	-17.8	-7%	-17%	-14%	-16%	-7%	-11%	-13%
Zion Hill Rd./High St.	16.7	18.3	71.4	14.3	20.4	72.0	143.4	15.6	15.4	61.4	11.9	18.7	63.7	125.1	-1.2	-2.9	-10.0	-2.4	-1.7	-8.3	-18.4	-7%	-16%	-14%	-17%	-8%	-12%	-13%
Int. 39	**18.2**	**20.7**	**78.3**	**15.9**	**20.6**	**75.9**	**154.1**	**13.4**	**14.2**	**58.5**	**10.2**	**16.4**	**57.5**	**116.0**	**-4.8**	**-6.5**	**-19.8**	**-5.7**	**-4.2**	**-18.4**	**-38.1**	**-27%**	**-32%**	**-25%**	**-36%**	**-20%**	**-24%**	**-25%**
Woodmont Rd.	18.2	20.1	76.1	16.1	21.1	77.0	153.1	14.5	16.0	62.8	11.8	17.8	63.8	126.6	-3.8	-4.0	-13.3	-4.3	-3.3	-13.2	-26.4	-21%	-20%	-17%	-27%	-16%	-17%	-17%
Marsh Hill Rd.	18.0	19.9	75.4	15.9	20.5	76.4	151.9	14.2	15.6	61.4	11.5	17.0	62.4	123.8	-3.8	-4.3	-14.1	-4.4	-3.5	-14.0	-28.1	-21%	-21%	-19%	-28%	-17%	-18%	-18%
Saw Mill Rd.	**18.1**	**20.4**	**76.9**	**16.0**	**19.1**	**74.1**	**151.0**	**13.5**	**14.9**	**59.1**	**10.8**	**14.9**	**56.3**	**115.4**	**-4.7**	**-5.5**	**-17.9**	**-5.2**	**-4.2**	**-17.8**	**-35.6**	**-26%**	**-27%**	**-23%**	**-33%**	**-22%**	**-24%**	**-24%**
Campbell Ave.	18.2	21.8	79.7	17.4	18.5	75.5	155.3	14.4	17.4	65.3	12.8	15.5	60.8	126.2	-3.8	-4.4	-14.4	-4.6	-3.0	-14.7	-29.1	-21%	-20%	-18%	-26%	-16%	-19%	-19%
West River	19.4	22.8	83.4	17.8	18.7	76.9	160.3	15.9	18.7	69.3	13.2	15.9	62.3	131.6	-3.5	-4.1	-14.1	-4.6	-2.8	-14.6	-28.7	-18%	-18%	-17%	-26%	-15%	-19%	-18%
Long Wharf Dr.	**20.9**	**23.9**	**88.3**	**20.1**	**21.4**	**86.3**	**174.6**	**16.4**	**18.0**	**69.7**	**14.6**	**17.5**	**68.2**	**137.8**	**-4.4**	**-5.9**	**-18.6**	**-5.5**	**-3.9**	**-18.1**	**-36.8**	**-21%**	**-25%**	**-21%**	**-27%**	**-18%**	**-21%**	**-21%**
I-91 Split	20.7	22.7	86.4	18.7	21.5	83.6	170.1	17.5	18.5	72.3	14.9	18.9	70.3	142.6	-3.2	-4.2	-14.2	-3.8	-2.6	-13.3	-27.5	-15%	-18%	-16%	-20%	-12%	-16%	-16%
Tolling Locations Total	**236.6**	**234.8**	**953.8**	**196.2**	**257.6**	**955.5**	**1909.4**	**196.0**	**170.3**	**748.8**	**140.4**	**217.9**	**762.1**	**1510.9**	**-40.6**	**-64.5**	**-205.0**	**-55.8**	**-39.7**	**-193.4**	**-398.5**	**-17%**	**-27%**	**-21%**	**-28%**	**-15%**	**-20%**	**-21%**
Tolling Locations Avg	**19.7**	**19.6**	**79.5**	**16.3**	**21.5**	**79.6**	**159.1**	**16.3**	**14.2**	**62.4**	**11.7**	**18.2**	**63.5**	**125.9**	**-3.4**	**-5.4**	**-17.1**	**-4.6**	**-3.3**	**-16.1**	**-33.2**	**-17%**	**-27%**	**-21%**	**-28%**	**-15%**	**-20%**	**-21%**
Non-Tolling Locations Total	**657.0**	**635.2**	**2631.0**	**527.1**	**726.3**	**2645.1**	**5276.1**	**589.7**	**509.1**	**2235.7**	**413.6**	**656.9**	**2272.2**	**4507.9**	**-67.3**	**-126.1**	**-395.3**	**-113.5**	**-69.4**	**-372.9**	**-768.2**	**-10%**	**-20%**	**-15%**	**-22%**	**-10%**	**-14%**	**-15%**
Non-Tolling Locations Avg	**19.9**	**19.2**	**79.7**	**16.0**	**22.0**	**80.2**	**159.9**	**17.9**	**15.4**	**67.7**	**12.5**	**19.9**	**68.9**	**136.6**	**-2.0**	**-3.8**	**-12.0**	**-3.4**	**-2.1**	**-11.3**	**-23.3**	**-10%**	**-20%**	**-15%**	**-22%**	**-10%**	**-14%**	**-15%**

Notes:
Volume in 1000's
Shading indicates tolling location

toll locations see a lower loss of traffic (10 percent), as only a portion of the traffic passing through these locations would be impacted by a toll from an adjacent segment or segments.

In the southbound direction, the PM traffic loss is estimated to be significantly more than the AM. This is entirely due to the fact that the southbound travel is the off peak travel direction (in general) during the PM and the alternate routes such as Route 15 would be a much more viable option. One option from these findings is to consider implementing the off-peak toll rate in the northbound direction during the AM Period and in the southbound direction during the PM period. This would promote consistency with the overall strategy of applying congestion pricing when and where needed, while also striking a balance between diversion and revenue needs.

Similar to the AM southbound results, the northbound traffic during the PM Peak Period is estimated to be 15 percent lower on average at the tolling locations. On a daily basis, traffic loss along I-95 is estimated to be 21 percent along the tolled segments and 15 percent along the non-tolled segments. By incorporating a lower toll rate during the off peak travel directions with the AM and PM periods, diversion would be reduced to below 20 percent on a daily basis. It should be noted, and as discussed in Chapter 5, a portion (roughly 3-5 percent) of the traffic loss when tolls are considered in this analysis can be attributed to trip suppression, mode shift, and time shift behavior impacts under tolling, and not entirely due to route diversion.

Table 6-2 shows 2020 estimated volumes in thousands along the mainline segments of Route 15 in the southbound and northbound directions under toll free no build conditions on I-95. To the right of the Route 15 traffic estimates are corresponding Route 15 estimates under Alternative 1 (I-95 No Build Tolling). The net impact of comparing Route 15 volumes when I-95 is tolled versus when I-95 is toll free is then shown by time period and direction, as well as the percent increase in traffic that can be expected to occur on Route 15 from tolling I-95. At the bottom of the table, a summation and average of volumes is shown to give an overall assessment of the traffic gains that could be expected along the entire stretch of Route 15 under Alternative 1. In the southbound direction during the AM Peak Period, traffic is estimated to increase on average by 4 percent. It should be noted, that the trip tables also include the impact of reduced vehicle trips due to mode shift, time shift to off peak travel, and overall trip suppression due to the tolls. In the southbound direction during the PM, the traffic gain (11%) is estimated to be significantly more than the AM. This is due to Route 15 having the available capacity to accommodate diversion from I-95. In addition, I-95 is not congested during the off-peak travel direction (in most locations), and therefore pricing of I-95 does produce additional time savings over the current non-priced condition. On a daily basis, traffic gain along Route 15 is estimated to be 14 percent on average between New Haven and NY. The diversion to Route 15 would be reduced on a daily basis, if the tolls on I-95 in the off peak travel direction during the AM and PM periods were reduced to off peak levels.

Alternative 2

Table 6-3 shows 2020 estimated volumes in thousands along the mainline segments of I-95 in the southbound and northbound directions for toll free no build conditions. To the right of the toll free estimates are results from Alternative 2 (I-95 No-Build Tolling – Toll Rate Level 2). Alternative 2

Table 6-2
Year 2020 Rt 15 Traffic Comparisons
Toll Free No Build vs Alternative 1 - No Build Toll I-95 ($0.50 Peak/$0.35 Off Peak)

	2020 Toll Free No Build							2020 Alternative 1 - No Build Toll I-95($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Round Hill Rd	8.6	8.1	28.8	4.9	9.1	24.4	53.3	8.8	9.0	33.7	5.7	9.1	28.2	61.9	0.2	0.9	4.9	0.8	0.1	3.7	8.6	3%	12%	17%	17%	1%	15%	16%
Old Mill Rd Int	9.1	8.1	29.6	5.1	9.8	26.3	55.9	9.3	9.0	34.5	5.9	9.9	29.9	64.4	0.2	0.9	4.9	0.8	0.1	3.6	8.5	2%	12%	16%	15%	1%	14%	15%
North St	9.8	8.7	31.5	5.1	9.8	26.2	57.7	10.0	9.5	36.1	5.9	9.9	29.9	66.0	0.2	0.8	4.6	0.8	0.1	3.7	8.3	2%	9%	15%	15%	1%	14%	14%
Den Rd	10.9	8.8	32.9	5.4	11.1	28.9	61.8	11.3	9.6	37.8	6.3	11.3	33.2	71.0	0.4	0.8	4.9	0.9	0.3	4.3	9.3	4%	9%	15%	16%	3%	15%	15%
Long Ridge Rd	11.1	9.4	34.5	6.0	11.5	30.7	65.2	11.5	10.2	39.5	6.9	11.9	35.1	74.6	0.4	0.8	5.0	0.9	0.4	4.4	9.4	4%	9%	14%	15%	3%	14%	14%
High Ridge Rd	11.6	9.5	36.0	6.0	11.7	32.0	67.9	11.9	10.3	40.7	6.7	12.1	36.0	76.7	0.3	0.8	4.8	0.7	0.4	4.0	8.8	3%	8%	13%	12%	3%	13%	13%
Old Stamford Rd	11.9	9.6	36.8	6.8	13.1	35.6	72.4	12.5	10.9	42.7	8.1	13.4	40.8	83.5	0.6	1.3	5.9	1.3	0.3	5.2	11.1	5%	14%	16%	19%	2%	15%	15%
White Birch Rd / South Ave	11.4	9.9	36.4	7.3	13.2	36.4	72.8	12.2	11.4	43.4	8.6	13.6	42.1	85.5	0.7	1.5	7.0	1.3	0.4	5.7	12.7	7%	15%	19%	18%	3%	16%	17%
New Canaan Ave	11.2	9.2	35.3	7.0	13.4	36.2	71.5	12.0	11.1	42.7	8.5	13.8	42.4	85.1	0.8	1.9	7.4	1.4	0.4	6.2	13.6	7%	21%	21%	20%	3%	17%	19%
US 7	11.1	10.1	36.8	8.1	13.8	39.2	76.0	11.8	11.8	43.7	9.6	14.2	45.5	89.2	0.7	1.8	6.9	1.5	0.4	6.2	13.2	6%	18%	19%	18%	3%	16%	17%
Merritt 7 Railroad Bridge	8.3	6.8	26.8	5.8	10.2	28.5	55.3	8.8	8.1	32.5	7.0	10.4	34.1	66.6	0.5	1.4	5.7	1.3	0.2	5.6	11.3	6%	20%	21%	22%	2%	20%	21%
Main Ave	9.8	6.5	28.9	5.6	10.3	28.8	57.7	10.1	8.0	34.5	6.9	10.5	34.4	68.9	0.3	1.5	5.6	1.3	0.2	5.6	11.2	3%	22%	19%	23%	2%	20%	19%
Route 33	11.0	6.5	30.8	5.3	11.3	30.4	61.2	11.3	8.0	36.6	6.9	11.9	37.4	74.0	0.3	1.5	5.8	1.6	0.6	7.0	12.8	3%	23%	19%	31%	5%	23%	21%
Weston Rd	12.7	7.3	34.9	6.2	13.8	36.2	71.1	13.3	8.8	41.1	7.9	14.4	43.6	84.7	0.6	1.5	6.2	1.7	0.6	7.3	13.6	5%	21%	18%	27%	4%	20%	19%
Black Rock Tpke	12.7	7.4	34.7	6.3	13.8	36.2	70.8	13.1	8.9	40.6	7.9	14.4	43.3	83.9	0.4	1.5	6.0	1.6	0.6	7.1	13.1	3%	20%	17%	26%	4%	20%	18%
Easton Tpke	11.8	8.4	35.9	7.2	13.8	38.7	74.6	12.3	9.6	41.3	8.5	14.3	45.0	86.4	0.5	1.3	5.4	1.4	0.5	6.3	11.7	4%	15%	15%	19%	4%	16%	16%
Park Ave	11.6	9.0	36.3	8.0	13.9	40.4	76.6	12.2	10.2	41.8	9.3	14.4	46.4	88.2	0.6	1.2	5.5	1.3	0.5	6.1	11.6	5%	13%	15%	16%	3%	15%	15%
Route 111	11.5	9.6	37.3	8.5	13.5	40.6	77.9	12.0	10.7	42.5	9.8	14.2	46.8	89.3	0.4	1.1	5.2	1.3	0.7	6.2	11.4	4%	11%	14%	15%	5%	15%	15%
Route 25	11.7	11.3	41.9	9.8	14.2	45.5	87.4	12.1	12.2	46.8	10.9	14.8	51.2	97.9	0.4	0.9	4.9	1.1	0.6	5.7	10.5	3%	8%	12%	11%	4%	12%	12%
Route 108	12.8	12.6	46.2	11.8	14.8	49.6	95.8	13.2	13.5	50.9	12.8	15.2	54.8	105.7	0.4	0.8	4.7	1.0	0.4	5.2	9.9	3%	7%	10%	8%	3%	11%	10%
Route 8	11.1	11.0	40.0	10.6	12.4	42.7	82.7	11.3	11.7	44.2	11.5	12.7	47.5	91.6	0.2	0.8	4.2	0.9	0.2	4.8	9.0	2%	7%	10%	8%	2%	11%	11%
Route 110	12.4	11.9	44.9	11.1	13.0	45.4	90.2	12.5	12.0	48.4	11.7	13.1	49.0	97.4	0.1	0.2	3.5	0.5	0.1	3.7	7.2	1%	1%	8%	5%	1%	8%	8%
Housatonic River	15.0	14.0	53.1	12.4	16.0	52.4	105.5	15.2	14.1	56.7	13.2	16.0	56.5	113.3	0.1	0.1	3.7	0.8	0.1	4.1	7.8	1%	1%	7%	6%	1%	8%	7%
Wheelers Farms Rd	8.7	7.5	30.1	8.2	12.1	36.4	66.5	9.2	8.0	35.2	9.5	12.7	42.5	77.7	0.5	0.5	5.1	1.3	0.7	6.1	11.2	6%	7%	17%	16%	5%	17%	17%
Grassy Hill Rd	11.3	10.0	38.3	7.3	11.4	34.0	72.3	12.7	11.3	45.0	8.7	12.6	40.7	85.7	1.4	1.3	6.7	1.3	1.2	6.7	13.4	12%	13%	17%	18%	11%	20%	19%
Derby Ave	10.6	10.0	37.0	7.3	10.7	32.8	69.8	12.0	11.0	43.2	8.1	11.5	38.3	81.5	1.4	1.0	6.2	0.8	0.9	5.5	11.8	13%	10%	17%	11%	8%	17%	17%
Route 69	11.0	11.1	39.6	8.2	11.1	35.2	74.8	11.6	11.7	42.3	8.7	11.0	37.0	79.2	0.6	0.7	2.7	0.5	-0.1	1.7	4.4	5%	6%	7%	6%	-1%	5%	6%
Heroes Tunnel	10.4	11.8	40.4	9.0	12.4	39.9	80.2	10.7	12.2	42.2	9.4	12.0	40.7	82.9	0.4	0.3	1.8	0.4	-0.4	0.9	2.7	4%	3%	4%	4%	-3%	2%	3%
Total	**311.2**	**263.7**	**1015.5**	**210.4**	**345.0**	**1009.6**	**2025.1**	**324.9**	**292.9**	**1160.6**	**240.9**	**355.4**	**1152.4**	**2313.0**	**13.7**	**29.2**	**145.1**	**30.5**	**10.4**	**142.8**	**287.8**	**4%**	**11%**	**14%**	**14%**	**3%**	**14%**	**14%**
Average	**11.1**	**9.4**	**36.3**	**7.5**	**12.3**	**36.1**	**72.3**	**11.6**	**10.5**	**41.4**	**8.6**	**12.7**	**41.2**	**82.6**	**0.5**	**1.0**	**5.2**	**1.1**	**0.4**	**5.1**	**10.3**	**4%**	**11%**	**14%**	**14%**	**3%**	**14%**	**14%**

Note:
Volume in 1000's

Table 6-3
Year 2020 I-95 Traffic Comparisons
Toll Free No Build vs Alternative 2 - No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak)

	2020 Toll Free no Build							2020 Alternative 2 - No Build I-95 Toll ($0.80/$0.56)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Delavan Ave.	**17.1**	**20.4**	**76.3**	**19.4**	**17.8**	**73.7**	**150.0**	**12.8**	**14.5**	**55.6**	**14.5**	**13.8**	**56.4**	**112.0**	**-4.3**	**-5.9**	**-20.7**	**-4.9**	**-4.0**	**-17.3**	**-38.0**	**-25%**	**-29%**	**-27%**	**-25%**	**-23%**	**-24%**	**-25%**
Field Point Rd.	17.6	21.7	80.1	20.3	18.3	77.7	157.8	14.2	16.9	63.2	15.9	15.1	62.0	125.3	-3.4	-4.7	-16.9	-4.4	-3.2	-15.7	-32.6	-19%	-22%	-21%	-22%	-18%	-20%	-21%
Indian Field Rd.	20.3	20.6	82.3	20.1	20.0	81.1	163.4	16.4	15.4	64.0	15.3	16.5	64.1	128.2	-3.9	-5.3	-18.3	-4.7	-3.5	-16.9	-35.2	-19%	-26%	-22%	-24%	-17%	-21%	-22%
Mianus River	**20.6**	**20.3**	**82.5**	**19.8**	**20.4**	**80.9**	**163.4**	**15.4**	**13.7**	**58.8**	**14.1**	**15.8**	**61.0**	**119.8**	**-5.2**	**-6.6**	**-23.7**	**-5.7**	**-4.5**	**-19.9**	**-43.6**	**-25%**	**-32%**	**-29%**	**-29%**	**-22%**	**-25%**	**-27%**
Harvard Ave.	21.2	20.4	83.8	19.7	20.3	81.5	165.4	17.7	17.0	68.9	15.1	17.2	66.3	135.2	-3.5	-3.3	-15.0	-4.6	-3.1	-15.3	-30.2	-17%	-16%	-18%	-23%	-15%	-19%	-18%
Greenwich Ave.	22.9	20.4	87.5	20.3	21.4	85.9	173.4	19.4	16.6	72.4	15.7	18.8	71.4	143.8	-3.4	-3.8	-15.1	-4.6	-2.7	-14.4	-29.5	-15%	-19%	-17%	-23%	-13%	-17%	-17%
Washington Blvd.	21.1	16.3	76.9	16.1	19.2	75.0	151.8	17.4	12.1	60.7	12.2	17.3	62.3	123.0	-3.6	-4.2	-16.2	-3.9	-1.9	-12.7	-28.9	-17%	-26%	-21%	-24%	-10%	-17%	-19%
Elm St.	21.8	16.0	77.8	13.5	18.6	70.0	147.8	18.0	11.2	60.2	9.0	16.3	55.4	115.6	-3.8	-4.8	-17.6	-4.4	-2.3	-14.6	-32.2	-17%	-30%	-23%	-33%	-13%	-21%	-22%
E. Main St.	25.9	19.4	89.5	15.5	22.0	82.1	171.6	20.8	13.5	68.7	10.6	19.0	65.0	133.7	-5.1	-5.9	-20.7	-4.9	-2.9	-17.2	-37.9	-20%	-31%	-23%	-32%	-13%	-21%	-22%
Noroton Ave.	**25.6**	**20.7**	**91.9**	**16.4**	**21.2**	**82.9**	**174.8**	**17.5**	**11.1**	**58.1**	**8.8**	**16.9**	**56.7**	**114.8**	**-8.0**	**-9.6**	**-33.8**	**-7.6**	**-4.3**	**-26.2**	**-60.0**	**-31%**	**-47%**	**-37%**	**-46%**	**-20%**	**-32%**	**-34%**
Boston Post Rd.	24.9	20.6	90.2	16.8	19.9	81.9	172.1	17.7	11.8	59.7	9.4	17.6	59.0	118.7	-7.2	-8.8	-30.5	-7.4	-2.3	-22.9	-53.4	-29%	-43%	-34%	-44%	-12%	-28%	-31%
Tekeneke Rd.	25.6	21.9	96.1	17.0	22.9	87.7	183.8	21.3	15.3	74.7	12.3	20.8	72.1	146.8	-4.2	-6.6	-21.4	-4.7	-2.1	-15.6	-37.0	-17%	-30%	-22%	-28%	-9%	-18%	-20%
Old Kings Hwy.	24.3	20.3	89.6	15.7	21.1	79.9	169.5	19.9	13.6	67.4	10.9	18.8	63.9	131.3	-4.4	-6.7	-22.1	-4.8	-2.3	-16.1	-38.2	-18%	-33%	-25%	-30%	-11%	-20%	-23%
Scribner Ave.	**22.8**	**18.4**	**82.1**	**14.6**	**18.6**	**73.6**	**155.7**	**16.9**	**10.6**	**55.3**	**7.7**	**15.7**	**50.8**	**106.1**	**-5.9**	**-7.8**	**-26.9**	**-6.9**	**-2.9**	**-22.7**	**-49.6**	**-26%**	**-43%**	**-33%**	**-47%**	**-16%**	**-31%**	**-32%**
US 7	24.0	21.3	92.0	15.8	22.5	83.6	175.6	19.1	14.2	68.3	10.4	19.4	64.5	132.8	-4.8	-7.1	-23.8	-5.4	-3.1	-19.1	-42.9	-20%	-33%	-26%	-34%	-14%	-23%	-24%
Norwalk River	20.7	19.7	81.6	16.7	24.5	88.2	169.8	17.1	12.7	60.9	10.3	19.9	66.0	126.9	-3.6	-7.0	-20.7	-6.3	-4.6	-22.2	-42.9	-17%	-36%	-25%	-38%	-19%	-25%	-25%
Riverside Ave.	**18.3**	**16.9**	**72.7**	**15.0**	**22.2**	**80.6**	**153.3**	**13.9**	**9.0**	**47.4**	**7.9**	**16.9**	**54.7**	**102.1**	**-4.5**	**-7.9**	**-25.3**	**-7.0**	**-5.3**	**-26.0**	**-51.2**	**-24%**	**-47%**	**-35%**	**-47%**	**-24%**	**-32%**	**-33%**
Sherwood Is. Conn.	18.6	16.4	71.8	14.2	22.5	79.3	151.1	15.0	9.8	50.9	8.3	18.2	57.8	108.7	-3.5	-6.6	-20.9	-5.9	-4.3	-21.5	-42.3	-19%	-40%	-29%	-42%	-19%	-27%	-28%
Center St.	**18.5**	**15.6**	**70.1**	**13.3**	**22.3**	**76.9**	**147.0**	**14.0**	**8.5**	**46.3**	**7.1**	**16.9**	**52.9**	**99.2**	**-4.5**	**-7.1**	**-23.8**	**-6.1**	**-5.4**	**-24.0**	**-47.8**	**-24%**	**-45%**	**-34%**	**-46%**	**-24%**	**-31%**	**-33%**
Bronson Rd.	19.4	16.3	73.8	14.2	24.0	82.1	156.0	16.8	10.8	56.1	9.3	20.6	64.3	120.4	-2.6	-5.5	-17.7	-4.9	-3.4	-17.9	-35.6	-13%	-34%	-24%	-35%	-14%	-22%	-23%
Mill Plain Rd.	20.0	16.9	76.2	14.5	24.9	84.8	161.1	17.2	11.2	57.8	9.4	21.1	65.9	123.8	-2.8	-5.8	-18.4	-5.1	-3.7	-18.9	-37.3	-14%	-34%	-24%	-35%	-15%	-22%	-23%
Round Hill Rd.	20.4	17.6	77.8	15.0	25.4	87.2	164.9	16.9	11.5	58.2	9.5	21.9	66.5	124.7	-3.6	-6.1	-19.6	-5.6	-3.5	-20.7	-40.2	-17%	-35%	-25%	-37%	-14%	-24%	-24%
Meadowbrook Rd.	**19.8**	**18.1**	**78.7**	**15.3**	**26.3**	**89.0**	**167.7**	**14.9**	**9.5**	**50.4**	**7.7**	**18.4**	**56.6**	**107.0**	**-4.9**	**-8.6**	**-28.3**	**-7.6**	**-7.9**	**-32.4**	**-60.6**	**-25%**	**-48%**	**-36%**	**-49%**	**-30%**	**-36%**	**-36%**
Int. 24	18.7	18.5	78.6	15.4	26.1	88.7	167.3	16.5	11.4	57.4	10.0	22.3	69.3	126.7	-2.2	-7.1	-21.2	-5.4	-3.8	-19.4	-40.6	-12%	-39%	-27%	-35%	-15%	-22%	-24%
Commerce Dr./Fairfield Ave.	18.5	18.8	78.8	15.1	25.4	84.7	163.5	16.6	12.7	60.7	9.9	21.9	66.9	127.6	-1.9	-6.1	-18.1	-5.2	-3.4	-17.8	-35.9	-10%	-32%	-23%	-34%	-13%	-21%	-22%
Wordin Ave.	19.6	20.7	84.7	17.0	27.0	92.3	177.0	18.3	15.2	69.3	11.6	23.3	74.5	143.8	-1.3	-5.5	-15.4	-5.3	-3.7	-17.8	-33.2	-7%	-26%	-18%	-31%	-14%	-19%	-19%
Park Ave.	21.4	21.4	88.2	17.5	28.2	95.0	183.2	19.1	15.2	70.0	12.2	23.5	75.7	145.8	-2.3	-6.2	-18.2	-5.3	-4.8	-19.3	-37.5	-11%	-29%	-21%	-30%	-17%	-20%	-20%
Pequonnock River	**19.4**	**21.3**	**83.6**	**16.7**	**26.2**	**89.1**	**172.7**	**13.5**	**11.3**	**51.0**	**9.3**	**18.6**	**59.7**	**110.7**	**-5.9**	**-10.0**	**-32.6**	**-7.4**	**-7.7**	**-29.4**	**-62.0**	**-31%**	**-47%**	**-39%**	**-44%**	**-29%**	**-33%**	**-36%**
Seaview Ave.	18.5	20.0	79.7	15.7	24.9	83.6	163.3	13.1	11.0	49.7	9.1	18.1	57.6	107.4	-5.4	-9.0	-30.0	-6.7	-6.8	-25.9	-55.9	-29%	-45%	-38%	-42%	-27%	-31%	-34%
Hollister Ave.	18.6	19.1	77.3	15.2	24.6	81.9	159.3	15.1	12.6	56.7	10.1	19.1	62.3	119.0	-3.5	-6.5	-20.6	-5.0	-5.6	-19.7	-40.2	-19%	-34%	-27%	-33%	-23%	-24%	-25%
Honeyspot Rd.	16.6	16.7	68.9	12.9	22.3	73.0	142.0	13.2	10.6	49.2	7.8	16.9	53.2	102.4	-3.5	-6.1	-19.7	-5.1	-5.4	-19.8	-39.5	-21%	-36%	-29%	-39%	-24%	-27%	-28%
W. Broad St.	17.2	16.9	70.0	12.8	21.7	71.7	141.7	13.2	10.7	49.0	7.5	16.1	50.9	99.8	-4.0	-6.1	-21.1	-5.4	-5.6	-20.8	-41.9	-23%	-36%	-30%	-42%	-26%	-29%	-30%
Route 130	**17.3**	**18.0**	**72.6**	**13.6**	**21.4**	**72.5**	**145.1**	**11.8**	**10.4**	**46.0**	**7.2**	**14.4**	**46.9**	**92.9**	**-5.6**	**-7.6**	**-26.6**	**-6.5**	**-7.0**	**-25.6**	**-52.2**	**-32%**	**-42%**	**-37%**	**-47%**	**-33%**	**-35%**	**-36%**
Housatonic River	15.3	16.0	64.3	12.5	18.7	64.7	129.0	11.1	10.1	43.6	6.9	13.4	44.0	87.6	-4.2	-5.9	-20.7	-5.6	-5.3	-20.7	-41.4	-27%	-37%	-32%	-45%	-28%	-32%	-32%
Schoolhouse Rd./BIC Dr.	16.3	17.9	70.0	13.5	19.4	68.8	138.7	12.1	11.6	48.7	9.1	15.1	52.6	101.4	-4.2	-6.3	-21.2	-4.4	-4.3	-16.1	-37.4	-26%	-35%	-30%	-33%	-22%	-23%	-27%
Plains Rd.	16.4	18.1	70.9	14.0	19.9	71.0	141.9	13.0	12.6	52.0	9.8	16.0	55.7	107.7	-3.4	-5.6	-18.9	-4.2	-3.8	-15.3	-34.2	-21%	-31%	-27%	-30%	-19%	-22%	-24%
Zion Hill Rd./High St.	16.7	18.3	71.4	14.3	20.4	72.0	143.4	13.3	12.9	52.6	9.9	16.2	55.5	108.1	-3.4	-5.4	-18.8	-4.4	-4.2	-16.5	-35.3	-20%	-30%	-26%	-31%	-21%	-23%	-25%
Int. 39	**18.2**	**20.7**	**78.3**	**15.9**	**20.6**	**75.9**	**154.1**	**10.7**	**11.6**	**47.9**	**8.0**	**13.6**	**47.3**	**95.2**	**-7.5**	**-9.2**	**-30.4**	**-7.9**	**-7.0**	**-28.5**	**-58.9**	**-41%**	**-44%**	**-39%**	**-50%**	**-34%**	**-38%**	**-38%**
Woodmont Rd.	18.2	20.1	76.1	16.1	21.1	77.0	153.1	12.3	14.0	54.3	10.0	15.7	56.0	110.4	-5.9	-6.0	-21.7	-6.1	-5.3	-21.0	-42.7	-32%	-30%	-29%	-38%	-25%	-27%	-28%
Marsh Hill Rd.	18.0	19.9	75.4	15.9	20.5	76.4	151.9	12.3	13.6	53.0	9.8	14.9	54.4	107.4	-5.8	-6.3	-22.4	-6.2	-5.5	-22.0	-44.5	-32%	-32%	-30%	-39%	-27%	-29%	-29%
Saw Mill Rd.	**18.1**	**20.4**	**76.9**	**16.0**	**19.1**	**74.1**	**151.0**	**11.0**	**12.5**	**49.2**	**8.7**	**12.6**	**47.2**	**96.4**	**-7.1**	**-7.9**	**-27.7**	**-7.3**	**-6.5**	**-26.9**	**-54.6**	**-39%**	**-39%**	**-36%**	**-46%**	**-34%**	**-36%**	**-36%**
Campbell Ave.	18.2	21.8	79.7	17.4	18.5	75.5	155.3	12.4	15.5	57.2	11.0	13.6	53.1	110.3	-5.8	-6.2	-22.5	-6.4	-4.9	-22.4	-45.0	-32%	-29%	-28%	-37%	-26%	-30%	-29%
West River	19.4	22.8	83.4	17.8	18.7	76.9	160.3	14.2	17.0	61.8	11.5	14.2	54.7	116.4	-5.2	-5.9	-21.7	-6.3	-4.5	-22.3	-43.9	-27%	-26%	-26%	-35%	-24%	-29%	-27%
Long Wharf Dr.	**20.9**	**23.9**	**88.3**	**20.1**	**21.4**	**86.3**	**174.6**	**14.4**	**15.7**	**60.2**	**12.4**	**15.3**	**58.8**	**119.0**	**-6.5**	**-8.2**	**-28.1**	**-7.7**	**-6.1**	**-27.5**	**-55.6**	**-31%**	**-34%**	**-32%**	**-39%**	**-29%**	**-32%**	**-32%**
I-91 Split	20.7	22.7	86.4	18.7	21.5	83.6	170.1	15.7	16.6	64.2	13.2	17.0	62.4	126.6	-5.0	-6.1	-22.3	-5.5	-4.5	-21.2	-43.5	-24%	-27%	-26%	-29%	-21%	-25%	-26%
Tolling Locations Total	**236.6**	**234.8**	**953.8**	**196.2**	**257.6**	**955.5**	**1909.4**	**166.9**	**138.4**	**626.2**	**113.5**	**188.9**	**648.9**	**1275.1**	**-69.7**	**-96.4**	**-327.7**	**-82.7**	**-68.7**	**-306.6**	**-634.3**	**-29%**	**-41%**	**-34%**	**-42%**	**-27%**	**-32%**	**-33%**
Tolling Locations Avg	**19.7**	**19.6**	**79.5**	**16.3**	**21.5**	**79.6**	**159.1**	**13.9**	**11.5**	**52.2**	**9.5**	**15.7**	**54.1**	**106.3**	**-5.8**	**-8.0**	**-27.3**	**-6.9**	**-5.7**	**-25.6**	**-52.9**	**-29%**	**-41%**	**-34%**	**-42%**	**-27%**	**-32%**	**-33%**
Non-Tolling Locations Total	**657.0**	**635.2**	**2631.0**	**527.1**	**726.3**	**2645.1**	**5276.1**	**526.7**	**436.7**	**1961.7**	**353.1**	**595.7**	**2025.6**	**3987.3**	**-130.3**	**-198.5**	**-669.3**	**-174.0**	**-130.6**	**-619.5**	**-1288.8**	**-20%**	**-31%**	**-25%**	**-33%**	**-18%**	**-23%**	**-24%**
Non-Tolling Locations Avg	**19.9**	**19.2**	**79.7**	**16.0**	**22.0**	**80.2**	**159.9**	**16.0**	**13.2**	**59.4**	**10.7**	**18.1**	**61.4**	**120.8**	**-3.9**	**-6.0**	**-20.3**	**-5.3**	**-4.0**	**-18.8**	**-39.1**	**-20%**	**-31%**	**-25%**	**-33%**	**-18%**	**-23%**	**-24%**

Notes:
Volume in 1000's
Shading indicates tolling location

considers a significantly higher toll rate than Alternative 1 and results in significantly more diversion off of I-95. This higher toll rate also leads to additional traffic shifts to rail, additional time shifting of peak travel to off peak travel, and additional trip suppression. The toll rate considered in Alternative 2 is equivalent to about 20 cents per mile which would be considered on the high end of toll rates in practice today, particularly on existing turnpikes in the northeast. This is compared to an equivalent per mile toll rate of about 12.5 cents per mile under Alternative 1. It is not likely the 20 cent per mile toll rate would be needed to manage congestion along I-95, at least early on. In should be noted that this also assumes the toll rate in place for the entire peak period. In practice, a higher toll rate may be warranted during the peak of the peak (i.e. 7-9AM, 4-6PM) and slightly lower rates on the shoulders to manage congestion and provide further incentives to shift ones travel time.

Table 6-4 shows 2020 estimated volumes in thousands along the mainline segments of Route 15 in the southbound and northbound directions under toll free no build conditions on I-95. To the right of the toll free estimates are Route 15 estimates under Alternative 2. In the southbound direction during the AM Peak Period, traffic is estimated to increase on average by 8 percent. On a daily basis, traffic gain along Route 15 is estimated to be 21 percent on average between New Haven and NY. Again, it should be noted that this level of toll would not be recommended or needed to manage congestion along I-95 in the short term. For all additional Alternatives (3, 4, and 5) discussed below, toll rate levels used in Alternative 1 were assumed.

Alternative 3

Table 6-5 shows 2020 estimated volumes in thousands along the mainline segments of I-95 in the southbound and northbound directions for toll free no build conditions. To the right of the toll free estimates are results from Alternative 3 (I-95 No Build **with I-95 and Route 15 Tolling**). In the southbound direction during the AM Peak Period, traffic is estimated to reduce between 9 and 21 percent depending on the toll location, with an overall average of 15 percent. A similar pattern is displayed in the northbound direction during the PM Peak Period, where 14 percent of the traffic at the tolling locations on average is diverted off of I-95. On a daily basis, traffic loss along I-95 is estimated to be 15 percent along the tolled segments and 7 percent along the non-tolled segments. Implementing a toll on Route 15 in addition to I-95 has the result of reducing the amount of diversion off of I-95, particularly in the northbound and southbound travel directions (non-peak travel directions) during the AM and PM periods, respectively. It should be noted that the vehicle trip tables have also been reduced to reflect mode shift, time shift from peak to off peak travel, and overall trip suppression in response to pricing both I-95 and Route 15.

Table 6-6 shows 2020 estimated volumes in thousands along the mainline segments of Route 15 in the southbound and northbound directions under toll free no build and toll conditions on I-95 and Route 15. To the right of the Route 15 traffic estimates are corresponding Route 15 estimates under Alternative 3 (I-95 No Build with I-95 and Route 15 Tolling). In the southbound direction during the AM Peak Period, traffic is estimated to reduce on average by 21 percent at the tolling locations. In the northbound direction during the PM, the traffic loss at the tolling locations is estimated to be 20 percent on average. On a daily basis, traffic loss at the tolling segments along Route 15 is estimated to be 22 percent on average between New Haven and NY.

Alternative 4

Table 6-7 shows 2020 estimated volumes in thousands along the mainline segments of I-95 in the southbound and northbound directions for toll free widening conditions. Under Alternative 4, one additional general purpose lane in each direction is assumed along I-95 between Stamford and

Table 6-4
Year 2020 Rt 15 Traffic Comparisons
Toll Free No Build vs Alternative 2 - No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak)

	2020 Toll Free No Build							2020 Alternative 2 - No Build Toll I-95 ($0.80/$0.56)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	**AM**	**PM**	**Daily**	**AM**	**PM**	**Daily**	**Daily**	**AM**	**PM**	**Daily**	**AM**	**PM**	**Daily**	**Daily**	**AM**	**PM**	**Daily**	**AM**	**PM**	**Daily**	**Daily**	**AM**	**PM**	**Daily**	**AM**	**PM**	**Daily**	**Daily**
Round Hill Rd	8.6	8.1	28.8	4.9	9.1	24.4	53.3	9.4	9.6	36.2	6.2	9.4	30.1	66.3	0.8	1.5	7.4	1.3	0.4	5.6	13.0	9%	19%	26%	26%	4%	23%	24%
Old Mill Rd Int	9.1	8.1	29.6	5.1	9.8	26.3	55.9	9.9	9.6	37.0	6.4	10.1	31.8	68.8	0.8	1.5	7.4	1.3	0.3	5.5	12.9	8%	19%	25%	24%	3%	21%	23%
North St	9.8	8.7	31.5	5.1	9.8	26.2	57.7	10.5	10.0	38.5	6.4	10.1	31.8	70.3	0.7	1.4	7.1	1.3	0.3	5.6	12.6	7%	16%	23%	25%	3%	21%	22%
Den Rd	10.9	8.8	32.9	5.4	11.1	28.9	61.8	11.9	10.2	40.5	6.9	11.6	35.5	76.0	1.0	1.4	7.7	1.5	0.6	6.6	14.2	9%	16%	23%	27%	5%	23%	23%
Long Ridge Rd	11.1	9.4	34.5	6.0	11.5	30.7	65.2	12.1	10.8	42.3	7.5	12.1	37.4	79.6	1.0	1.4	7.7	1.5	0.6	6.7	14.4	9%	15%	22%	25%	6%	22%	22%
High Ridge Rd	11.6	9.5	36.0	6.0	11.7	32.0	67.9	12.5	10.9	43.4	7.2	12.2	37.9	81.3	0.9	1.4	7.4	1.3	0.5	5.9	13.3	8%	14%	21%	21%	4%	18%	20%
Old Stamford Rd	11.9	9.6	36.8	6.8	13.1	35.6	72.4	13.1	11.7	45.8	8.9	13.4	43.3	89.1	1.2	2.1	9.0	2.1	0.3	7.7	16.7	10%	22%	25%	31%	2%	22%	23%
White Birch Rd / South Ave	11.4	9.9	36.4	7.3	13.2	36.4	72.8	12.8	12.2	46.8	9.5	13.7	44.7	91.5	1.4	2.3	10.4	2.2	0.5	8.3	18.7	12%	23%	28%	31%	4%	23%	26%
New Canaan Ave	11.2	9.2	35.3	7.0	13.4	36.2	71.5	12.6	12.1	46.3	9.4	13.8	45.2	91.5	1.4	2.8	10.9	2.4	0.4	9.0	20.0	12%	31%	31%	34%	3%	25%	28%
US 7	11.1	10.1	36.8	8.1	13.8	39.2	76.0	12.2	12.7	46.8	10.5	14.2	48.2	95.0	1.2	2.6	10.0	2.4	0.4	9.0	19.0	10%	26%	27%	29%	3%	23%	25%
Merritt 7 Railroad Bridge	8.3	6.8	26.8	5.8	10.2	28.5	55.3	9.4	9.0	35.9	7.9	10.7	36.7	72.6	1.1	2.3	9.1	2.2	0.5	8.2	17.3	13%	34%	34%	38%	5%	29%	31%
Main Ave	9.8	6.5	28.9	5.6	10.3	28.8	57.7	10.6	8.9	37.9	7.8	10.8	37.0	74.8	0.8	2.4	8.9	2.2	0.4	8.2	17.1	8%	37%	31%	39%	4%	28%	30%
Route 33	11.0	6.5	30.8	5.3	11.3	30.4	61.2	11.8	9.0	40.0	7.9	12.3	40.6	80.6	0.8	2.5	9.2	2.7	1.0	10.2	19.4	7%	39%	30%	51%	8%	34%	32%
Weston Rd	12.7	7.3	34.9	6.2	13.8	36.2	71.1	13.6	9.9	44.6	9.0	14.8	47.0	91.6	0.9	2.6	9.8	2.8	1.1	10.7	20.5	7%	36%	28%	44%	8%	30%	29%
Black Rock Tpke	12.7	7.4	34.7	6.3	13.8	36.2	70.8	13.3	9.9	43.8	8.9	15.0	46.6	90.4	0.6	2.5	9.2	2.6	1.2	10.4	19.6	5%	34%	26%	42%	8%	29%	28%
Easton Tpke	11.8	8.4	35.9	7.2	13.8	38.7	74.6	12.4	10.5	44.0	9.4	14.6	47.7	91.8	0.6	2.1	8.1	2.3	0.8	9.0	17.1	5%	25%	23%	32%	6%	23%	23%
Park Ave	11.6	9.0	36.3	8.0	13.9	40.4	76.6	12.3	11.0	44.4	10.1	14.8	49.0	93.4	0.7	2.0	8.1	2.0	0.9	8.7	16.8	6%	22%	22%	25%	6%	21%	22%
Route 111	11.5	9.6	37.3	8.5	13.5	40.6	77.9	12.2	11.4	45.1	10.5	14.5	49.3	94.4	0.7	1.8	7.8	2.0	1.0	8.7	16.5	6%	19%	21%	24%	7%	22%	21%
Route 25	11.7	11.3	41.9	9.8	14.2	45.5	87.4	12.3	12.9	49.2	11.5	15.1	53.5	102.7	0.6	1.6	7.3	1.7	0.9	8.0	15.3	5%	14%	17%	17%	7%	17%	17%
Route 108	12.8	12.6	46.2	11.8	14.8	49.6	95.8	13.4	14.1	53.2	13.4	15.5	57.1	110.3	0.6	1.5	7.1	1.6	0.8	7.5	14.6	4%	12%	15%	13%	5%	15%	15%
Route 8	11.1	11.0	40.0	10.6	12.4	42.7	82.7	11.4	12.3	46.3	12.1	13.0	49.5	95.9	0.3	1.3	6.4	1.5	0.6	6.8	13.2	3%	12%	16%	14%	5%	16%	16%
Route 110	12.4	11.9	44.9	11.1	13.0	45.4	90.2	12.8	12.9	51.0	12.5	14.1	52.3	103.3	0.3	1.1	6.1	1.4	1.1	7.0	13.1	3%	9%	14%	12%	8%	15%	15%
Housatonic River	15.0	14.0	53.1	12.4	16.0	52.4	105.5	15.4	15.0	59.6	14.2	17.1	60.1	119.7	0.4	1.1	6.5	1.8	1.1	7.7	14.2	2%	8%	12%	15%	7%	15%	13%
Wheelers Farms Rd	8.7	7.5	30.1	8.2	12.1	36.4	66.5	9.9	9.1	38.0	10.2	13.2	45.3	83.3	1.3	1.5	7.8	2.0	1.2	8.9	16.7	14%	20%	26%	24%	10%	24%	25%
Grassy Hill Rd	11.3	10.0	38.3	7.3	11.4	34.0	72.3	13.2	11.8	47.5	9.4	13.2	43.7	91.2	1.8	1.7	9.1	2.0	1.8	9.7	18.9	16%	17%	24%	28%	16%	29%	26%
Derby Ave	10.6	10.0	37.0	7.3	10.7	32.8	69.8	12.4	11.2	45.3	8.5	11.8	40.5	85.8	1.8	1.2	8.3	1.3	1.2	7.8	16.0	17%	12%	22%	18%	11%	24%	23%
Route 69	11.0	11.1	39.6	8.2	11.1	35.2	74.8	11.8	12.0	43.6	9.0	11.1	38.2	81.8	0.8	0.9	4.1	0.8	0.0	3.0	7.1	7%	8%	10%	10%	0%	9%	9%
Heroes Tunnel	10.4	11.8	40.4	9.0	12.4	39.9	80.2	10.7	12.3	42.5	9.6	11.8	41.1	83.6	0.3	0.4	2.1	0.5	-0.6	1.2	3.4	3%	4%	5%	6%	-5%	3%	4%
Total	**311.2**	**263.7**	**1015.5**	**210.4**	**345.0**	**1009.6**	**2025.1**	**336.1**	**312.8**	**1235.4**	**260.9**	**364.1**	**1221.2**	**2456.7**	**24.9**	**49.1**	**219.9**	**50.5**	**19.1**	**211.6**	**431.5**	**8%**	**19%**	**22%**	**24%**	**6%**	**21%**	**21%**
Average	**11.1**	**9.4**	**36.3**	**7.5**	**12.3**	**36.1**	**72.3**	**12.0**	**11.2**	**44.1**	**9.3**	**13.0**	**43.6**	**87.7**	**0.9**	**1.8**	**7.9**	**1.8**	**0.7**	**7.6**	**15.4**	**8%**	**19%**	**22%**	**24%**	**6%**	**21%**	**21%**

Note:
Volume in 1000's

Table 6-5
Year 2020 I-95 Traffic Comparisons
Toll Free No Build vs Alternative 3 - No Build Toll I-95 and Rt 15 ($0.50 Peak/$0.35 Off Peak)

	2020 Toll Free No Build							2020 Alternative 3 - No Build Toll I-95 and Rt 15 ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Delavan Ave.	**17.1**	**20.4**	**76.3**	**19.4**	**17.8**	**73.7**	**150.0**	**15.2**	**18.0**	**68.4**	**17.4**	**15.4**	**66.8**	**135.2**	**-1.8**	**-2.5**	**-7.8**	**-2.0**	**-2.4**	**-7.0**	**-14.8**	**-11%**	**-12%**	**-10%**	**-10%**	**-13%**	**-9%**	**-10%**
Field Point Rd.	17.6	21.7	80.1	20.3	18.3	77.7	157.8	16.9	20.5	76.5	18.8	16.7	72.3	148.7	-0.7	-1.2	-3.6	-1.6	-1.6	-5.4	-9.1	-4%	-6%	-5%	-8%	-9%	-7%	-6%
Indian Field Rd.	20.3	20.6	82.3	20.1	20.0	81.1	163.4	19.5	19.2	78.7	18.5	18.5	75.8	154.5	-0.8	-1.4	-3.6	-1.5	-1.5	-5.3	-8.9	-4%	-7%	-4%	-8%	-8%	-7%	-5%
Mianus River	**20.6**	**20.3**	**82.5**	**19.8**	**20.4**	**80.9**	**163.4**	**18.7**	**17.9**	**74.5**	**17.6**	**17.9**	**73.7**	**148.2**	**-1.9**	**-2.4**	**-8.0**	**-2.2**	**-2.4**	**-7.2**	**-15.2**	**-9%**	**-12%**	**-10%**	**-11%**	**-12%**	**-9%**	**-9%**
Harvard Ave.	21.2	20.4	83.8	19.7	20.3	81.5	165.4	20.7	19.7	82.8	18.4	19.1	78.7	161.5	-0.5	-0.6	-1.0	-1.3	-1.2	-2.8	-3.9	-2%	-3%	-1%	-6%	-6%	-3%	-2%
Greenwich Ave.	22.9	20.4	87.5	20.3	21.4	85.9	173.4	22.4	19.8	86.5	19.2	20.6	84.0	170.6	-0.4	-0.5	-1.0	-1.1	-0.8	-1.8	-2.8	-2%	-3%	-1%	-6%	-4%	-2%	-2%
Washington Blvd.	21.1	16.3	76.9	16.1	19.2	75.0	151.8	20.6	15.8	75.7	15.5	18.7	74.0	149.7	-0.5	-0.5	-1.2	-0.6	-0.5	-0.9	-2.2	-2%	-3%	-2%	-4%	-2%	-1%	-1%
Elm St.	21.8	16.0	77.8	13.5	18.6	70.0	147.8	21.2	15.4	76.2	12.6	18.1	68.4	144.7	-0.6	-0.6	-1.6	-0.8	-0.6	-1.6	-3.2	-3%	-4%	-2%	-6%	-3%	-2%	-2%
E. Main St.	25.9	19.4	89.5	15.5	22.0	82.1	171.6	24.7	18.3	86.8	14.7	21.2	80.0	166.8	-1.2	-1.1	-2.7	-0.8	-0.7	-2.1	-4.8	-4%	-6%	-3%	-5%	-3%	-3%	-3%
Noroton Ave.	**25.6**	**20.7**	**91.9**	**16.4**	**21.2**	**82.9**	**174.8**	**21.9**	**16.5**	**78.0**	**13.5**	**19.3**	**73.4**	**151.4**	**-3.7**	**-4.1**	**-13.8**	**-2.9**	**-1.9**	**-9.6**	**-23.4**	**-14%**	**-20%**	**-15%**	**-18%**	**-9%**	**-12%**	**-13%**
Boston Post Rd.	24.9	20.6	90.2	16.8	19.9	81.9	172.1	21.7	17.1	78.5	14.0	19.1	74.2	152.7	-3.2	-3.6	-11.7	-2.8	-0.9	-7.7	-19.4	-13%	-17%	-13%	-17%	-4%	-9%	-11%
Tekeneke Rd.	25.6	21.9	96.1	17.0	22.9	87.7	183.8	24.6	20.7	93.5	16.6	22.3	86.8	180.3	-1.0	-1.2	-2.6	-0.4	-0.6	-0.9	-3.5	-4%	-5%	-3%	-2%	-3%	-1%	-2%
Old Kings Hwy.	24.3	20.3	89.6	15.7	21.1	79.9	169.5	23.5	19.0	86.5	15.2	20.6	78.9	165.4	-0.8	-1.3	-3.1	-0.5	-0.5	-1.0	-4.1	-3%	-7%	-3%	-3%	-2%	-1%	-2%
Scribner Ave.	**22.8**	**18.4**	**82.1**	**14.6**	**18.6**	**73.6**	**155.7**	**20.6**	**15.8**	**73.8**	**11.9**	**17.1**	**65.3**	**139.1**	**-2.2**	**-2.6**	**-8.3**	**-2.7**	**-1.5**	**-8.3**	**-16.6**	**-10%**	**-14%**	**-10%**	**-19%**	**-8%**	**-11%**	**-11%**
US 7	24.0	21.3	92.0	15.8	22.5	83.6	175.6	22.6	19.0	86.0	14.1	21.0	78.0	164.0	-1.4	-2.2	-6.1	-1.7	-1.5	-5.6	-11.7	-6%	-11%	-7%	-11%	-7%	-7%	-7%
Norwalk River	20.7	19.7	81.6	16.7	24.5	88.2	169.8	18.7	17.0	74.6	14.0	21.7	79.4	154.0	-2.0	-2.7	-7.0	-2.7	-2.7	-8.8	-15.8	-10%	-14%	-9%	-16%	-11%	-10%	-9%
Riverside Ave.	**18.3**	**16.9**	**72.7**	**15.0**	**22.2**	**80.6**	**153.3**	**15.7**	**13.5**	**62.1**	**11.8**	**18.9**	**69.3**	**131.4**	**-2.7**	**-3.4**	**-10.5**	**-3.2**	**-3.3**	**-11.4**	**-21.9**	**-15%**	**-20%**	**-14%**	**-21%**	**-15%**	**-14%**	**-14%**
Sherwood Is. Conn.	18.6	16.4	71.8	14.2	22.5	79.3	151.1	16.9	14.1	65.4	12.1	20.6	72.7	138.2	-1.6	-2.3	-6.4	-2.1	-2.0	-6.5	-12.9	-9%	-14%	-9%	-15%	-9%	-8%	-9%
Center St.	**18.5**	**15.6**	**70.1**	**13.3**	**22.3**	**76.9**	**147.0**	**15.7**	**12.7**	**60.4**	**10.7**	**19.2**	**67.1**	**127.6**	**-2.8**	**-2.9**	**-9.7**	**-2.6**	**-3.2**	**-9.8**	**-19.4**	**-15%**	**-19%**	**-14%**	**-20%**	**-14%**	**-13%**	**-13%**
Bronson Rd.	19.4	16.3	73.8	14.2	24.0	82.1	156.0	18.5	15.5	71.8	13.6	22.3	80.2	152.0	-0.9	-0.8	-2.1	-0.5	-1.7	-1.9	-3.9	-4%	-5%	-3%	-4%	-7%	-2%	-3%
Mill Plain Rd.	20.0	16.9	76.2	14.5	24.9	84.8	161.1	19.0	15.9	73.7	13.9	23.0	82.4	156.0	-1.0	-1.0	-2.6	-0.7	-1.8	-2.5	-5.0	-5%	-6%	-3%	-5%	-7%	-3%	-3%
Round Hill Rd.	20.4	17.6	77.8	15.0	25.4	87.2	164.9	18.7	16.4	74.4	14.0	24.1	83.7	158.1	-1.7	-1.2	-3.4	-1.0	-1.4	-3.5	-6.9	-9%	-7%	-4%	-7%	-5%	-4%	-4%
Meadowbrook Rd.	**19.8**	**18.1**	**78.7**	**15.3**	**26.3**	**89.0**	**167.7**	**16.6**	**14.1**	**65.4**	**11.4**	**21.0**	**72.0**	**137.4**	**-3.2**	**-4.0**	**-13.3**	**-3.9**	**-5.3**	**-16.9**	**-30.2**	**-16%**	**-22%**	**-17%**	**-26%**	**-20%**	**-19%**	**-18%**
Int. 24	18.7	18.5	78.6	15.4	26.1	88.7	167.3	18.0	16.2	73.0	14.3	24.6	85.2	158.2	-0.7	-2.3	-5.6	-1.1	-1.5	-3.5	-9.0	-4%	-13%	-7%	-7%	-6%	-4%	-5%
Commerce Dr./Fairfield Ave.	18.5	18.8	78.8	15.1	25.4	84.7	163.5	17.7	17.2	75.0	14.0	24.2	82.1	157.1	-0.8	-1.6	-3.8	-1.2	-1.1	-2.6	-6.4	-4%	-9%	-5%	-8%	-4%	-3%	-4%
Wordin Ave.	19.6	20.7	84.7	17.0	27.0	92.3	177.0	18.9	19.4	82.1	15.5	25.4	88.5	170.6	-0.7	-1.3	-2.6	-1.4	-1.6	-3.9	-6.4	-4%	-6%	-3%	-8%	-6%	-4%	-4%
Park Ave.	21.4	21.4	88.2	17.5	28.2	95.0	183.2	20.1	19.5	83.8	16.0	26.2	90.3	174.1	-1.3	-1.9	-4.4	-1.5	-2.1	-4.7	-9.2	-6%	-9%	-5%	-9%	-7%	-5%	-5%
Pequonnock River	**19.4**	**21.3**	**83.6**	**16.7**	**26.2**	**89.1**	**172.7**	**16.0**	**15.3**	**66.0**	**13.0**	**22.4**	**74.8**	**140.8**	**-3.4**	**-6.0**	**-17.5**	**-3.7**	**-3.8**	**-14.3**	**-31.9**	**-17%**	**-28%**	**-21%**	**-22%**	**-15%**	**-16%**	**-18%**
Seaview Ave.	18.5	20.0	79.7	15.7	24.9	83.6	163.3	15.5	14.7	63.7	12.6	21.7	71.6	135.3	-3.0	-5.4	-16.0	-3.2	-3.2	-12.0	-28.0	-16%	-27%	-20%	-20%	-13%	-14%	-17%
Hollister Ave.	18.6	19.1	77.3	15.2	24.6	81.9	159.3	17.2	16.1	69.2	13.4	22.3	74.8	144.1	-1.4	-3.1	-8.1	-1.7	-2.4	-7.1	-15.2	-7%	-16%	-10%	-11%	-10%	-9%	-10%
Honeyspot Rd.	16.6	16.7	68.9	12.9	22.3	73.0	142.0	15.3	14.0	61.4	11.2	20.1	66.0	127.4	-1.3	-2.7	-7.5	-1.7	-2.2	-7.1	-14.6	-8%	-16%	-11%	-13%	-10%	-10%	-10%
W. Broad St.	17.2	16.9	70.0	12.8	21.7	71.7	141.7	15.4	14.3	61.8	10.9	19.4	64.0	125.8	-1.8	-2.6	-8.2	-1.9	-2.3	-7.7	-15.9	-10%	-15%	-12%	-15%	-10%	-11%	-11%
Route 130	**17.3**	**18.0**	**72.6**	**13.6**	**21.4**	**72.5**	**145.1**	**14.2**	**14.1**	**59.7**	**10.6**	**18.2**	**61.0**	**120.7**	**-3.1**	**-3.9**	**-12.9**	**-3.0**	**-3.3**	**-11.5**	**-24.4**	**-18%**	**-21%**	**-18%**	**-22%**	**-15%**	**-16%**	**-17%**
Housatonic River	15.3	16.0	64.3	12.5	18.7	64.7	129.0	13.0	13.3	55.4	10.1	16.5	56.3	111.7	-2.3	-2.7	-8.9	-2.4	-2.2	-8.4	-17.3	-15%	-17%	-14%	-19%	-12%	-13%	-13%
Schoolhouse Rd./BIC Dr.	16.3	17.9	70.0	13.5	19.4	68.8	138.7	13.8	14.5	59.9	12.9	18.7	65.9	125.8	-2.5	-3.4	-10.1	-0.6	-0.7	-2.8	-12.9	-15%	-19%	-14%	-5%	-4%	-4%	-9%
Plains Rd.	16.4	18.1	70.9	14.0	19.9	71.0	141.9	14.3	15.1	61.6	13.2	19.1	67.8	129.3	-2.2	-3.1	-9.3	-0.8	-0.7	-3.2	-12.5	-13%	-17%	-13%	-5%	-4%	-5%	-9%
Zion Hill Rd./High St.	16.7	18.3	71.4	14.3	20.4	72.0	143.4	14.5	15.3	61.8	13.0	18.8	66.6	128.4	-2.2	-3.0	-9.6	-1.3	-1.6	-5.4	-15.0	-13%	-16%	-14%	-9%	-8%	-7%	-10%
Int. 39	**18.2**	**20.7**	**78.3**	**15.9**	**20.6**	**75.9**	**154.1**	**14.4**	**16.0**	**64.0**	**11.9**	**18.0**	**63.7**	**127.7**	**-3.9**	**-4.7**	**-14.3**	**-4.0**	**-2.6**	**-12.1**	**-26.4**	**-21%**	**-23%**	**-18%**	**-25%**	**-13%**	**-16%**	**-17%**
Woodmont Rd.	18.2	20.1	76.1	16.1	21.1	77.0	153.1	15.2	17.5	67.3	13.1	18.9	68.3	135.7	-3.1	-2.5	-8.7	-3.1	-2.1	-8.6	-17.4	-17%	-13%	-11%	-19%	-10%	-11%	-11%
Marsh Hill Rd.	18.0	19.9	75.4	15.9	20.5	76.4	151.9	15.1	17.2	66.2	12.9	18.3	67.2	133.4	-2.9	-2.7	-9.2	-3.1	-2.2	-9.3	-18.5	-16%	-14%	-12%	-19%	-11%	-12%	-12%
Saw Mill Rd.	**18.1**	**20.4**	**76.9**	**16.0**	**19.1**	**74.1**	**151.0**	**14.3**	**16.4**	**63.7**	**12.1**	**15.8**	**60.8**	**124.4**	**-3.8**	**-4.0**	**-13.3**	**-3.9**	**-3.3**	**-13.3**	**-26.6**	**-21%**	**-20%**	**-17%**	**-24%**	**-17%**	**-18%**	**-18%**
Campbell Ave.	18.2	21.8	79.7	17.4	18.5	75.5	155.3	15.4	18.7	69.7	14.0	16.2	65.0	134.7	-2.9	-3.0	-10.0	-3.4	-2.3	-10.6	-20.6	-16%	-14%	-13%	-19%	-12%	-14%	-13%
West River	19.4	22.8	83.4	17.8	18.7	76.9	160.3	16.8	19.9	73.6	14.4	16.7	66.3	139.9	-2.6	-3.0	-9.8	-3.4	-2.1	-10.6	-20.5	-13%	-13%	-12%	-19%	-11%	-14%	-13%
Long Wharf Dr.	**20.9**	**23.9**	**88.3**	**20.1**	**21.4**	**86.3**	**174.6**	**17.2**	**19.2**	**73.7**	**15.8**	**18.1**	**72.0**	**145.7**	**-3.7**	**-4.8**	**-14.6**	**-4.3**	**-3.3**	**-14.3**	**-28.9**	**-18%**	**-20%**	**-17%**	**-21%**	**-15%**	**-17%**	**-17%**
I-91 Split	20.7	22.7	86.4	18.7	21.5	83.6	170.1	18.3	19.5	76.1	15.9	19.5	73.8	149.9	-2.4	-3.2	-10.4	-2.8	-2.0	-9.8	-20.1	-12%	-14%	-12%	-15%	-10%	-12%	-12%
Tolling Locations Total	**236.6**	**234.8**	**953.8**	**196.2**	**257.6**	**955.5**	**1909.4**	**200.5**	**189.5**	**809.7**	**157.7**	**221.4**	**819.9**	**1629.6**	**-36.1**	**-45.3**	**-144.1**	**-38.4**	**-36.2**	**-135.6**	**-279.7**	**-15%**	**-19%**	**-15%**	**-20%**	**-14%**	**-14%**	**-15%**
Tolling Locations Avg	**19.7**	**19.6**	**79.5**	**16.3**	**21.5**	**79.6**	**159.1**	**16.7**	**15.8**	**67.5**	**13.1**	**18.5**	**68.3**	**135.8**	**-3.0**	**-3.8**	**-12.0**	**-3.2**	**-3.0**	**-11.3**	**-23.3**	**-15%**	**-19%**	**-15%**	**-20%**	**-14%**	**-14%**	**-15%**
Non-Tolling Locations Total	**657.0**	**635.2**	**2631.0**	**527.1**	**726.3**	**2645.1**	**5276.1**	**604.8**	**565.4**	**2429.2**	**472.6**	**674.1**	**2469.3**	**4898.4**	**-52.3**	**-69.7**	**-201.8**	**-54.5**	**-52.2**	**-175.9**	**-377.7**	**-8%**	**-11%**	**-8%**	**-10%**	**-7%**	**-7%**	**-7%**
Non-Tolling Locations Avg	**19.9**	**19.2**	**79.7**	**16.0**	**22.0**	**80.2**	**159.9**	**18.3**	**17.1**	**73.6**	**14.3**	**20.4**	**74.8**	**148.4**	**-1.6**	**-2.1**	**-6.1**	**-1.7**	**-1.6**	**-5.3**	**-11.4**	**-8%**	**-11%**	**-8%**	**-10%**	**-7%**	**-7%**	**-7%**

Notes:
Volume in 1000's
Shading indicates tolling location

Table 6-6
Year 2020 Rt 15 Traffic Comparisons
Toll Free No Build vs Alternative 3 - No Build Toll I-95 and Rt 15 ($0.50 Peak/$0.35 Off Peak)

	2020 Toll Free No Build							2020 Alternative 3 - No Build Toll I-95 and Rt 15 ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Round Hill Rd	**8.6**	**8.1**	**28.8**	**4.9**	**9.1**	**24.4**	**53.3**	**6.2**	**5.2**	**21.4**	**3.1**	**6.9**	**18.2**	**39.6**	**-2.4**	**-2.8**	**-7.5**	**-1.8**	**-2.2**	**-6.2**	**-13.7**	**-28%**	**-35%**	**-26%**	**-37%**	**-24%**	**-25%**	**-26%**
Old Mill Rd Int	9.1	8.1	29.6	5.1	9.8	26.3	55.9	6.7	5.3	22.1	3.2	7.5	19.8	41.9	-2.5	-2.8	-7.5	-1.9	-2.2	-6.5	-14.0	-27%	-35%	-25%	-37%	-23%	-25%	-25%
North St	9.8	8.7	31.5	5.1	9.8	26.2	57.7	7.2	5.6	23.5	3.2	7.6	19.8	43.3	-2.6	-3.1	-7.9	-1.9	-2.2	-6.5	-14.4	-27%	-35%	-25%	-37%	-23%	-25%	-25%
Den Rd	**10.9**	**8.8**	**32.9**	**5.4**	**11.1**	**28.9**	**61.8**	**8.1**	**5.7**	**24.5**	**3.3**	**8.6**	**21.8**	**46.3**	**-2.8**	**-3.1**	**-8.4**	**-2.1**	**-2.4**	**-7.1**	**-15.5**	**-26%**	**-36%**	**-25%**	**-39%**	**-22%**	**-25%**	**-25%**
Long Ridge Rd	11.1	9.4	34.5	6.0	11.5	30.7	65.2	8.3	6.2	26.3	3.8	9.1	23.6	49.9	-2.8	-3.1	-8.2	-2.2	-2.3	-7.1	-15.3	-25%	-33%	-24%	-36%	-20%	-23%	-23%
High Ridge Rd	11.6	9.5	36.0	6.0	11.7	32.0	67.9	8.7	6.5	27.5	3.8	9.6	24.9	52.4	-2.9	-3.1	-8.5	-2.2	-2.1	-7.1	-15.6	-25%	-32%	-24%	-37%	-18%	-22%	-23%
Old Stamford Rd	**11.9**	**9.6**	**36.8**	**6.8**	**13.1**	**35.6**	**72.4**	**8.7**	**6.2**	**27.1**	**4.3**	**10.2**	**26.7**	**53.8**	**-3.2**	**-3.4**	**-9.7**	**-2.5**	**-2.9**	**-8.9**	**-18.6**	**-27%**	**-35%**	**-26%**	**-37%**	**-22%**	**-25%**	**-26%**
White Birch Rd / South Ave	11.4	9.9	36.4	7.3	13.2	36.4	72.8	8.7	6.7	27.8	4.8	10.7	28.0	55.8	-2.8	-3.2	-8.6	-2.5	-2.5	-8.4	-17.0	-24%	-32%	-24%	-34%	-19%	-23%	-23%
New Canaan Ave	**11.2**	**9.2**	**35.3**	**7.0**	**13.4**	**36.2**	**71.5**	**8.2**	**5.8**	**25.6**	**4.4**	**10.6**	**27.0**	**52.6**	**-3.0**	**-3.4**	**-9.7**	**-2.6**	**-2.8**	**-9.2**	**-18.9**	**-27%**	**-37%**	**-27%**	**-37%**	**-21%**	**-25%**	**-26%**
US 7	11.1	10.1	36.8	8.1	13.8	39.2	76.0	9.1	7.2	29.7	5.7	11.7	31.6	61.3	-2.0	-2.8	-7.1	-2.4	-2.1	-7.6	-14.7	-18%	-28%	-19%	-30%	-15%	-19%	-19%
Merritt 7 Railroad Bridge	8.3	6.8	26.8	5.8	10.2	28.5	55.3	6.6	4.3	20.2	3.9	8.9	22.9	43.1	-1.7	-2.4	-6.5	-1.9	-1.3	-5.6	-12.1	-21%	-36%	-24%	-32%	-13%	-20%	-22%
Main Ave	9.8	6.5	28.9	5.6	10.3	28.8	57.7	8.3	4.2	22.5	3.8	9.1	23.4	45.9	-1.5	-2.3	-6.4	-1.8	-1.3	-5.4	-11.8	-15%	-36%	-22%	-31%	-12%	-19%	-20%
Route 33	11.0	6.5	30.8	5.3	11.3	30.4	61.2	9.4	4.2	24.5	3.6	10.0	25.0	49.5	-1.6	-2.2	-6.4	-1.7	-1.4	-5.4	-11.7	-14%	-35%	-21%	-31%	-12%	-18%	-19%
Weston Rd	**12.7**	**7.3**	**34.9**	**6.2**	**13.8**	**36.2**	**71.1**	**10.9**	**4.4**	**26.8**	**4.0**	**11.3**	**28.2**	**55.0**	**-1.8**	**-2.8**	**-8.1**	**-2.2**	**-2.5**	**-8.0**	**-16.1**	**-14%**	**-39%**	**-23%**	**-35%**	**-18%**	**-22%**	**-23%**
Black Rock Tpke	**12.7**	**7.4**	**34.7**	**6.3**	**13.8**	**36.2**	**70.8**	**10.8**	**4.6**	**26.9**	**4.2**	**11.3**	**28.4**	**55.3**	**-1.9**	**-2.8**	**-7.8**	**-2.1**	**-2.5**	**-7.7**	**-15.5**	**-15%**	**-38%**	**-22%**	**-33%**	**-18%**	**-21%**	**-22%**
Easton Tpke	11.8	8.4	35.9	7.2	13.8	38.7	74.6	11.0	5.8	29.8	5.3	12.0	32.3	62.1	-0.8	-2.6	-6.0	-1.9	-1.8	-6.5	-12.5	-7%	-31%	-17%	-27%	-13%	-17%	-17%
Park Ave	11.6	9.0	36.3	8.0	13.9	40.4	76.6	10.6	6.3	30.0	6.1	12.1	33.9	64.0	-1.0	-2.7	-6.2	-1.9	-1.9	-6.4	-12.7	-8%	-30%	-17%	-24%	-13%	-16%	-17%
Route 111	11.5	9.6	37.3	8.5	13.5	40.6	77.9	10.3	6.8	30.9	6.6	12.0	34.5	65.4	-1.2	-2.7	-6.5	-1.9	-1.6	-6.1	-12.5	-11%	-29%	-17%	-23%	-12%	-15%	-16%
Route 25	**11.7**	**11.3**	**41.9**	**9.8**	**14.2**	**45.5**	**87.4**	**9.6**	**7.5**	**31.9**	**7.0**	**11.4**	**35.7**	**67.6**	**-2.1**	**-3.8**	**-10.0**	**-2.8**	**-2.8**	**-9.9**	**-19.8**	**-18%**	**-34%**	**-24%**	**-28%**	**-19%**	**-22%**	**-23%**
Route 108	12.8	12.6	46.2	11.8	14.8	49.6	95.8	11.2	10.2	39.7	9.5	13.2	43.1	82.9	-1.7	-2.4	-6.5	-2.3	-1.5	-6.4	-12.9	-13%	-19%	-14%	-20%	-10%	-13%	-13%
Route 8	11.1	11.0	40.0	10.6	12.4	42.7	82.7	9.5	8.8	33.9	8.7	10.9	37.0	70.9	-1.6	-2.2	-6.1	-1.9	-1.5	-5.7	-11.8	-14%	-20%	-15%	-18%	-12%	-13%	-14%
Route 110	12.4	11.9	44.9	11.1	13.0	45.4	90.2	9.9	9.4	36.6	8.7	10.6	38.0	74.7	-2.5	-2.5	-8.2	-2.4	-2.4	-7.4	-15.6	-20%	-21%	-18%	-21%	-18%	-16%	-17%
Housatonic River	**15.0**	**14.0**	**53.1**	**12.4**	**16.0**	**52.4**	**105.5**	**12.0**	**11.0**	**43.3**	**9.6**	**13.0**	**43.4**	**86.6**	**-3.0**	**-3.0**	**-9.8**	**-2.8**	**-3.0**	**-9.1**	**-18.9**	**-20%**	**-21%**	**-18%**	**-23%**	**-19%**	**-17%**	**-18%**
Wheelers Farms Rd	8.7	7.5	30.1	8.2	12.1	36.4	66.5	6.8	5.9	24.1	6.4	9.7	30.7	54.8	-1.9	-1.6	-6.0	-1.8	-2.3	-5.8	-11.7	-22%	-22%	-20%	-22%	-19%	-16%	-18%
Grassy Hill Rd	11.3	10.0	38.3	7.3	11.4	34.0	72.3	9.9	7.8	32.1	5.7	9.5	28.9	61.0	-1.5	-2.2	-6.2	-1.7	-1.9	-5.1	-11.4	-13%	-22%	-16%	-23%	-16%	-15%	-16%
Derby Ave	**10.6**	**10.0**	**37.0**	**7.3**	**10.7**	**32.8**	**69.8**	**8.7**	**7.4**	**29.6**	**5.4**	**8.2**	**26.2**	**55.8**	**-1.9**	**-2.6**	**-7.4**	**-1.8**	**-2.5**	**-6.6**	**-14.0**	**-18%**	**-26%**	**-20%**	**-25%**	**-23%**	**-20%**	**-20%**
Route 69	11.0	11.1	39.6	8.2	11.1	35.2	74.8	9.5	9.1	34.2	6.8	9.1	30.4	64.6	-1.5	-2.0	-5.4	-1.4	-1.9	-4.8	-10.2	-13%	-18%	-14%	-17%	-17%	-14%	-14%
Heroes Tunnel	**10.4**	**11.8**	**40.4**	**9.0**	**12.4**	**39.9**	**80.2**	**8.5**	**9.4**	**33.3**	**7.3**	**10.0**	**33.2**	**66.4**	**-1.9**	**-2.4**	**-7.1**	**-1.7**	**-2.4**	**-6.7**	**-13.8**	**-18%**	**-20%**	**-18%**	**-19%**	**-19%**	**-17%**	**-17%**
Tolling Locations Total	**115.7**	**97.4**	**375.7**	**75.2**	**127.4**	**368.2**	**743.9**	**91.6**	**67.2**	**290.4**	**52.7**	**101.5**	**288.8**	**579.2**	**-24.1**	**-30.2**	**-85.3**	**-22.5**	**-25.9**	**-79.4**	**-164.7**	**-21%**	**-31%**	**-23%**	**-30%**	**-20%**	**-22%**	**-22%**
Tolling Locations Avg	**11.6**	**9.7**	**37.6**	**7.5**	**12.7**	**36.8**	**74.4**	**9.2**	**6.7**	**29.0**	**5.3**	**10.1**	**28.9**	**57.9**	**-2.4**	**-3.0**	**-8.5**	**-2.2**	**-2.6**	**-7.9**	**-16.5**	**-21%**	**-31%**	**-23%**	**-30%**	**-20%**	**-22%**	**-22%**
Non-Tolling Locations Total	**195.5**	**166.3**	**639.9**	**135.3**	**217.5**	**641.4**	**1281.3**	**161.7**	**120.3**	**515.6**	**99.6**	**183.2**	**527.8**	**1043.4**	**-33.8**	**-46.0**	**-124.3**	**-35.7**	**-34.3**	**-113.6**	**-237.9**	**-17%**	**-28%**	**-19%**	**-26%**	**-16%**	**-18%**	**-19%**
Non-Tolling Locations Avg	**10.9**	**9.2**	**35.5**	**7.5**	**12.1**	**35.6**	**71.2**	**9.0**	**6.7**	**28.6**	**5.5**	**10.2**	**29.3**	**58.0**	**-1.9**	**-2.6**	**-6.9**	**-2.0**	**-1.9**	**-6.3**	**-13.2**	**-17%**	**-28%**	**-19%**	**-26%**	**-16%**	**-18%**	**-19%**

Notes:
Volume in 1000's
Shading indicates tolling location

Table 6-7
Year 2020 I-95 Traffic Comparisons
Toll Free I-95 Widening vs Alternative 4 - Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak)

	2020 I-95 Toll Free with I-95 Widening							2020 Alternative 4 - I-95 Widening and Tolling ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Delavan Ave.	**18.2**	**20.7**	**79.3**	**19.6**	**19.2**	**77.8**	**157.0**	**15.1**	**16.6**	**64.9**	**16.3**	**16.3**	**65.3**	**130.3**	**-3.1**	**-4.1**	**-14.3**	**-3.3**	**-2.9**	**-12.4**	**-26.8**	**-17%**	**-20%**	**-18%**	**-17%**	**-15%**	**-16%**	**-17%**
Field Point Rd.	19.0	21.9	83.5	20.6	19.9	82.1	165.6	16.5	18.9	72.2	17.6	17.6	70.7	142.9	-2.5	-3.0	-11.3	-3.1	-2.2	-11.4	-22.7	-13%	-14%	-14%	-15%	-11%	-14%	-14%
Indian Field Rd.	21.7	21.0	86.0	20.4	21.6	85.6	171.7	19.0	17.5	73.7	17.1	19.3	73.6	147.2	-2.7	-3.5	-12.3	-3.3	-2.4	-12.1	-24.4	-12%	-17%	-14%	-16%	-11%	-14%	-14%
Mianus River	**22.0**	**20.7**	**85.9**	**20.1**	**22.0**	**85.5**	**171.4**	**18.5**	**16.3**	**70.0**	**16.2**	**19.1**	**72.0**	**142.0**	**-3.4**	**-4.4**	**-15.9**	**-3.9**	**-3.0**	**-13.5**	**-29.3**	**-16%**	**-21%**	**-18%**	**-19%**	**-13%**	**-16%**	**-17%**
Harvard Ave.	22.6	20.9	87.8	20.1	21.9	86.5	174.3	20.6	18.6	78.0	16.9	20.1	76.1	154.1	-2.0	-2.3	-9.9	-3.2	-1.9	-10.4	-20.3	-9%	-11%	-11%	-16%	-9%	-12%	-12%
Greenwich Ave.	25.4	21.8	94.0	21.0	24.2	92.5	186.6	22.5	18.9	82.8	17.6	22.0	81.7	164.5	-2.9	-2.8	-11.3	-3.5	-2.2	-10.8	-22.1	-11%	-13%	-12%	-16%	-9%	-12%	-12%
Washington Blvd.	23.5	17.3	82.7	16.7	22.4	82.3	165.0	20.6	14.3	70.9	13.8	20.7	72.4	143.3	-3.0	-3.0	-11.8	-2.9	-1.7	-9.9	-21.7	-13%	-17%	-14%	-17%	-8%	-12%	-13%
Elm St.	24.7	17.1	84.4	14.1	22.2	78.0	162.3	21.4	13.6	71.1	10.7	20.0	66.3	137.4	-3.3	-3.6	-13.3	-3.4	-2.2	-11.6	-24.9	-13%	-21%	-16%	-24%	-10%	-15%	-15%
E. Main St.	28.7	20.4	95.7	16.4	26.3	91.4	187.1	24.7	16.1	80.6	12.6	23.5	77.7	158.3	-4.0	-4.3	-15.1	-3.7	-2.8	-13.7	-28.8	-14%	-21%	-16%	-23%	-11%	-15%	-15%
Noroton Ave.	**28.6**	**21.5**	**98.2**	**17.6**	**26.2**	**93.2**	**191.4**	**22.2**	**14.6**	**73.6**	**11.7**	**22.3**	**72.8**	**146.5**	**-6.4**	**-7.0**	**-24.6**	**-5.8**	**-3.9**	**-20.3**	**-44.9**	**-22%**	**-32%**	**-25%**	**-33%**	**-15%**	**-22%**	**-23%**
Boston Post Rd.	28.1	21.5	96.6	17.6	26.0	92.4	189.0	21.9	15.0	73.9	12.1	22.7	74.1	148.0	-6.1	-6.4	-22.6	-5.5	-3.2	-18.3	-40.9	-22%	-30%	-23%	-31%	-12%	-20%	-22%
Tekeneke Rd.	29.0	22.9	103.2	17.9	27.6	97.5	200.7	25.4	18.5	88.0	14.4	25.3	84.9	173.0	-3.7	-4.3	-15.2	-3.5	-2.4	-12.5	-27.7	-13%	-19%	-15%	-20%	-9%	-13%	-14%
Old Kings Hwy.	27.8	21.3	96.6	16.5	25.6	89.4	186.0	23.9	16.6	80.4	13.0	23.3	76.8	157.2	-4.0	-4.7	-16.2	-3.5	-2.3	-12.6	-28.8	-14%	-22%	-17%	-21%	-9%	-14%	-15%
Scribner Ave.	**26.7**	**19.4**	**89.4**	**15.5**	**23.5**	**83.1**	**172.5**	**21.4**	**13.9**	**69.6**	**10.4**	**20.6**	**65.6**	**135.2**	**-5.3**	**-5.5**	**-19.8**	**-5.1**	**-2.8**	**-17.5**	**-37.2**	**-20%**	**-28%**	**-22%**	**-33%**	**-12%**	**-21%**	**-22%**
US 7	27.1	22.3	98.9	16.5	26.5	92.0	190.9	23.0	17.1	81.5	12.6	23.7	77.5	159.0	-4.2	-5.2	-17.3	-3.9	-2.8	-14.6	-31.9	-15%	-23%	-18%	-24%	-11%	-16%	-17%
Norwalk River	24.3	20.7	90.6	17.3	28.7	97.2	187.7	21.0	15.5	74.4	12.9	24.5	79.7	154.1	-3.3	-5.2	-16.2	-4.4	-4.2	-17.4	-33.7	-14%	-25%	-18%	-26%	-15%	-18%	-18%
Riverside Ave.	**22.1**	**18.1**	**82.1**	**15.7**	**26.7**	**89.8**	**171.8**	**18.0**	**12.1**	**62.1**	**10.7**	**21.8**	**69.7**	**131.8**	**-4.1**	**-6.1**	**-20.0**	**-4.9**	**-4.8**	**-20.1**	**-40.1**	**-19%**	**-33%**	**-24%**	**-32%**	**-18%**	**-22%**	**-23%**
Sherwood Is. Conn.	21.6	17.5	79.8	14.8	26.7	87.7	167.5	18.4	12.5	63.5	10.6	22.5	70.5	134.0	-3.2	-5.0	-16.4	-4.3	-4.2	-17.2	-33.6	-15%	-29%	-21%	-29%	-16%	-20%	-20%
Center St.	**21.2**	**16.7**	**77.6**	**13.9**	**26.3**	**85.1**	**162.6**	**17.7**	**11.4**	**59.6**	**9.6**	**21.8**	**66.9**	**126.6**	**-3.5**	**-5.3**	**-17.9**	**-4.3**	**-4.5**	**-18.1**	**-36.0**	**-17%**	**-32%**	**-23%**	**-31%**	**-17%**	**-21%**	**-22%**
Bronson Rd.	23.0	17.7	82.5	14.9	27.9	90.7	173.2	19.9	13.2	67.5	11.3	24.7	76.5	144.0	-3.1	-4.6	-15.1	-3.5	-3.2	-14.2	-29.2	-14%	-26%	-18%	-24%	-11%	-16%	-17%
Mill Plain Rd.	23.7	18.3	85.1	15.2	29.0	93.6	178.6	20.5	13.6	69.6	11.6	25.5	78.6	148.2	-3.2	-4.7	-15.5	-3.7	-3.5	-15.0	-30.4	-14%	-26%	-18%	-24%	-12%	-16%	-17%
Round Hill Rd.	23.6	19.0	86.0	15.7	30.6	96.8	182.8	20.3	14.0	70.3	11.7	26.6	80.0	150.4	-3.3	-5.0	-15.7	-4.0	-4.0	-16.8	-32.4	-14%	-26%	-18%	-26%	-13%	-17%	-18%
Meadowbrook Rd.	**23.8**	**19.7**	**88.8**	**16.0**	**31.0**	**98.7**	**187.5**	**19.4**	**12.9**	**66.5**	**10.5**	**24.1**	**73.4**	**139.9**	**-4.3**	**-6.8**	**-22.3**	**-5.5**	**-6.9**	**-25.3**	**-47.6**	**-18%**	**-34%**	**-25%**	**-34%**	**-22%**	**-26%**	**-25%**
Int. 24	23.9	19.8	88.4	16.1	30.8	98.5	186.9	20.9	14.3	71.4	12.2	26.9	82.4	153.8	-3.0	-5.4	-17.0	-4.0	-3.9	-16.2	-33.1	-13%	-28%	-19%	-25%	-13%	-16%	-18%
Commerce Dr./Fairfield Ave.	22.8	20.2	87.7	16.1	30.1	95.1	182.8	21.0	15.4	73.9	12.2	26.7	80.4	154.3	-1.8	-4.8	-13.9	-3.9	-3.4	-14.7	-28.6	-8%	-24%	-16%	-24%	-11%	-15%	-16%
Wordin Ave.	23.3	21.8	92.3	17.9	31.6	102.5	194.8	22.1	17.7	80.9	13.9	27.9	87.6	168.6	-1.2	-4.2	-11.4	-4.0	-3.8	-14.9	-26.3	-5%	-19%	-12%	-22%	-12%	-15%	-13%
Park Ave.	24.2	22.4	94.7	18.4	32.2	104.5	199.2	22.7	17.8	81.9	14.5	28.3	89.5	171.3	-1.5	-4.6	-12.8	-3.9	-3.9	-15.1	-27.9	-6%	-21%	-14%	-21%	-12%	-14%	-14%
Pequonnock River	**19.9**	**21.6**	**85.5**	**17.0**	**27.9**	**92.2**	**177.7**	**17.0**	**14.9**	**64.8**	**12.2**	**23.2**	**73.7**	**138.6**	**-2.9**	**-6.7**	**-20.7**	**-4.8**	**-4.8**	**-18.5**	**-39.2**	**-14%**	**-31%**	**-24%**	**-28%**	**-17%**	**-20%**	**-22%**
Seaview Ave.	18.9	20.3	81.0	16.0	26.0	85.7	166.7	16.4	14.4	62.5	11.8	22.3	70.5	133.0	-2.4	-5.9	-18.5	-4.2	-3.7	-15.3	-33.8	-13%	-29%	-23%	-26%	-14%	-18%	-20%
Hollister Ave.	19.0	19.4	78.7	15.4	25.5	83.7	162.5	17.7	15.4	66.8	12.4	22.6	72.8	139.6	-1.3	-4.0	-11.9	-2.9	-2.9	-10.9	-22.9	-7%	-21%	-15%	-19%	-11%	-13%	-14%
Honeyspot Rd.	17.2	17.0	70.7	13.1	23.0	74.7	145.4	15.8	13.3	59.2	10.2	20.3	63.8	123.0	-1.4	-3.7	-11.5	-2.9	-2.7	-10.9	-22.4	-8%	-22%	-16%	-22%	-12%	-15%	-15%
W. Broad St.	17.9	17.1	71.9	13.1	22.4	73.4	145.2	16.1	13.5	59.5	9.8	19.6	61.6	121.1	-1.8	-3.7	-12.4	-3.3	-2.8	-11.8	-24.2	-10%	-21%	-17%	-25%	-12%	-16%	-17%
Route 130	**18.0**	**18.3**	**74.4**	**13.8**	**22.1**	**74.0**	**148.3**	**14.9**	**13.5**	**57.6**	**9.7**	**18.3**	**58.7**	**116.3**	**-3.0**	**-4.8**	**-16.8**	**-4.1**	**-3.8**	**-15.3**	**-32.1**	**-17%**	**-26%**	**-23%**	**-30%**	**-17%**	**-21%**	**-22%**
Housatonic River	15.9	16.3	66.3	12.6	19.4	66.1	132.4	14.0	12.7	53.9	9.2	16.7	54.1	108.0	-1.9	-3.6	-12.4	-3.4	-2.7	-12.0	-24.4	-12%	-22%	-19%	-27%	-14%	-18%	-18%
Schoolhouse Rd./BIC Dr.	16.9	18.3	72.0	13.7	20.1	70.2	142.2	15.0	14.4	59.2	11.2	18.2	61.6	120.8	-1.9	-3.9	-12.7	-2.5	-2.0	-8.6	-21.3	-11%	-21%	-18%	-18%	-10%	-12%	-15%
Plains Rd.	16.9	18.5	72.6	14.1	20.6	72.4	145.0	15.6	15.2	61.8	11.8	19.0	64.4	126.2	-1.3	-3.3	-10.8	-2.3	-1.6	-7.9	-18.8	-7%	-18%	-15%	-16%	-8%	-11%	-13%
Zion Hill Rd./High St.	17.3	18.7	73.2	14.5	21.2	73.5	146.7	16.0	15.5	62.5	12.0	19.3	64.8	127.2	-1.3	-3.1	-10.8	-2.5	-1.9	-8.8	-19.5	-8%	-17%	-15%	-17%	-9%	-12%	-13%
Int. 39	**18.4**	**20.7**	**78.8**	**15.9**	**20.7**	**76.2**	**155.0**	**13.5**	**14.2**	**59.2**	**10.2**	**16.6**	**58.0**	**117.2**	**-4.8**	**-6.4**	**-19.6**	**-5.7**	**-4.1**	**-18.2**	**-37.8**	**-26%**	**-31%**	**-25%**	**-36%**	**-20%**	**-24%**	**-24%**
Woodmont Rd.	18.4	20.1	76.7	16.1	21.3	77.5	154.1	14.6	16.1	63.4	11.8	18.0	64.3	127.8	-3.8	-4.0	-13.2	-4.3	-3.3	-13.1	-26.4	-21%	-20%	-17%	-27%	-15%	-17%	-17%
Marsh Hill Rd.	18.3	19.9	76.1	16.0	20.7	76.9	153.0	14.4	15.7	62.0	11.5	17.3	62.9	124.9	-3.9	-4.3	-14.1	-4.4	-3.5	-14.0	-28.1	-21%	-21%	-18%	-28%	-17%	-18%	-18%
Saw Mill Rd.	**18.3**	**20.5**	**77.5**	**16.0**	**19.3**	**74.4**	**151.9**	**13.6**	**14.9**	**59.7**	**10.8**	**15.1**	**56.8**	**116.5**	**-4.7**	**-5.5**	**-17.8**	**-5.2**	**-4.2**	**-17.6**	**-35.5**	**-26%**	**-27%**	**-23%**	**-33%**	**-22%**	**-24%**	**-23%**
Campbell Ave.	18.4	21.7	80.3	17.4	18.7	75.9	156.1	14.6	17.4	66.0	12.8	15.7	61.3	127.2	-3.8	-4.3	-14.3	-4.6	-3.0	-14.6	-28.9	-21%	-20%	-18%	-27%	-16%	-19%	-19%
West River	19.9	23.0	84.3	17.8	18.9	77.2	161.6	16.1	18.7	70.0	13.2	16.2	62.7	132.7	-3.8	-4.3	-14.4	-4.6	-2.7	-14.5	-28.9	-19%	-19%	-17%	-26%	-14%	-19%	-18%
Long Wharf Dr.	**21.2**	**23.8**	**88.6**	**20.1**	**21.5**	**86.5**	**175.2**	**16.5**	**18.1**	**70.2**	**14.6**	**17.7**	**68.6**	**138.8**	**-4.7**	**-5.8**	**-18.4**	**-5.5**	**-3.7**	**-17.9**	**-36.4**	**-22%**	**-24%**	**-21%**	**-28%**	**-17%**	**-21%**	**-21%**
I-91 Split	20.8	22.6	86.4	18.7	21.5	83.8	170.2	17.6	18.6	72.9	14.9	19.1	70.7	143.6	-3.2	-4.0	-13.5	-3.8	-2.5	-13.0	-26.6	-15%	-18%	-16%	-20%	-11%	-16%	-16%
Tolling Locations Total	**258.4**	**241.8**	**1006.0**	**201.2**	**286.4**	**1016.4**	**2022.4**	**208.0**	**173.4**	**777.9**	**143.0**	**237.0**	**801.6**	**1579.5**	**-50.4**	**-68.4**	**-228.1**	**-58.2**	**-49.4**	**-214.8**	**-442.9**	**-20%**	**-28%**	**-23%**	**-29%**	**-17%**	**-21%**	**-22%**
Tolling Locations Avg	**21.5**	**20.2**	**83.8**	**16.8**	**23.9**	**84.7**	**168.5**	**17.3**	**14.4**	**64.8**	**11.9**	**19.7**	**66.8**	**131.6**	**-4.2**	**-5.7**	**-19.0**	**-4.8**	**-4.1**	**-17.9**	**-36.9**	**-20%**	**-28%**	**-23%**	**-29%**	**-17%**	**-21%**	**-22%**
Non-Tolling Locations Total	**723.9**	**658.8**	**2786.8**	**543.1**	**811.4**	**2827.3**	**5614.1**	**629.9**	**520.1**	**2326.0**	**422.1**	**715.9**	**2392.6**	**4718.6**	**-93.9**	**-138.8**	**-460.7**	**-121.0**	**-95.5**	**-434.7**	**-895.4**	**-13%**	**-21%**	**-17%**	**-22%**	**-12%**	**-15%**	**-16%**
Non-Tolling Locations Avg	**21.9**	**20.0**	**84.4**	**16.5**	**24.6**	**85.7**	**170.1**	**19.1**	**15.8**	**70.5**	**12.8**	**21.7**	**72.5**	**143.0**	**-2.8**	**-4.2**	**-14.0**	**-3.7**	**-2.9**	**-13.2**	**-27.1**	**-13%**	**-21%**	**-17%**	**-22%**	**-12%**	**-15%**	**-16%**

Notes:
Volume in 1000's
Shading indicates tolling location

Bridgeport. To the right of the toll free estimates are results from Alternative 4 (I-95 Widening with I-95 Tolling). In the southbound direction during the AM Peak Period, traffic is estimated to reduce between 14 and 26 percent depending on the toll location, with an overall average of 20 percent across the tolling locations. In the northbound direction during the PM Peak Period, traffic is estimated to reduce between 12 and 22 percent depending on the toll location, with an overall average of 17 percent across the tolling locations. On a daily basis, traffic loss along I-95 is estimated to be 22 percent along the tolled segments and 16 percent along the non-tolled segments. These percent reductions in I-95 traffic are slightly higher than Alternative 1, but they are also off a higher base since the widening of I-95 has the impact of attracting more demand to I-95. On a daily basis, about 6 percent more traffic is realized under widening. However, during the peak travel directions during the peak periods, roughly 20 percent more traffic on average is added to I-95 along the widened sections of I-95. A slightly higher loss of traffic under Alternative 4 versus Alternative 1 would be expected as some of this additional traffic under toll free widened conditions would be more likely to return to their original travel route to avoid the toll, as compared to traffic that was already using I-95.

Table 6-8 shows 2020 estimated volumes in thousands along the mainline segments of Route 15 in the southbound and northbound directions under I-95 widened toll free and I-95 widened and tolled conditions. To the right of the Route 15 traffic estimates are corresponding Route 15 estimates under Alternative 4 (I-95 widened with I-95 Tolling). In the southbound direction during the AM Peak Period, traffic is estimated to increase on average by 8 percent. In the northbound direction during the PM, the traffic gain is estimated to be 6 percent on average. On a daily basis, traffic gain along Route 15 is estimated to be 20 percent on average between New Haven and NY.

However, when Alternative 4 volumes are compared to 2020 estimated volumes under No Build Toll Free volumes on I-95 and Route 15 (**Table 6-9**), there is very little impact shown for the AM and PM periods in the major travel directions. This is a key finding, as it illustrates that a widening and tolling of I-95 has the overall impact of managing demand to roughly the 2020 no build toll free volumes, but now on a facility that has increased capacity. Route 15 volumes during the major direction of travel during the peak periods are also roughly equivalent to the no build toll free condition. As shown at the bottom of the table, the average volume along segments of both facilities combined is lower by only 6 percent on a daily basis when compared against the no build toll free condition.

Alternative 5

Table 6-10 shows 2020 estimated volumes in thousands along the mainline segments of I-95 in the southbound and northbound directions for toll free widening conditions. Under Alternative 5, one additional general purpose lane in each direction is assumed along I-95 between Stamford and Bridgeport. To the right of the toll free estimates are results from Alternative 5 (I-95 Widening with I-95 and Route 15 Tolling). In the southbound direction during the AM Peak Period, traffic is estimated to reduce 15 percent on average across the tolling locations. In the northbound direction during the PM Peak Period, traffic is estimated to reduce by 13 percent on average across the tolling locations. On a daily basis, traffic loss along I-95 is estimated to be 15 percent along the tolled segments and 8 percent along the non-tolled segments.

Table 6-11 shows 2020 estimated volumes in thousands along the mainline segments of Route 15 in the southbound and northbound directions under I-95 widened toll free and I-95 widened with I-95 and Route 15 tolling. To the right of the Route 15 traffic estimates are corresponding Route 15 estimates under Alternative 5 (I-95 widened with I-95 and Route 15 Tolling). In the southbound

Table 6-8
Year 2020 Rt 15 Traffic Comparisons
Toll Free I-95 Widening vs Alternative 4 - Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak)

	2020 I-95 Toll Free with I-95 Widening							2020 Alternative 4 - I-95 Widening and Tolling ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Round Hill Rd	7.7	7.5	25.7	4.6	8.1	20.7	46.5	8.6	8.7	32.1	5.4	8.3	25.4	57.6	0.8	1.1	6.4	0.9	0.3	4.7	11.1	11%	15%	25%	19%	3%	23%	24%
Old Mill Rd Int	8.3	7.6	26.5	4.8	8.8	22.5	49.0	9.1	8.7	32.9	5.7	9.0	27.1	59.9	0.8	1.1	6.4	0.8	0.1	4.6	11.0	10%	15%	24%	18%	2%	20%	22%
North St	9.1	8.2	28.5	4.8	8.9	22.4	50.9	9.7	9.1	34.5	5.6	9.0	27.1	61.5	0.6	1.0	6.0	0.8	0.2	4.6	10.6	7%	12%	21%	18%	2%	21%	21%
Den Rd	9.9	8.3	29.5	5.1	10.0	24.9	54.4	10.8	9.3	36.0	6.1	10.3	30.2	66.2	0.9	1.0	6.4	1.0	0.3	5.4	11.8	9%	12%	22%	20%	3%	22%	22%
Long Ridge Rd	10.0	8.9	31.2	5.6	10.3	26.5	57.7	11.0	9.9	37.7	6.7	10.7	32.0	69.7	0.9	1.0	6.5	1.1	0.4	5.5	11.9	9%	11%	21%	19%	4%	21%	21%
High Ridge Rd	10.4	9.1	32.4	5.5	10.8	27.8	60.2	11.2	10.1	38.8	6.4	11.0	32.7	71.5	0.9	1.0	6.3	0.9	0.2	4.9	11.2	8%	11%	20%	16%	2%	18%	19%
Old Stamford Rd	10.3	8.9	32.5	6.2	11.2	30.0	62.5	11.6	10.5	40.3	7.7	11.6	36.6	76.9	1.3	1.6	7.8	1.5	0.4	6.6	14.4	13%	18%	24%	24%	4%	22%	23%
White Birch Rd / South Ave	9.8	9.1	32.1	6.6	11.3	30.6	62.7	11.3	11.0	41.1	8.2	11.8	37.8	78.9	1.5	1.9	9.1	1.6	0.5	7.2	16.2	16%	20%	28%	25%	5%	23%	26%
New Canaan Ave	9.5	8.5	30.9	6.4	11.3	30.1	61.0	11.1	10.7	40.5	8.1	12.0	38.0	78.5	1.7	2.2	9.6	1.7	0.7	7.9	17.5	18%	26%	31%	27%	6%	26%	29%
US 7	9.8	9.4	32.9	7.5	12.0	33.6	66.4	11.2	11.4	41.9	9.3	12.6	41.5	83.3	1.4	2.1	9.0	1.7	0.7	7.9	16.9	14%	22%	27%	23%	6%	24%	25%
Merritt 7 Railroad Bridge	6.9	5.8	22.2	5.2	8.7	23.5	45.7	8.1	7.8	30.4	6.7	9.5	30.9	61.3	1.1	2.0	8.2	1.5	0.8	7.4	15.6	16%	35%	37%	28%	9%	31%	34%
Main Ave	8.3	5.6	23.9	5.1	8.9	23.9	47.8	9.3	7.7	32.2	6.5	9.7	31.3	63.5	1.0	2.1	8.3	1.5	0.8	7.4	15.7	12%	38%	35%	29%	9%	31%	33%
Route 33	9.6	5.6	25.7	4.7	9.9	25.4	51.1	10.5	7.7	34.2	6.6	11.1	34.3	68.5	1.0	2.2	8.4	1.8	1.2	8.9	17.4	10%	39%	33%	39%	12%	35%	34%
Weston Rd	11.6	6.3	30.1	5.7	12.0	30.8	60.9	12.7	8.5	38.8	7.6	13.3	40.2	78.9	1.1	2.2	8.7	1.9	1.3	9.4	18.1	9%	35%	29%	33%	11%	30%	30%
Black Rock Tpke	11.5	6.4	29.9	5.7	11.7	30.4	60.3	12.4	8.6	38.4	7.5	13.2	39.7	78.0	1.0	2.2	8.4	1.8	1.5	9.3	17.7	8%	34%	28%	32%	12%	31%	29%
Easton Tpke	11.3	7.5	32.1	6.7	12.1	33.5	65.6	12.0	9.4	39.5	8.3	13.2	41.7	81.2	0.7	1.9	7.4	1.5	1.2	8.2	15.6	6%	25%	23%	23%	10%	24%	24%
Park Ave	11.1	8.2	32.6	7.6	12.2	35.3	67.9	11.8	9.9	39.9	9.1	13.4	43.3	83.2	0.7	1.8	7.3	1.4	1.2	8.0	15.3	6%	22%	22%	19%	10%	23%	23%
Route 111	10.8	8.7	33.5	8.1	12.1	35.9	69.4	11.5	10.5	40.7	9.5	13.3	43.8	84.5	0.7	1.7	7.1	1.4	1.2	8.0	15.1	6%	20%	21%	18%	10%	22%	22%
Route 25	11.1	10.6	38.4	9.4	12.8	41.2	79.5	11.8	12.0	45.1	10.6	13.9	48.6	93.7	0.7	1.5	6.8	1.2	1.1	7.4	14.2	6%	14%	18%	13%	9%	18%	18%
Route 108	12.3	12.0	43.2	11.4	13.7	46.5	89.7	13.0	13.4	49.7	12.5	14.5	53.0	102.7	0.7	1.4	6.5	1.1	0.8	6.5	13.0	5%	12%	15%	10%	6%	14%	14%
Route 8	10.5	10.4	36.9	10.3	11.3	39.9	76.8	11.0	11.7	43.0	11.3	12.1	45.9	88.9	0.5	1.3	6.0	1.0	0.7	6.0	12.1	5%	13%	16%	9%	6%	15%	16%
Route 110	12.3	11.5	43.5	10.9	12.7	44.4	87.9	12.5	12.0	47.9	11.6	12.9	48.5	96.3	0.2	0.5	4.4	0.7	0.2	4.1	8.5	2%	4%	10%	6%	2%	9%	10%
Housatonic River	14.9	13.6	51.7	12.3	15.7	51.6	103.3	15.0	14.1	56.2	13.2	15.9	55.9	112.2	0.2	0.5	4.5	0.9	0.1	4.3	8.9	1%	3%	9%	7%	1%	8%	9%
Wheelers Farms Rd	8.9	7.5	29.9	8.2	12.3	36.5	66.4	9.1	8.0	34.7	9.5	12.9	42.5	77.2	0.2	0.5	4.9	1.3	0.5	6.0	10.8	2%	7%	16%	17%	4%	16%	16%
Grassy Hill Rd	11.5	10.0	38.2	7.3	11.7	34.1	72.2	12.7	11.4	44.8	8.7	12.7	40.6	85.5	1.3	1.4	6.7	1.4	1.1	6.6	13.2	11%	14%	17%	19%	9%	19%	18%
Derby Ave	10.8	10.0	37.0	7.2	10.9	32.9	69.9	12.0	11.0	43.1	8.1	11.7	38.3	81.4	1.2	1.1	6.1	0.9	0.8	5.4	11.5	11%	11%	16%	12%	7%	16%	16%
Route 69	11.1	11.0	39.5	8.2	11.3	35.4	74.9	11.6	11.8	42.2	8.7	11.6	36.9	79.1	0.5	0.7	2.6	0.6	0.3	1.6	4.2	4%	7%	7%	7%	2%	4%	6%
Heroes Tunnel	10.5	11.8	40.4	9.0	12.6	40.0	80.3	10.8	12.1	42.0	9.4	12.6	40.7	82.7	0.3	0.3	1.7	0.4	0.0	0.7	2.4	3%	3%	4%	4%	0%	2%	3%
Total	**289.7**	**248.0**	**930.8**	**200.2**	**315.4**	**910.0**	**1840.9**	**313.4**	**287.1**	**1118.4**	**234.6**	**334.0**	**1084.5**	**2202.9**	**23.7**	**39.0**	**187.6**	**34.4**	**18.6**	**174.4**	**362.0**	**8%**	**16%**	**20%**	**17%**	**6%**	**19%**	**20%**
Average	**10.3**	**8.9**	**33.2**	**7.1**	**11.3**	**32.5**	**65.7**	**11.2**	**10.3**	**39.9**	**8.4**	**11.9**	**38.7**	**78.7**	**0.8**	**1.4**	**6.7**	**1.2**	**0.7**	**6.2**	**12.9**	**8%**	**16%**	**20%**	**17%**	**6%**	**19%**	**20%**

Note:
Volume in 1000's

Table 6-9
2020 Average Mainline Volumes (000's) - New Haven to NY

Time Period	I-95 No Build Toll Free			I-95 Alternative 4			Net Impact Alt 4 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	19.9	16.1	36.0	18.6	12.6	31.2	-1.3	-3.5	-4.8	-7%	-22%	-13%
PM	19.3	21.9	41.2	15.4	21.2	36.6	-3.9	-0.7	-4.6	-20%	-3%	-11%
Daily	79.7	80.0	159.7	69.0	71.0	140.0	-10.7	-9.0	-19.7	-13%	-11%	-12%
Time Period	Route 15 No Build Toll Free			Route 15 Alternative 4			Net Impact Alt 4 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	11.1	7.5	18.6	11.2	8.4	19.6	0.1	0.9	1.0	1%	12%	5%
PM	9.4	12.3	21.7	10.3	11.9	22.2	0.9	-0.4	0.5	10%	-3%	2%
Daily	36.3	36.1	72.4	39.9	38.7	78.6	3.6	2.6	6.2	10%	7%	9%
Time Period	I-95 and Route 15 No Build Toll Free			I-95 and Route 15 Alternative 4			Net Impact Alt 4 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	31.0	23.6	54.6	29.8	21.0	50.8	-1.2	-2.6	-3.8	-4%	-11%	-7%
PM	28.7	34.2	62.9	25.7	33.1	58.8	-3.0	-1.1	-4.1	-10%	-3%	-7%
Daily	116.0	116.1	232.1	108.9	109.7	218.6	-7.1	-6.4	-13.5	-6%	-6%	-6%

direction during the AM Peak Period, traffic is estimated to reduce on average by 25 percent at the tolling locations. In the northbound direction during the PM, the traffic loss at the tolling locations is estimated to be 28 percent on average. On a daily basis, traffic loss at the tolling segments along Route 15 is estimated to be 24 percent on average between New Haven and NY.

When Alternative 5 volumes are compared to 2020 estimated volumes under No Build Toll Free volumes on I-95 (**Table 6-12**), there is very little impact shown for the AM and PM periods in the major travel directions. In addition, the volume estimated to occur in the off-peak directions as well as on a daily basis are approaching the No Build I-95 Toll Free estimates. This is due to the tolling of Route 15, which has the impact of mitigating some of the diversion off of I-95. However, Route 15 traffic is significantly lower (-29 percent) when compared to the Route 15 volumes under the No Build I-95 Toll Free estimates. This is a combination of the widening of I-95, in addition to the tolling of Route 15. As shown at the bottom of the table, the average volume along segments of both facilities combined is lower by about 12 percent on a daily basis when compared against the no build toll free condition.

Table 6-10
Year 2020 I-95 Traffic Comparisons
Toll Free I-95 Widening vs Alternative 5 - Widen I-95 and Toll I-95 and Rt 15 ($0.50 Peak/$0.35 Off Peak)

	2020 I-95 Toll Free with I-95 Widening							2020 Alternative 5 - Widen I-95 and Toll I-95 and Rt 15 ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Location: South of:	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Delavan Ave.	**18.2**	**20.7**	**79.3**	**19.6**	**19.2**	**77.8**	**157.0**	**16.3**	**18.3**	**71.3**	**17.6**	**17.2**	**70.5**	**141.7**	**-1.9**	**-2.4**	**-8.0**	**-2.0**	**-2.0**	**-7.3**	**-15.3**	**-10%**	**-11%**	**-10%**	**-10%**	**-10%**	**-9%**	**-10%**
Field Point Rd.	19.0	21.9	83.5	20.6	19.9	82.1	165.6	18.1	20.8	79.5	18.9	18.7	76.3	155.8	-0.9	-1.0	-4.0	-1.7	-1.2	-5.8	-9.8	-5%	-5%	-5%	-8%	-6%	-7%	-6%
Indian Field Rd.	21.7	21.0	86.0	20.4	21.6	85.6	171.7	20.8	19.6	82.1	18.7	20.7	80.1	162.3	-0.9	-1.3	-3.9	-1.6	-1.0	-5.5	-9.4	-4%	-6%	-5%	-8%	-4%	-6%	-5%
Mianus River	**22.0**	**20.7**	**85.9**	**20.1**	**22.0**	**85.5**	**171.4**	**20.2**	**18.4**	**78.0**	**17.9**	**20.2**	**78.4**	**156.3**	**-1.8**	**-2.3**	**-7.9**	**-2.3**	**-1.8**	**-7.1**	**-15.1**	**-8%**	**-11%**	**-9%**	**-11%**	**-8%**	**-8%**	**-9%**
Harvard Ave.	22.6	20.9	87.8	20.1	21.9	86.5	174.3	21.9	20.2	86.2	18.7	21.3	83.3	169.5	-0.6	-0.7	-1.6	-1.4	-0.6	-3.2	-4.8	-3%	-3%	-2%	-7%	-3%	-4%	-3%
Greenwich Ave.	25.4	21.8	94.0	21.0	24.2	92.5	186.6	24.6	21.1	92.4	19.6	23.7	90.0	182.4	-0.9	-0.6	-1.7	-1.5	-0.4	-2.5	-4.2	-3%	-3%	-2%	-7%	-2%	-3%	-2%
Washington Blvd.	23.5	17.3	82.7	16.7	22.4	82.3	165.0	22.7	16.7	80.7	16.0	22.3	80.8	161.5	-0.9	-0.6	-2.0	-0.8	-0.1	-1.5	-3.5	-4%	-3%	-2%	-5%	-1%	-2%	-2%
Elm St.	24.7	17.1	84.4	14.1	22.2	78.0	162.3	23.7	16.5	81.7	13.1	21.8	75.3	157.0	-1.0	-0.7	-2.6	-1.1	-0.5	-2.7	-5.3	-4%	-4%	-3%	-7%	-2%	-3%	-3%
E. Main St.	28.7	20.4	95.7	16.4	26.3	91.4	187.1	27.0	19.2	91.9	15.2	25.6	87.5	179.4	-1.7	-1.2	-3.8	-1.2	-0.8	-3.8	-7.7	-6%	-6%	-4%	-7%	-3%	-4%	-4%
Noroton Ave.	**28.6**	**21.5**	**98.2**	**17.6**	**26.2**	**93.2**	**191.4**	**24.2**	**17.2**	**82.9**	**14.0**	**23.9**	**81.4**	**164.3**	**-4.5**	**-4.3**	**-15.3**	**-3.5**	**-2.3**	**-11.8**	**-27.1**	**-16%**	**-20%**	**-16%**	**-20%**	**-9%**	**-13%**	**-14%**
Boston Post Rd.	28.1	21.5	96.6	17.6	26.0	92.4	189.0	24.0	17.7	83.3	14.5	24.4	82.7	166.0	-4.1	-3.8	-13.3	-3.2	-1.5	-9.7	-23.0	-15%	-18%	-14%	-18%	-6%	-11%	-12%
Tekeneke Rd.	29.0	22.9	103.2	17.9	27.6	97.5	200.7	27.9	21.4	99.6	17.1	27.2	95.0	194.6	-1.2	-1.5	-3.6	-0.8	-0.4	-2.5	-6.1	-4%	-7%	-4%	-4%	-1%	-3%	-3%
Old Kings Hwy.	27.8	21.3	96.6	16.5	25.6	89.4	186.0	26.3	19.7	92.1	15.7	25.2	86.7	178.8	-1.5	-1.7	-4.5	-0.8	-0.4	-2.7	-7.2	-5%	-8%	-5%	-5%	-1%	-3%	-4%
Scribner Ave.	**26.7**	**19.4**	**89.4**	**15.5**	**23.5**	**83.1**	**172.5**	**23.4**	**16.5**	**79.3**	**12.4**	**22.0**	**73.3**	**152.6**	**-3.3**	**-3.0**	**-10.1**	**-3.1**	**-1.5**	**-9.8**	**-19.9**	**-12%**	**-15%**	**-11%**	**-20%**	**-6%**	**-12%**	**-12%**
US 7	27.1	22.3	98.9	16.5	26.5	92.0	190.9	25.0	19.8	91.3	14.5	25.2	85.3	176.6	-2.1	-2.5	-7.5	-2.0	-1.4	-6.8	-14.3	-8%	-11%	-8%	-12%	-5%	-7%	-7%
Norwalk River	24.3	20.7	90.6	17.3	28.7	97.2	187.7	21.6	17.6	81.0	14.4	25.4	86.3	167.4	-2.7	-3.2	-9.6	-2.9	-3.3	-10.8	-20.4	-11%	-15%	-11%	-17%	-12%	-11%	-11%
Riverside Ave.	**22.1**	**18.1**	**82.1**	**15.7**	**26.7**	**89.8**	**171.8**	**18.4**	**14.1**	**68.3**	**12.2**	**22.7**	**76.1**	**144.4**	**-3.7**	**-4.0**	**-13.8**	**-3.5**	**-4.0**	**-13.7**	**-27.5**	**-17%**	**-22%**	**-17%**	**-22%**	**-15%**	**-15%**	**-16%**
Sherwood Is. Conn.	21.6	17.5	79.8	14.8	26.7	87.7	167.5	19.6	14.8	71.2	12.5	24.1	79.1	150.3	-2.0	-2.8	-8.6	-2.3	-2.6	-8.6	-17.2	-9%	-16%	-11%	-16%	-10%	-10%	-10%
Center St.	**21.2**	**16.7**	**77.6**	**13.9**	**26.3**	**85.1**	**162.6**	**18.5**	**13.3**	**66.2**	**11.0**	**22.7**	**73.5**	**139.7**	**-2.7**	**-3.4**	**-11.3**	**-2.8**	**-3.6**	**-11.6**	**-22.9**	**-13%**	**-20%**	**-15%**	**-20%**	**-14%**	**-14%**	**-14%**
Bronson Rd.	23.0	17.7	82.5	14.9	27.9	90.7	173.2	21.6	16.3	78.2	14.1	26.8	87.8	166.0	-1.4	-1.4	-4.3	-0.8	-1.1	-2.9	-7.3	-6%	-8%	-5%	-5%	-4%	-3%	-4%
Mill Plain Rd.	23.7	18.3	85.1	15.2	29.0	93.6	178.6	22.2	16.7	80.2	14.3	27.6	89.9	170.1	-1.6	-1.6	-4.9	-0.9	-1.4	-3.7	-8.6	-7%	-9%	-6%	-6%	-5%	-4%	-5%
Round Hill Rd.	23.6	19.0	86.0	15.7	30.6	96.8	182.8	22.2	17.2	81.5	14.5	28.8	91.5	173.0	-1.4	-1.7	-4.5	-1.2	-1.8	-5.3	-9.8	-6%	-9%	-5%	-8%	-6%	-6%	-5%
Meadowbrook Rd.	**23.8**	**19.7**	**88.8**	**16.0**	**31.0**	**98.7**	**187.5**	**19.9**	**14.8**	**72.3**	**11.8**	**25.0**	**79.3**	**151.6**	**-3.9**	**-4.9**	**-16.5**	**-4.2**	**-6.0**	**-19.4**	**-35.9**	**-16%**	**-25%**	**-19%**	**-26%**	**-19%**	**-20%**	**-19%**
Int. 24	23.9	19.8	88.4	16.1	30.8	98.5	186.9	21.6	16.9	80.0	14.8	28.9	93.1	173.1	-2.2	-2.8	-8.4	-1.4	-1.9	-5.4	-13.8	-9%	-14%	-9%	-8%	-6%	-6%	-7%
Commerce Dr./Fairfield Ave.	22.8	20.2	87.7	16.1	30.1	95.1	182.8	22.0	18.0	82.7	14.6	28.7	90.6	173.2	-0.8	-2.2	-5.1	-1.5	-1.4	-4.5	-9.6	-4%	-11%	-6%	-9%	-5%	-5%	-5%
Wordin Ave.	23.3	21.8	92.3	17.9	31.6	102.5	194.8	22.6	20.0	88.5	16.1	29.4	96.2	184.7	-0.7	-1.8	-3.9	-1.8	-2.2	-6.3	-10.1	-3%	-8%	-4%	-10%	-7%	-6%	-5%
Park Ave.	24.2	22.4	94.7	18.4	32.2	104.5	199.2	23.2	20.1	89.3	16.5	29.7	97.4	186.7	-1.0	-2.3	-5.3	-1.9	-2.6	-7.2	-12.5	-4%	-10%	-6%	-10%	-8%	-7%	-6%
Pequonnock River	**19.9**	**21.6**	**85.5**	**17.0**	**27.9**	**92.2**	**177.7**	**17.0**	**15.6**	**68.0**	**13.2**	**24.1**	**77.6**	**145.6**	**-2.9**	**-6.0**	**-17.5**	**-3.8**	**-3.9**	**-14.6**	**-32.1**	**-14%**	**-28%**	**-20%**	**-22%**	**-14%**	**-16%**	**-18%**
Seaview Ave.	18.9	20.3	81.0	16.0	26.0	85.7	166.7	16.3	14.9	65.1	12.8	23.1	74.1	139.2	-2.6	-5.5	-15.9	-3.3	-2.8	-11.6	-27.6	-14%	-27%	-20%	-20%	-11%	-14%	-17%
Hollister Ave.	19.0	19.4	78.7	15.4	25.5	83.7	162.5	18.0	16.3	70.6	13.6	23.6	77.1	147.7	-1.0	-3.1	-8.1	-1.7	-1.9	-6.6	-14.7	-5%	-16%	-10%	-11%	-7%	-8%	-9%
Honeyspot Rd.	17.2	17.0	70.7	13.1	23.0	74.7	145.4	16.1	14.3	63.1	11.4	21.3	68.1	131.2	-1.1	-2.7	-7.6	-1.7	-1.7	-6.6	-14.2	-6%	-16%	-11%	-13%	-7%	-9%	-10%
W. Broad St.	17.9	17.1	71.9	13.1	22.4	73.4	145.2	16.3	14.5	63.5	11.2	20.6	66.2	129.7	-1.5	-2.6	-8.3	-1.9	-1.8	-7.2	-15.5	-9%	-15%	-12%	-15%	-8%	-10%	-11%
Route 130	**18.0**	**18.3**	**74.4**	**13.8**	**22.1**	**74.0**	**148.3**	**15.1**	**14.4**	**61.4**	**10.8**	**19.4**	**63.0**	**124.4**	**-2.9**	**-3.9**	**-13.0**	**-3.0**	**-2.7**	**-10.9**	**-23.9**	**-16%**	**-21%**	**-17%**	**-22%**	**-12%**	**-15%**	**-16%**
Housatonic River	15.9	16.3	66.3	12.6	19.4	66.1	132.4	13.9	13.6	57.1	10.3	17.7	58.3	115.5	-2.1	-2.8	-9.1	-2.3	-1.7	-7.8	-16.9	-13%	-17%	-14%	-18%	-9%	-12%	-13%
Schoolhouse Rd./BIC Dr.	16.9	18.3	72.0	13.7	20.1	70.2	142.2	14.6	14.9	61.6	13.1	20.0	68.0	129.6	-2.3	-3.4	-10.3	-0.5	-0.1	-2.2	-12.6	-13%	-19%	-14%	-4%	-1%	-3%	-9%
Plains Rd.	16.9	18.5	72.6	14.1	20.6	72.4	145.0	15.1	15.4	63.4	13.5	20.4	69.7	133.1	-1.8	-3.0	-9.3	-0.7	-0.2	-2.6	-11.9	-10%	-16%	-13%	-5%	-1%	-4%	-8%
Zion Hill Rd./High St.	17.3	18.7	73.2	14.5	21.2	73.5	146.7	15.3	15.7	63.5	13.2	20.1	68.6	132.1	-1.9	-3.0	-9.7	-1.3	-1.1	-4.9	-14.6	-11%	-16%	-13%	-9%	-5%	-7%	-10%
Int. 39	**18.4**	**20.7**	**78.8**	**15.9**	**20.7**	**76.2**	**155.0**	**14.5**	**16.1**	**64.4**	**11.9**	**18.1**	**64.1**	**128.5**	**-3.9**	**-4.6**	**-14.4**	**-4.0**	**-2.6**	**-12.2**	**-26.6**	**-21%**	**-22%**	**-18%**	**-25%**	**-13%**	**-16%**	**-17%**
Woodmont Rd.	18.4	20.1	76.7	16.1	21.3	77.5	154.1	15.3	17.6	67.8	13.0	19.1	68.6	136.4	-3.2	-2.5	-8.9	-3.1	-2.2	-8.8	-17.7	-17%	-12%	-12%	-19%	-10%	-11%	-12%
Marsh Hill Rd.	18.3	19.9	76.1	16.0	20.7	76.9	153.0	15.2	17.2	66.6	12.9	18.4	67.5	134.1	-3.1	-2.7	-9.5	-3.1	-2.4	-9.4	-18.9	-17%	-13%	-12%	-19%	-11%	-12%	-12%
Saw Mill Rd.	**18.3**	**20.5**	**77.5**	**16.0**	**19.3**	**74.4**	**151.9**	**14.4**	**16.4**	**64.1**	**12.1**	**15.9**	**61.0**	**125.1**	**-3.9**	**-4.0**	**-13.4**	**-3.9**	**-3.4**	**-13.4**	**-26.8**	**-21%**	**-20%**	**-17%**	**-25%**	**-17%**	**-18%**	**-18%**
Campbell Ave.	18.4	21.7	80.3	17.4	18.7	75.9	156.1	15.5	18.7	70.1	14.0	16.3	65.2	135.3	-3.0	-3.1	-10.2	-3.4	-2.3	-10.7	-20.9	-16%	-14%	-13%	-19%	-13%	-14%	-13%
West River	19.9	23.0	84.3	17.8	18.9	77.2	161.6	16.9	19.9	73.9	14.4	16.8	66.5	140.4	-3.0	-3.1	-10.5	-3.4	-2.1	-10.7	-21.2	-15%	-14%	-12%	-19%	-11%	-14%	-13%
Long Wharf Dr.	**21.2**	**23.8**	**88.6**	**20.1**	**21.5**	**86.5**	**175.2**	**17.2**	**19.2**	**73.9**	**15.8**	**18.2**	**72.2**	**146.2**	**-4.1**	**-4.6**	**-14.7**	**-4.3**	**-3.3**	**-14.3**	**-29.0**	**-19%**	**-19%**	**-17%**	**-21%**	**-15%**	**-17%**	**-17%**
I-91 Split	20.8	22.6	86.4	18.7	21.5	83.8	170.2	18.3	19.5	76.4	15.9	19.5	74.1	150.4	-2.5	-3.1	-10.0	-2.8	-2.0	-9.7	-19.7	-12%	-14%	-12%	-15%	-9%	-12%	-12%
Tolling Locations Total	**258.4**	**241.8**	**1006.0**	**201.2**	**286.4**	**1016.4**	**2022.4**	**219.1**	**194.4**	**850.0**	**160.7**	**249.4**	**870.3**	**1720.3**	**-39.4**	**-47.4**	**-156.0**	**-40.4**	**-37.0**	**-146.1**	**-302.0**	**-15%**	**-20%**	**-16%**	**-20%**	**-13%**	**-14%**	**-15%**
Tolling Locations Avg	**21.5**	**20.2**	**83.8**	**16.8**	**23.9**	**84.7**	**168.5**	**18.3**	**16.2**	**70.8**	**13.4**	**20.8**	**72.5**	**143.4**	**-3.3**	**-3.9**	**-13.0**	**-3.4**	**-3.1**	**-12.2**	**-25.2**	**-15%**	**-20%**	**-16%**	**-20%**	**-13%**	**-14%**	**-15%**
Non-Tolling Locations Total	**723.9**	**658.8**	**2786.8**	**543.1**	**811.4**	**2827.3**	**5614.1**	**665.4**	**582.7**	**2556.3**	**483.1**	**762.4**	**2626.7**	**5183.0**	**-58.5**	**-76.1**	**-230.5**	**-60.0**	**-49.0**	**-200.6**	**-431.1**	**-8%**	**-12%**	**-8%**	**-11%**	**-6%**	**-7%**	**-8%**
Non-Tolling Locations Avg	**21.9**	**20.0**	**84.4**	**16.5**	**24.6**	**85.7**	**170.1**	**20.2**	**17.7**	**77.5**	**14.6**	**23.1**	**79.6**	**157.1**	**-1.8**	**-2.3**	**-7.0**	**-1.8**	**-1.5**	**-6.1**	**-13.1**	**-8%**	**-12%**	**-8%**	**-11%**	**-6%**	**-7%**	**-8%**

Notes:
Volume in 1000's
Shading indicates tolling location

Table 6-11
Year 2020 Rt 15 Traffic Comparisons
Toll Free I-95 Widening vs Alternative 5 - Widen I-95 and Toll I-95 and Rt 15 ($0.50 Peak/$0.35 Off Peak)

	2020 I-95 Toll Free with I-95 Widening							2020 Alternative 5 - Widen I-95 and Toll I-95 and Rt 15 ($0.50/$0.35)							Net Impact							Percent Reduction						
	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way	Southbound			Northbound			Two-Way
Interchange	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily	AM	PM	Daily	AM	PM	Daily	Daily
Round Hill Rd	**7.7**	**7.5**	**25.7**	**4.6**	**8.1**	**20.7**	**46.5**	**5.2**	**4.7**	**18.4**	**2.8**	**5.2**	**14.4**	**32.9**	**-2.5**	**-2.8**	**-7.3**	**-1.7**	**-2.9**	**-6.3**	**-13.6**	**-33%**	**-37%**	**-28%**	**-38%**	**-36%**	**-30%**	**-29%**
Old Mill Rd Int	8.3	7.6	26.5	4.8	8.8	22.5	49.0	5.7	4.8	19.1	3.0	5.9	15.9	35.1	-2.6	-2.8	-7.4	-1.8	-3.0	-6.6	-13.9	-31%	-37%	-28%	-38%	-34%	-29%	-28%
North St	9.1	8.2	28.5	4.8	8.9	22.4	50.9	6.2	5.1	20.5	3.0	5.9	15.9	36.4	-2.9	-3.1	-7.9	-1.8	-3.0	-6.5	-14.5	-32%	-37%	-28%	-38%	-34%	-29%	-28%
Den Rd	**9.9**	**8.3**	**29.5**	**5.1**	**10.0**	**24.9**	**54.4**	**6.8**	**5.2**	**21.2**	**3.1**	**6.6**	**17.6**	**38.7**	**-3.1**	**-3.2**	**-8.4**	**-2.0**	**-3.4**	**-7.3**	**-15.7**	**-31%**	**-38%**	**-28%**	**-39%**	**-34%**	**-29%**	**-29%**
Long Ridge Rd	10.0	8.9	31.2	5.6	10.3	26.5	57.7	7.0	5.7	23.0	3.6	7.0	19.2	42.2	-3.0	-3.2	-8.2	-2.0	-3.4	-7.3	-15.6	-30%	-36%	-26%	-36%	-33%	-28%	-27%
High Ridge Rd	10.4	9.1	32.4	5.5	10.8	27.8	60.2	7.4	5.9	23.9	3.5	7.4	20.3	44.3	-3.0	-3.2	-8.5	-2.0	-3.4	-7.5	-16.0	-29%	-35%	-26%	-37%	-31%	-27%	-27%
Old Stamford Rd	**10.3**	**8.9**	**32.5**	**6.2**	**11.2**	**30.0**	**62.5**	**7.0**	**5.6**	**23.0**	**3.9**	**7.1**	**20.9**	**44.0**	**-3.3**	**-3.4**	**-9.5**	**-2.3**	**-4.1**	**-9.0**	**-18.5**	**-32%**	**-38%**	**-29%**	**-37%**	**-36%**	**-30%**	**-30%**
White Birch Rd / South Ave	9.8	9.1	32.1	6.6	11.3	30.6	62.7	6.9	6.0	23.7	4.3	7.5	22.1	45.8	-2.9	-3.1	-8.4	-2.2	-3.8	-8.5	-16.9	-29%	-34%	-26%	-34%	-34%	-28%	-27%
New Canaan Ave	**9.5**	**8.5**	**30.9**	**6.4**	**11.3**	**30.1**	**61.0**	**6.3**	**5.2**	**21.4**	**4.0**	**7.2**	**20.9**	**42.4**	**-3.2**	**-3.3**	**-9.4**	**-2.4**	**-4.1**	**-9.2**	**-18.7**	**-33%**	**-39%**	**-31%**	**-37%**	**-36%**	**-31%**	**-31%**
US 7	9.8	9.4	32.9	7.5	12.0	33.6	66.4	7.4	6.6	25.7	5.3	8.7	26.0	51.7	-2.4	-2.7	-7.2	-2.2	-3.3	-7.5	-14.7	-24%	-29%	-22%	-29%	-27%	-22%	-22%
Merritt 7 Railroad Bridge	6.9	5.8	22.2	5.2	8.7	23.5	45.7	5.1	3.7	16.3	3.6	6.2	17.8	34.1	-1.9	-2.2	-5.9	-1.7	-2.5	-5.7	-11.6	-27%	-37%	-26%	-32%	-29%	-24%	-25%
Main Ave	8.3	5.6	23.9	5.1	8.9	23.9	47.8	6.5	3.5	18.0	3.5	6.4	18.4	36.4	-1.8	-2.1	-5.8	-1.6	-2.5	-5.5	-11.4	-22%	-37%	-24%	-31%	-28%	-23%	-24%
Route 33	9.6	5.6	25.7	4.7	9.9	25.4	51.1	7.6	3.6	20.0	3.3	7.5	20.1	40.1	-2.0	-1.9	-5.7	-1.5	-2.4	-5.3	-11.1	-21%	-35%	-22%	-31%	-24%	-21%	-22%
Weston Rd	**11.6**	**6.3**	**30.1**	**5.7**	**12.0**	**30.8**	**60.9**	**9.0**	**3.8**	**22.3**	**3.7**	**8.7**	**23.1**	**45.4**	**-2.6**	**-2.5**	**-7.8**	**-2.0**	**-3.3**	**-7.7**	**-15.5**	**-23%**	**-40%**	**-26%**	**-35%**	**-27%**	**-25%**	**-25%**
Black Rock Tpke	**11.5**	**6.4**	**29.9**	**5.7**	**11.7**	**30.4**	**60.3**	**9.1**	**4.0**	**22.7**	**3.8**	**8.6**	**23.2**	**46.0**	**-2.3**	**-2.4**	**-7.2**	**-1.9**	**-3.1**	**-7.1**	**-14.3**	**-20%**	**-38%**	**-24%**	**-33%**	**-26%**	**-24%**	**-24%**
Easton Tpke	11.3	7.5	32.1	6.7	12.1	33.5	65.6	9.6	5.2	26.0	4.9	9.6	27.4	53.3	-1.7	-2.4	-6.1	-1.8	-2.5	-6.1	-12.3	-15%	-31%	-19%	-27%	-21%	-18%	-19%
Park Ave	11.1	8.2	32.6	7.6	12.2	35.3	67.9	9.1	5.7	26.2	5.7	9.7	29.0	55.2	-2.0	-2.5	-6.5	-2.0	-2.5	-6.3	-12.8	-18%	-30%	-20%	-26%	-21%	-18%	-19%
Route 111	10.8	8.7	33.5	8.1	12.1	35.9	69.4	9.0	6.2	27.2	6.1	9.6	29.7	56.8	-1.9	-2.5	-6.4	-1.9	-2.5	-6.2	-12.6	-17%	-29%	-19%	-24%	-21%	-17%	-18%
Route 25	**11.1**	**10.6**	**38.4**	**9.4**	**12.8**	**41.2**	**79.5**	**8.3**	**6.9**	**28.3**	**6.6**	**9.2**	**31.1**	**59.5**	**-2.8**	**-3.6**	**-10.1**	**-2.8**	**-3.6**	**-10.0**	**-20.1**	**-25%**	**-34%**	**-26%**	**-30%**	**-28%**	**-24%**	**-25%**
Route 108	12.3	12.0	43.2	11.4	13.7	46.5	89.7	10.1	9.8	36.8	9.2	11.4	39.9	76.7	-2.2	-2.2	-6.3	-2.3	-2.3	-6.6	-13.0	-18%	-19%	-15%	-20%	-17%	-14%	-14%
Route 8	10.5	10.4	36.9	10.3	11.3	39.9	76.8	8.6	8.3	31.2	8.4	9.3	33.9	65.1	-2.0	-2.1	-5.8	-1.9	-2.1	-5.9	-11.7	-19%	-20%	-16%	-19%	-18%	-15%	-15%
Route 110	12.3	11.5	43.5	10.9	12.7	44.4	87.9	9.4	9.1	35.3	8.5	9.7	36.4	71.7	-2.9	-2.4	-8.2	-2.4	-3.0	-8.0	-16.2	-23%	-21%	-19%	-22%	-23%	-18%	-18%
Housatonic River	**14.9**	**13.6**	**51.7**	**12.3**	**15.7**	**51.6**	**103.3**	**11.4**	**10.7**	**42.0**	**9.4**	**12.2**	**41.8**	**83.8**	**-3.4**	**-2.9**	**-9.7**	**-2.8**	**-3.6**	**-9.8**	**-19.5**	**-23%**	**-22%**	**-19%**	**-23%**	**-23%**	**-19%**	**-19%**
Wheelers Farms Rd	8.9	7.5	29.9	8.2	12.3	36.5	66.4	6.8	5.9	23.9	6.4	9.9	30.6	54.5	-2.1	-1.6	-6.0	-1.8	-2.5	-5.9	-11.9	-24%	-22%	-20%	-21%	-20%	-16%	-18%
Grassy Hill Rd	11.5	10.0	38.2	7.3	11.7	34.1	72.2	10.0	7.8	32.1	5.6	9.7	28.9	61.0	-1.4	-2.2	-6.1	-1.6	-1.9	-5.2	-11.3	-13%	-22%	-16%	-23%	-17%	-15%	-16%
Derby Ave	**10.8**	**10.0**	**37.0**	**7.2**	**10.9**	**32.9**	**69.9**	**8.9**	**7.4**	**29.6**	**5.4**	**8.4**	**26.2**	**55.8**	**-1.9**	**-2.6**	**-7.4**	**-1.8**	**-2.5**	**-6.7**	**-14.1**	**-18%**	**-26%**	**-20%**	**-25%**	**-23%**	**-20%**	**-20%**
Route 69	11.1	11.0	39.5	8.2	11.3	35.4	74.9	9.7	9.1	34.3	6.8	9.4	30.5	64.7	-1.4	-1.9	-5.2	-1.4	-1.9	-4.9	-10.1	-13%	-17%	-13%	-17%	-17%	-14%	-14%
Heroes Tunnel	**10.5**	**11.8**	**40.4**	**9.0**	**12.6**	**40.0**	**80.3**	**8.7**	**9.4**	**33.3**	**7.3**	**10.2**	**33.3**	**66.6**	**-1.8**	**-2.4**	**-7.1**	**-1.7**	**-2.4**	**-6.7**	**-13.8**	**-17%**	**-20%**	**-17%**	**-19%**	**-19%**	**-17%**	**-17%**
Tolling Locations Total	**107.7**	**92.0**	**346.1**	**71.5**	**116.4**	**332.5**	**678.6**	**80.7**	**62.8**	**262.3**	**50.1**	**83.5**	**252.6**	**514.9**	**-27.0**	**-29.2**	**-83.8**	**-21.4**	**-32.9**	**-79.9**	**-163.7**	**-25%**	**-32%**	**-24%**	**-30%**	**-28%**	**-24%**	**-24%**
Tolling Locations Avg	**10.8**	**9.2**	**34.6**	**7.2**	**11.6**	**33.2**	**67.9**	**8.1**	**6.3**	**26.2**	**5.0**	**8.3**	**25.3**	**51.5**	**-2.7**	**-2.9**	**-8.4**	**-2.1**	**-3.3**	**-8.0**	**-16.4**	**-25%**	**-32%**	**-24%**	**-30%**	**-28%**	**-24%**	**-24%**
Non-Tolling Locations Total	**181.9**	**156.1**	**584.7**	**128.7**	**199.0**	**577.6**	**1162.3**	**141.9**	**112.0**	**463.1**	**94.7**	**150.6**	**461.9**	**925.0**	**-40.1**	**-44.1**	**-121.6**	**-34.0**	**-48.4**	**-115.7**	**-237.3**	**-22%**	**-28%**	**-21%**	**-26%**	**-24%**	**-20%**	**-20%**
Non-Tolling Locations Avg	**10.1**	**8.7**	**32.5**	**7.1**	**11.1**	**32.1**	**64.6**	**7.9**	**6.2**	**25.7**	**5.3**	**8.4**	**25.7**	**51.4**	**-2.2**	**-2.4**	**-6.8**	**-1.9**	**-2.7**	**-6.4**	**-13.2**	**-22%**	**-28%**	**-21%**	**-26%**	**-24%**	**-20%**	**-20%**

Note:
Volume in 1000's

Table 6-12
2020 Average Mainline Volumes (000's) - New Haven to NY

Time Period	I-95 No Build Toll Free			I-95 Alternative 5			Net Impact Alt 5 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	19.9	16.1	36.0	19.7	14.3	34.0	-0.2	-1.8	-2.0	-1%	-11%	-6%
PM	19.3	21.9	41.2	17.3	22.5	39.8	-2.0	0.6	-1.4	-10%	3%	-3%
Daily	79.7	80.0	159.7	75.7	77.7	153.4	-4.0	-2.3	-6.3	-5%	-3%	-4%
Time Period	Route 15 No Build Toll Free			Route 15 Alternative 5			Net Impact Alt 5 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	11.1	7.5	18.6	8.0	5.2	13.2	-3.1	-2.3	-5.4	-28%	-31%	-29%
PM	9.4	12.3	21.7	6.2	8.4	14.6	-3.2	-3.9	-7.1	-34%	-32%	-33%
Daily	36.3	36.1	72.4	25.9	25.5	51.4	-10.4	-10.6	-21.0	-29%	-29%	-29%
Time Period	I-95 and Route 15 No Build Toll Free			I-95 and Route 15 Alternative 5			Net Impact Alt 5 - No Build TF			Percent Impact Net Impact/No Build TF		
	SB	NB	Both	SB	NB	Both	SB	NB	Both	SB	NB	Both
AM	31.0	23.6	54.6	27.7	19.5	47.2	-3.3	-4.1	-7.4	-11%	-17%	-14%
PM	28.7	34.2	62.9	23.5	30.9	54.4	-5.2	-3.3	-8.5	-18%	-10%	-14%
Daily	116.0	116.1	232.1	101.6	103.2	204.8	-14.4	-12.9	-27.3	-12%	-11%	-12%

Summary Comparison of Average Segment Volumes

Table 6-13 presents 2020 estimated average weekday mainline traffic volumes (in thousands) on I-95 and Route 15 in the southbound direction during the AM Peak Period, the northbound direction during the PM Peak Period, and for the total average weekday. These traffic volumes represent the average of all segments between New Haven and the New York border.

The summary table below shows seven scenarios in the left column. This includes the 5 tolling alternatives discussed earlier, as well as No Build Toll Free (TF) and Build TF scenarios. The next column of numbers show the AM Peak Period traffic estimates in the southbound direction for I-95 and Route 15, as well as the sum total of both corridors. The traffic estimates for the PM Peak Period in the northbound direction are shown next. Finally, the daily traffic total is shown on the right side. The middle portion of the table shows the average net traffic impacts when compared to the No Build TF condition. The bottom portion of the tables presents the percent change when compare against the No Build TF condition.

Between the tolling alternatives, Alternative 2 results in the largest loss of traffic from I-95 and the largest increase in traffic to Route 15. Alternative 2 assumed a much higher toll rate assumption. As mentioned earlier, based on a review of the findings between Alternative 1 and Alternative 2, all other alternatives were analyzed with the Alternative 1 toll rates.

Table 6-13
Summary Comparison of Average Segment Traffic Volumes

	Average Weekday Segment Traffic Volumes (000's) - New Haven to NY								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	19.9	11.1	31.0	21.9	12.3	34.2	159.7	72.3	232.0
1	17.5	11.6	29.1	19.4	12.7	32.1	133.8	82.6	216.4
2	15.4	12.0	27.4	17.4	13.0	30.4	116.9	87.7	204.6
3	17.9	9.0	26.9	19.9	10.2	30.1	145.1	57.9	203.0
Build TF	21.8	10.3	32.1	24.4	11.3	35.7	169.7	65.7	235.4
4	18.6	11.2	29.8	21.2	11.9	33.1	140.0	78.7	218.7
5	19.7	8.0	27.7	22.5	8.4	30.9	153.4	51.4	204.8

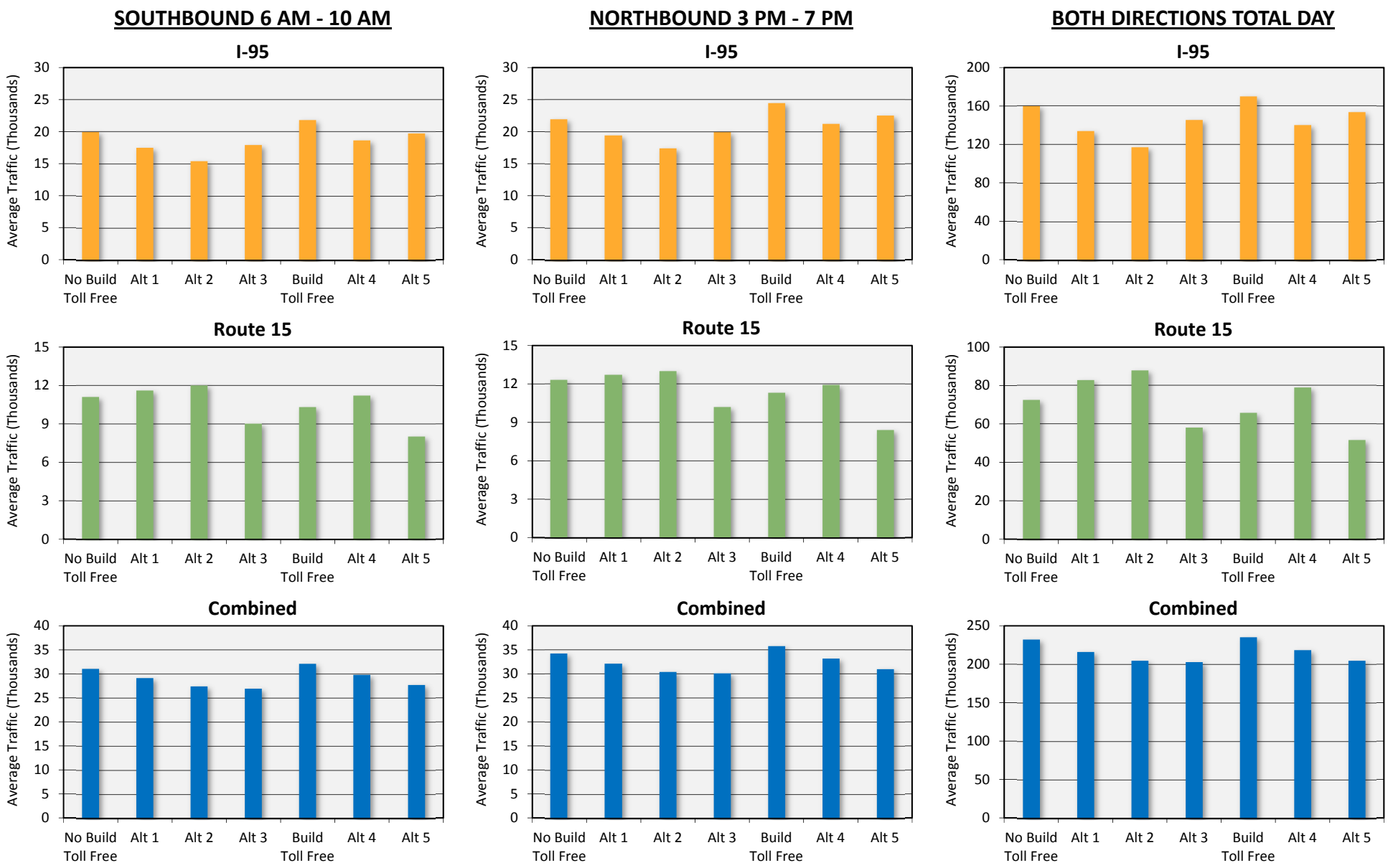
	Traffic Volume Difference as Compared to No Build Toll Free Traffic (000's)								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	-2.4	0.5	-1.9	-2.5	0.4	-2.1	-25.9	10.3	-15.6
2	-4.5	0.9	-3.6	-4.5	0.7	-3.8	-42.8	15.4	-27.4
3	-2.0	-2.1	-4.1	-2.0	-2.1	-4.1	-14.6	-14.4	-29.0
Build TF	1.9	-0.8	1.1	2.5	-1.0	1.5	10.0	-6.6	3.4
4	-1.3	0.1	-1.2	-0.7	-0.4	-1.1	-19.7	6.4	-13.3
5	-0.2	-3.1	-3.3	0.6	-3.9	-3.3	-6.3	-20.9	-27.2

	Percent Change in Traffic Volume as Compared to No Build Toll Free Traffic								
	AM (6AM-10AM) Southbound			PM (3PM-7PM) Northbound			Total Average Weekday		
Alternative	I-95	Route 15	Total	I-95	Route 15	Total	I-95	Route 15	Total
No Build TF	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1	-12.1%	4.5%	-6.1%	-11.4%	3.3%	-6.1%	-16.2%	14.2%	-6.7%
2	-22.6%	8.1%	-11.6%	-20.5%	5.7%	-11.1%	-26.8%	21.3%	-11.8%
3	-10.1%	-18.9%	-13.2%	-9.1%	-17.1%	-12.0%	-9.1%	-19.9%	-12.5%
Build TF	9.5%	-7.2%	3.5%	11.4%	-8.1%	4.4%	6.3%	-9.1%	1.5%
4	-6.5%	0.9%	-3.9%	-3.2%	-3.3%	-3.2%	-12.3%	8.9%	-5.7%
5	-1.0%	-27.9%	-10.6%	2.7%	-31.7%	-9.6%	-3.9%	-28.9%	-11.7%

Alternative 4 is estimated to have the least overall impact, particularly during the AM and PM peak period major travel directions. The widening of I-95 attracts more volume as displayed by the results of the Build TF run. However, the volume is then "managed" back down to roughly No Build volumes, resulting in an improved I-95 condition while also not overburdening Route 15 in the peak travel direction.

Alternative 5 also shows promising results, where the tolling of Route 15 diverts some traffic back to I-95, resulting in I-95 traffic levels that are closest to the No Build TF numbers. Tolling both corridors also ensures a "balancing" of traffic between the two facilities while also providing congestion relief for Route 15 as well.

Figure 6-2 shows the same information in an illustrative bar chart.



ESTIMATED 2020 AVERAGE MAINLINE VOLUMES

FIGURE 6-2

Volume Line Charts

In addition to the tables discussed above, traffic volumes were plotted for I-95 and Route 15 between New Haven and New York to visually demonstrate the impact across various scenarios.

Toll Free No Build, Alternative 1, and Alternative 2

Figure 6-3 shows the 2020 estimated average weekday traffic by direction during the AM Peak Period for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 2 conditions. The top half of the figure shows estimated volumes on I-95, while the bottom half shows volumes on Route 15. Tolling locations on I-95 are shown on the x-axis labelling with black dots. The southbound direction is shown on the left half of the figure and the northbound direction on the right half of the figure.

Figure 6-4 shows the 2020 estimated average weekday traffic by direction during the PM Peak Period for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 2 conditions.

Figure 6-5 shows the 2020 estimated average weekday traffic by direction for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 2 conditions.

Toll Free No Build, Alternative 1, and Alternative 3

Figure 6-6 shows the 2020 estimated average weekday traffic by direction during the AM Peak Period for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 3 conditions. The top half of the figure shows estimated volumes on I-95, while the bottom half shows volumes on Route 15. Tolling locations on I-95 and Route 15 (if applicable) are shown on the x-axis labelling with black dots. The southbound direction is shown on the left half of the figure and the northbound direction on the right half of the figure.

Figure 6-7 shows the 2020 estimated average weekday traffic by direction during the PM Peak Period for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 3 conditions.

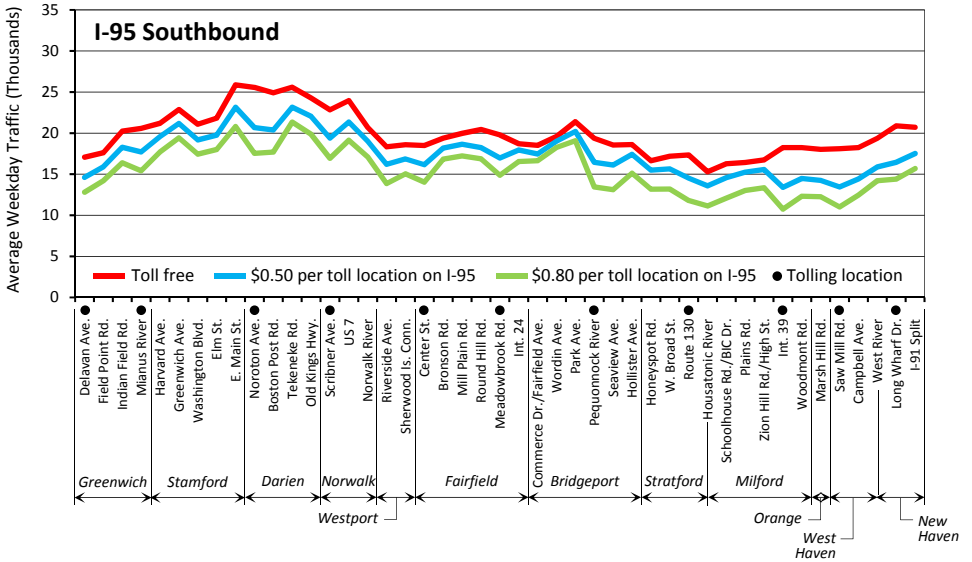
Figure 6-8 shows the 2020 estimated average weekday traffic by direction for I-95 and Route 15 under No Build Toll Free, Alternative 1, and Alternative 3 conditions.

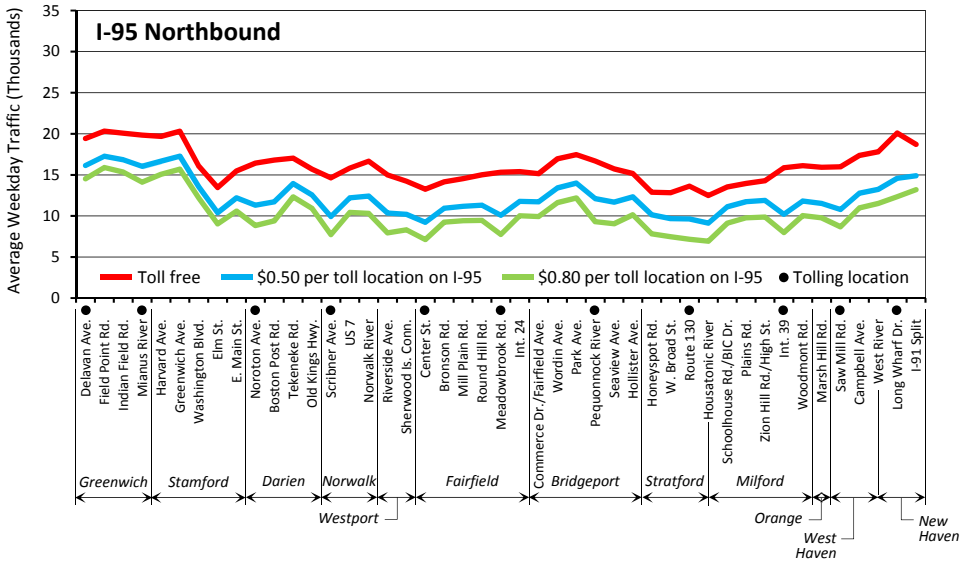
Toll Free No Build, Toll Free I-95 Widening, and Alternative 4

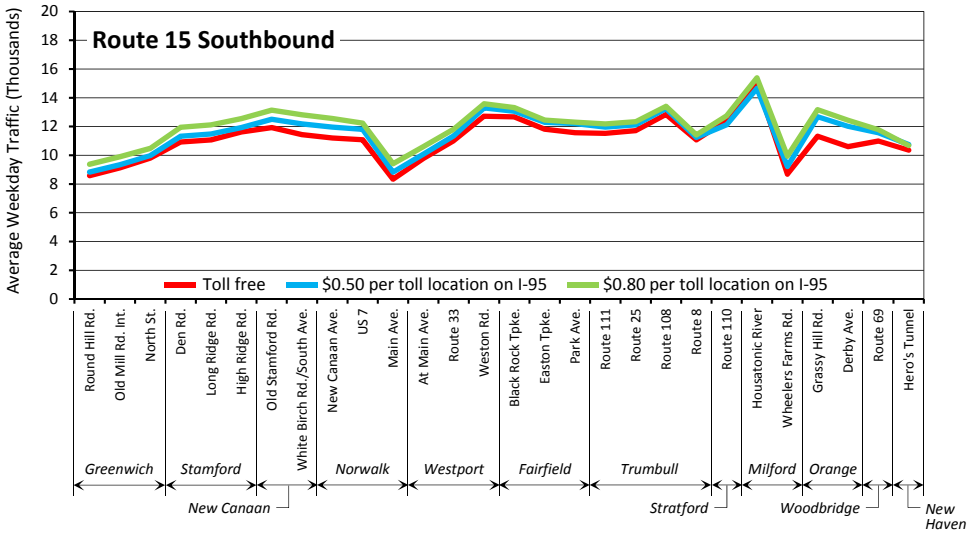
Figure 6-9 shows the 2020 estimated average weekday traffic by direction during the AM Peak Period for I-95 and Route 15 under Toll Free No Build, Toll Free I-95 Widening, and Alternative 4 conditions. The top half of the figure shows estimated volumes on I-95, while the bottom half shows volumes on Route 15. Tolling locations on I-95 are shown on the x-axis labelling with black dots. The southbound direction is shown on the left half of the figure and the northbound direction on the right half of the figure.

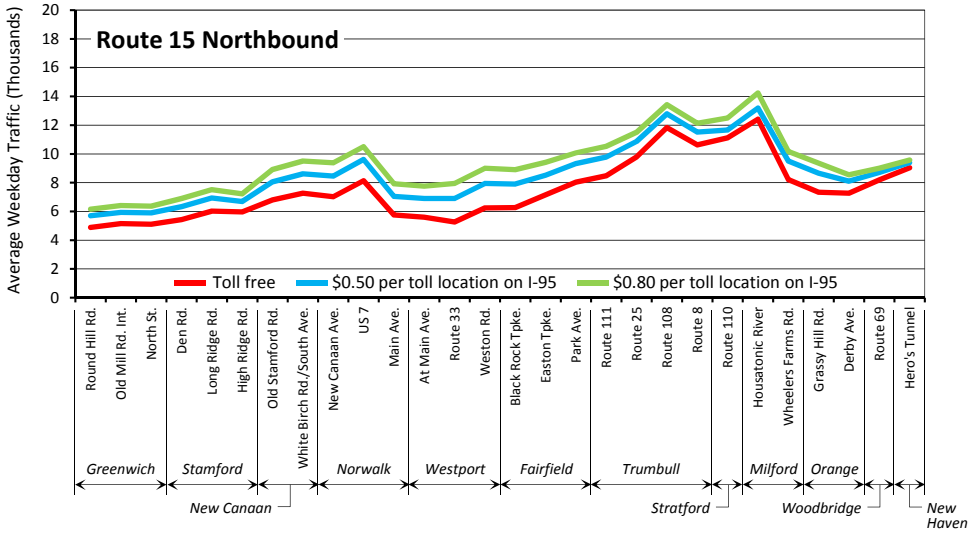
Figure 6-10 shows the 2020 estimated average weekday traffic by direction during the PM Peak Period for I-95 and Route 15 under Toll Free No Build, Toll Free I-95 Widening, and Alternative 4 conditions.

Figure 6-11 shows the 2020 estimated average weekday traffic by direction for I-95 and Route 15 under Toll Free No Build, Toll Free I-95 Widening, and Alternative 4 conditions.





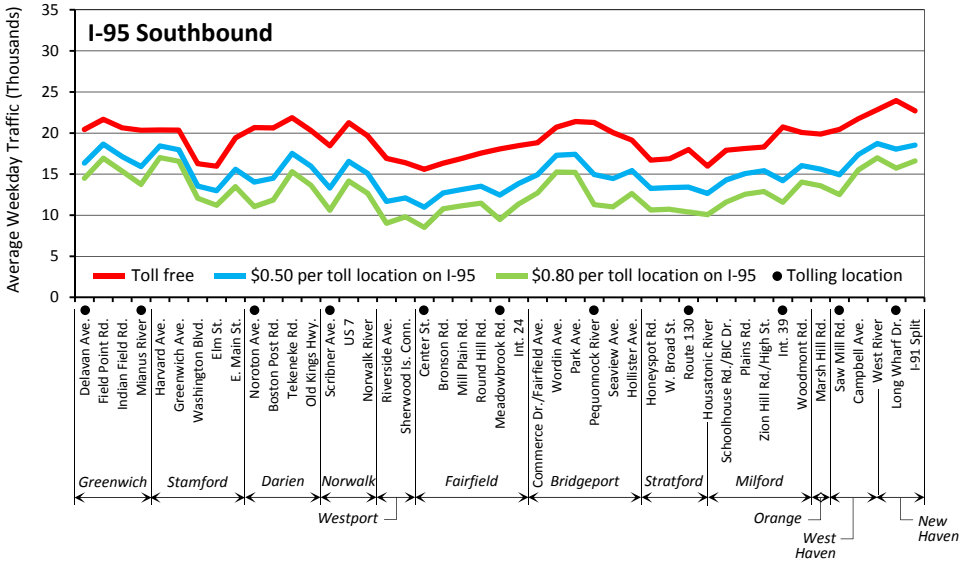


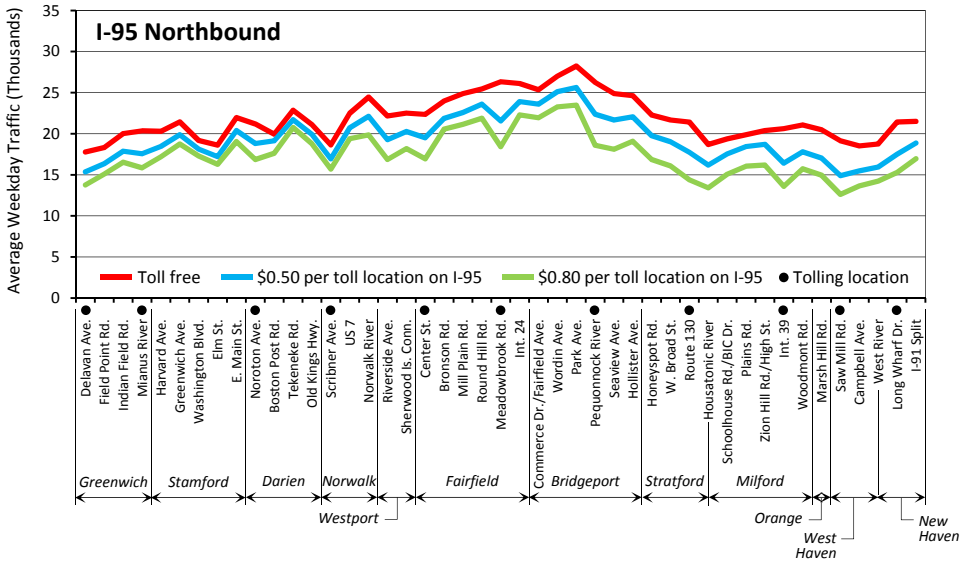


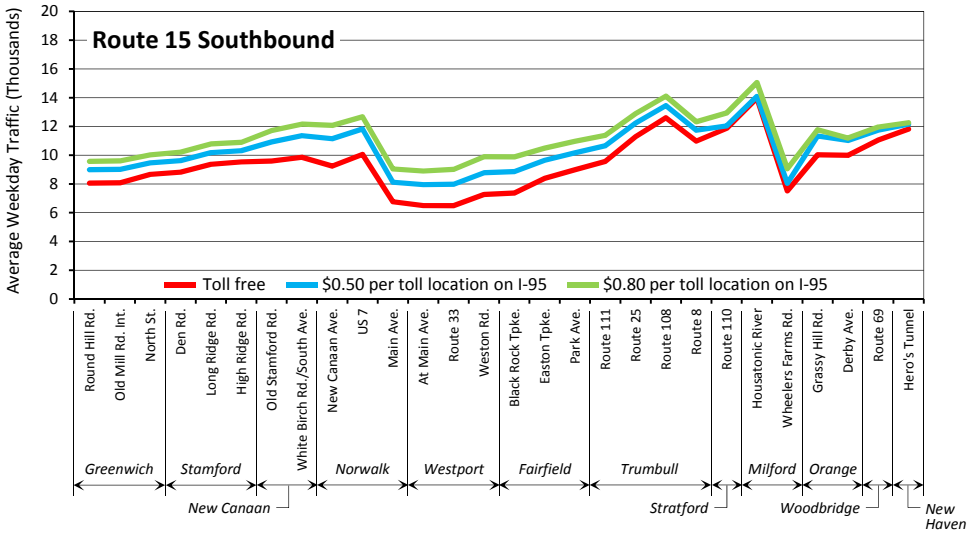
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.80/TOLL LOCATION ON I-95
AM PEAK PERIOD (6 AM-10 AM)

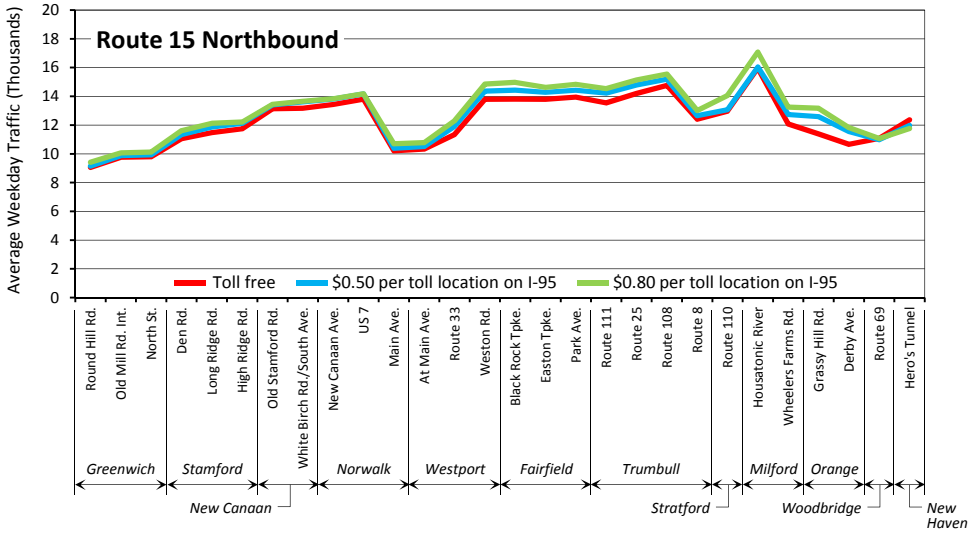
CDM Smith

FIGURE 6-3





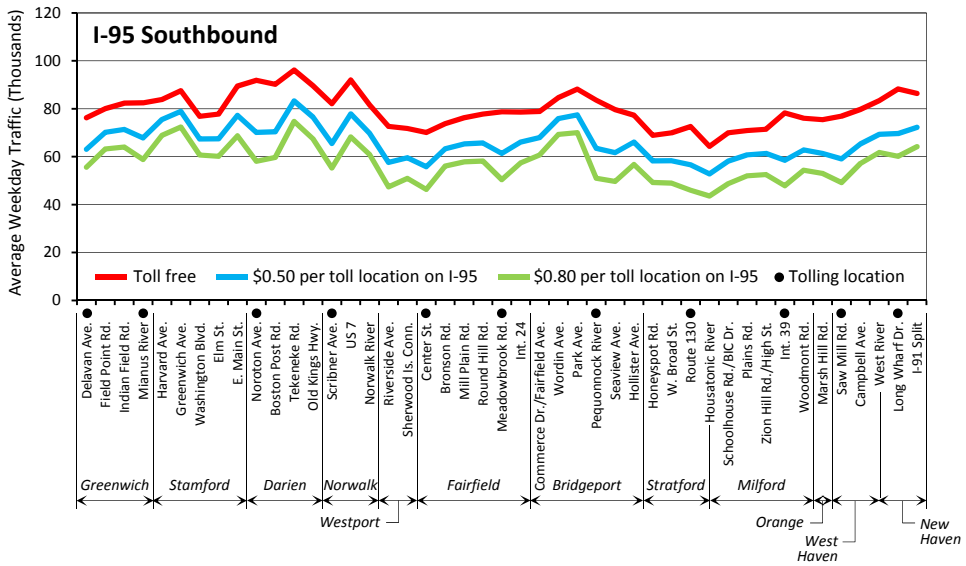


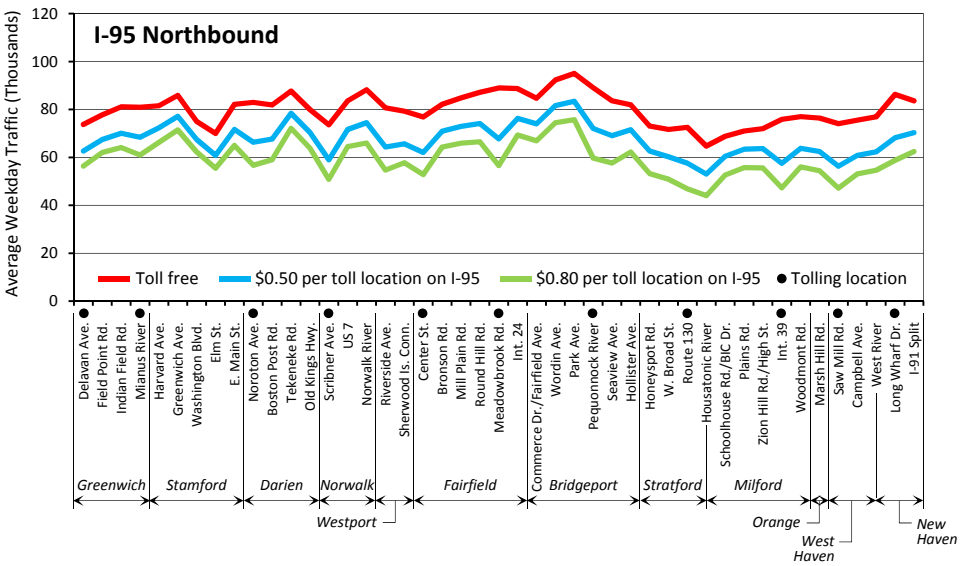


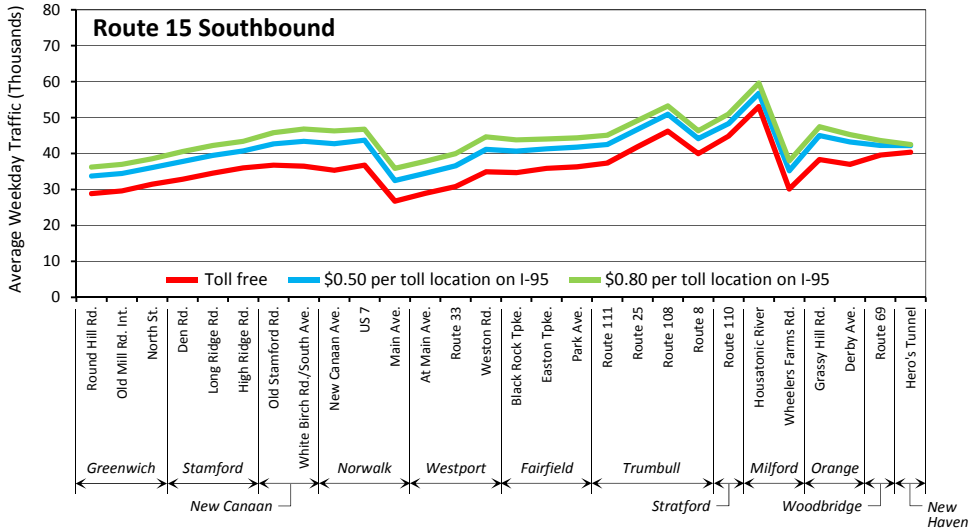
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.80/TOLL LOCATION ON I-95
PM PEAK PERIOD (3 PM-7 PM)

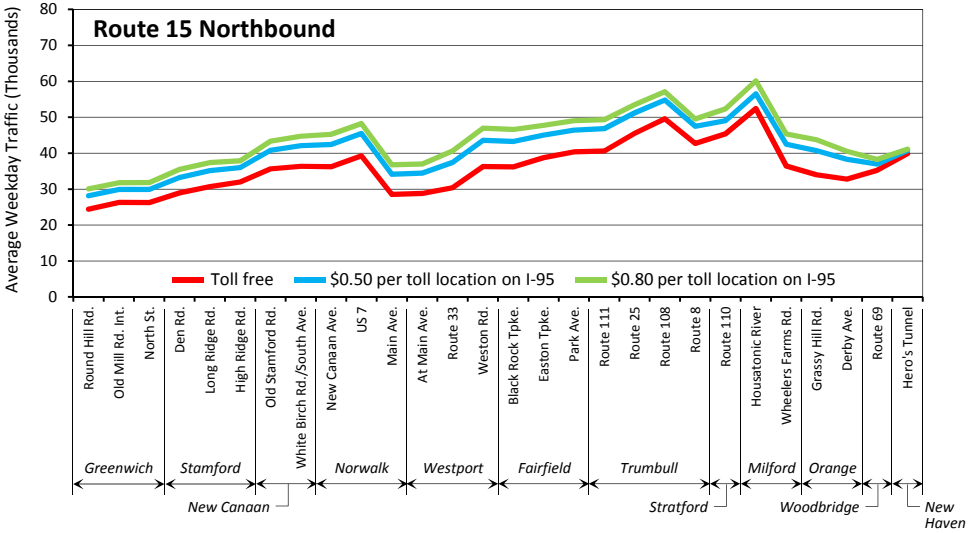
CDM Smith

FIGURE 6-4





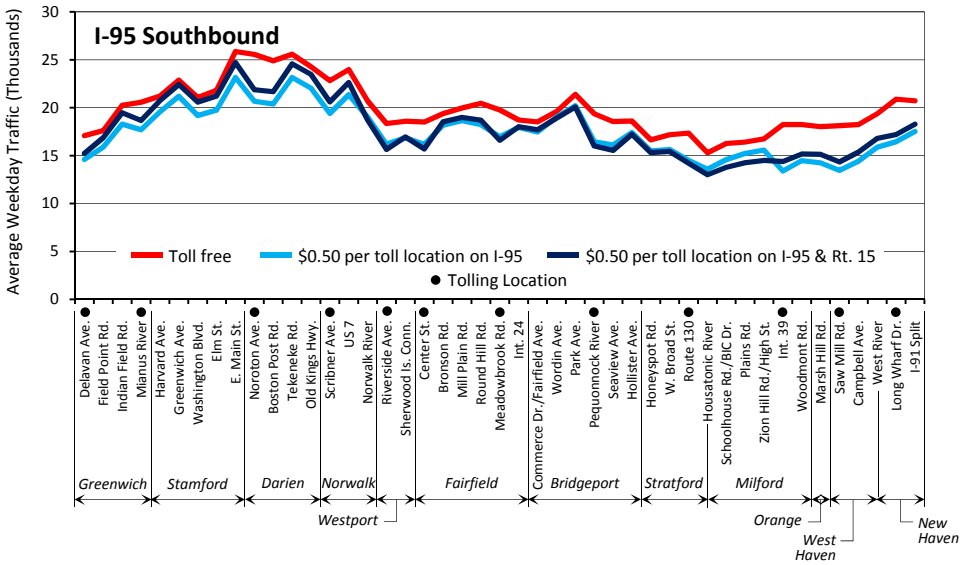


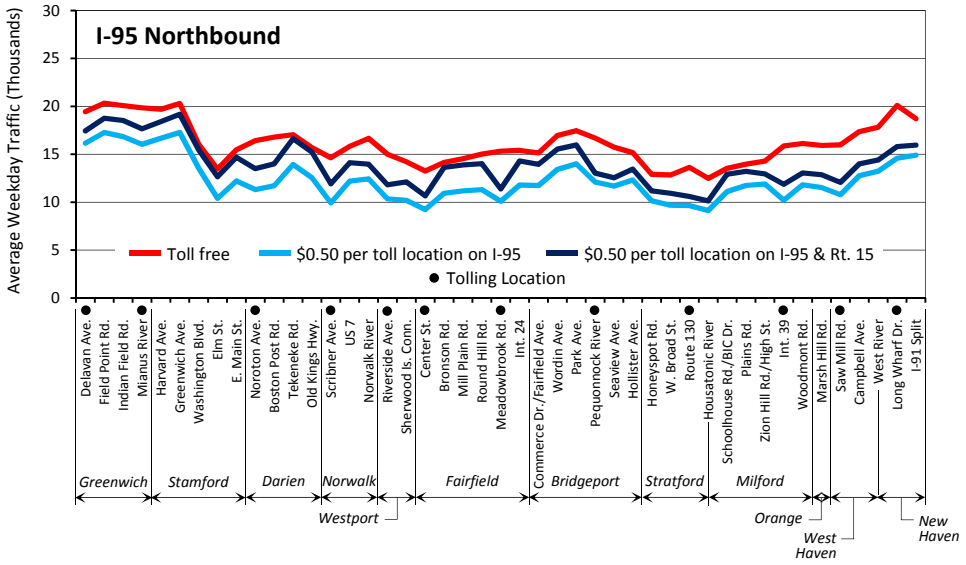


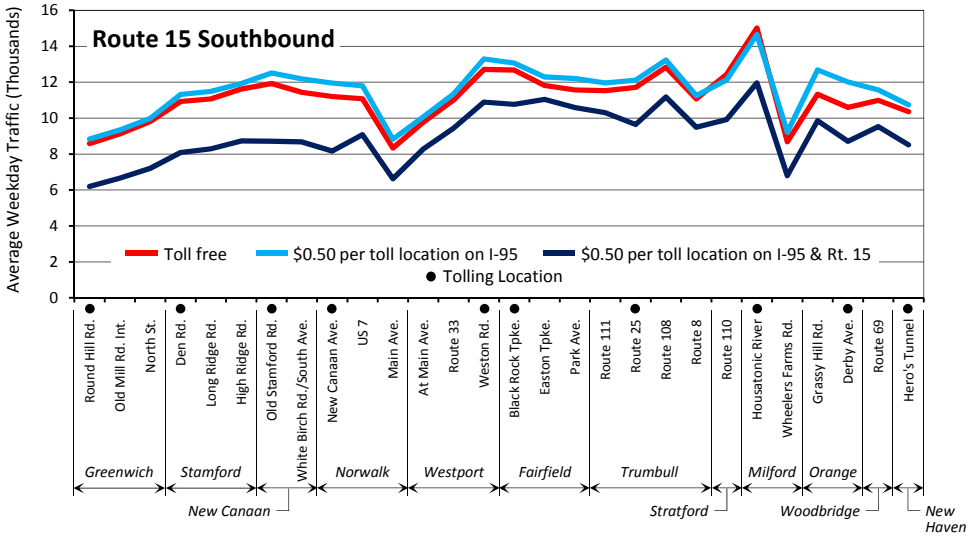
2020 ESTIMATED AVERAGE DAILY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.80/TOLL LOCATION ON I-95
TOTAL AVERAGE WEEKDAY

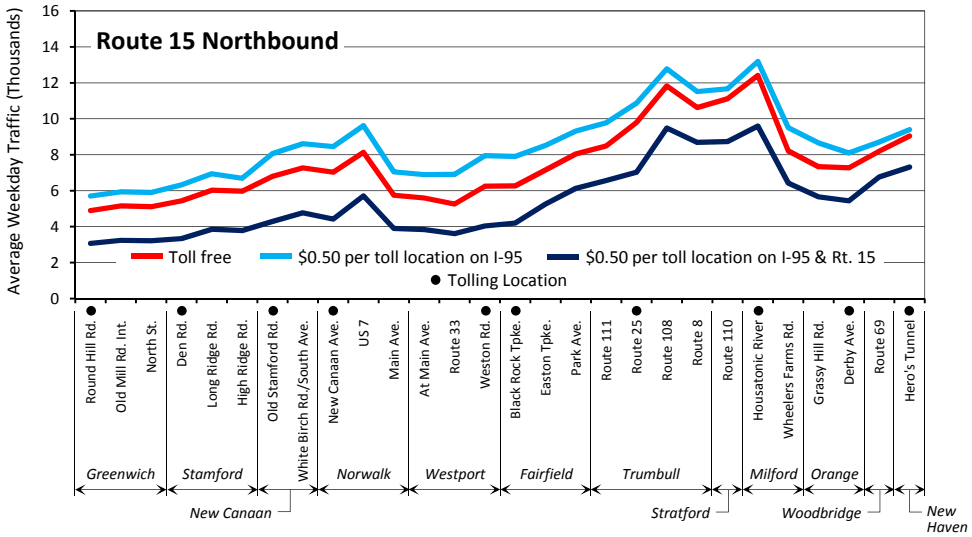
CDM Smith

FIGURE 6-5





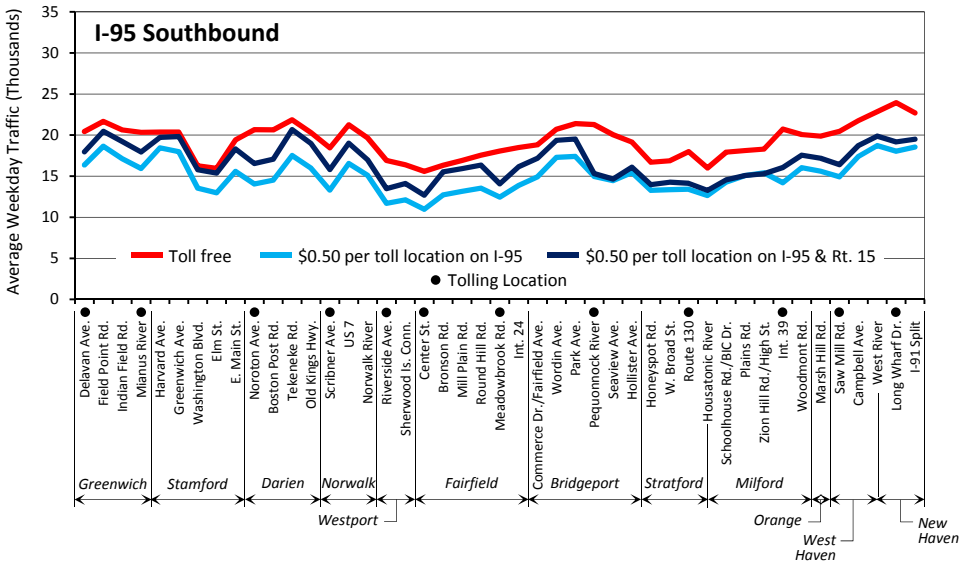


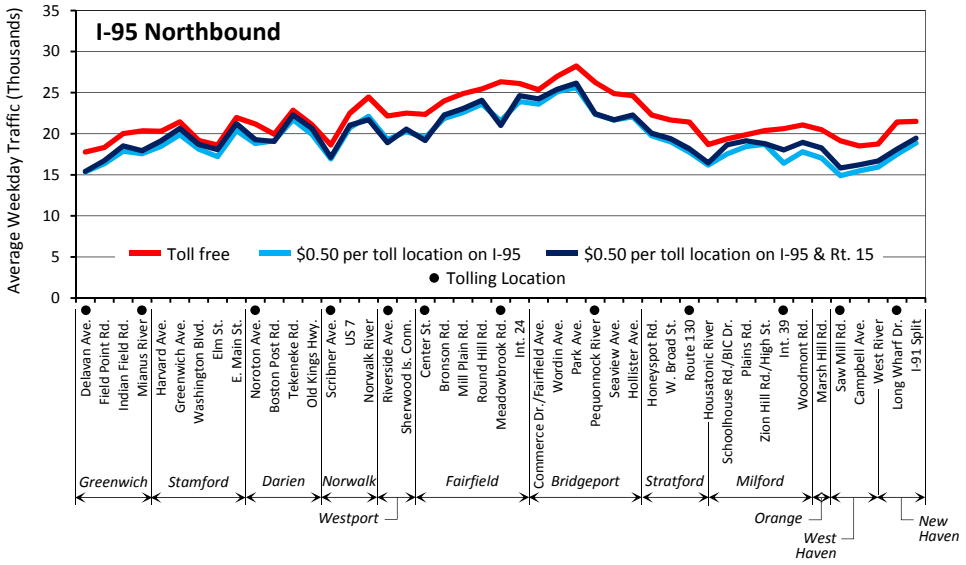


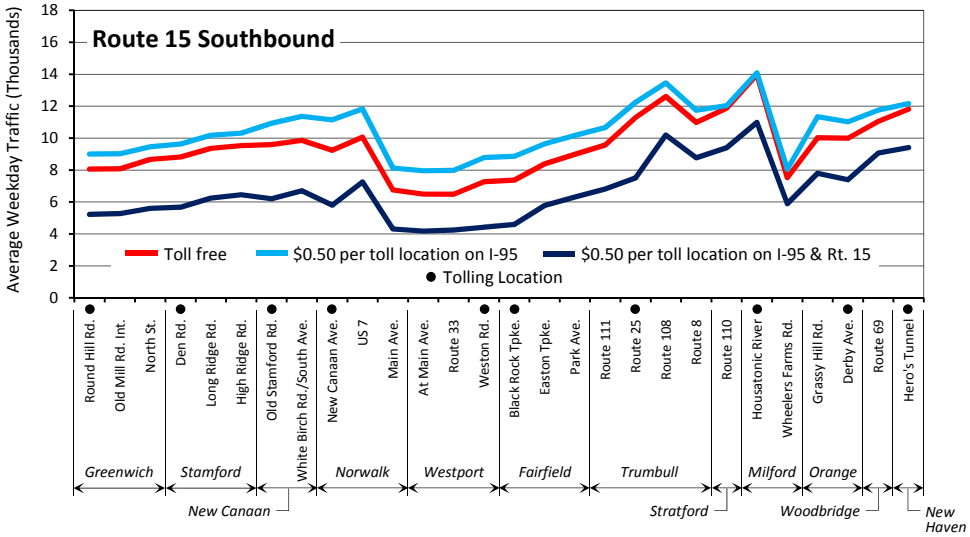
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
AM PEAK PERIOD (6 AM-10 AM)

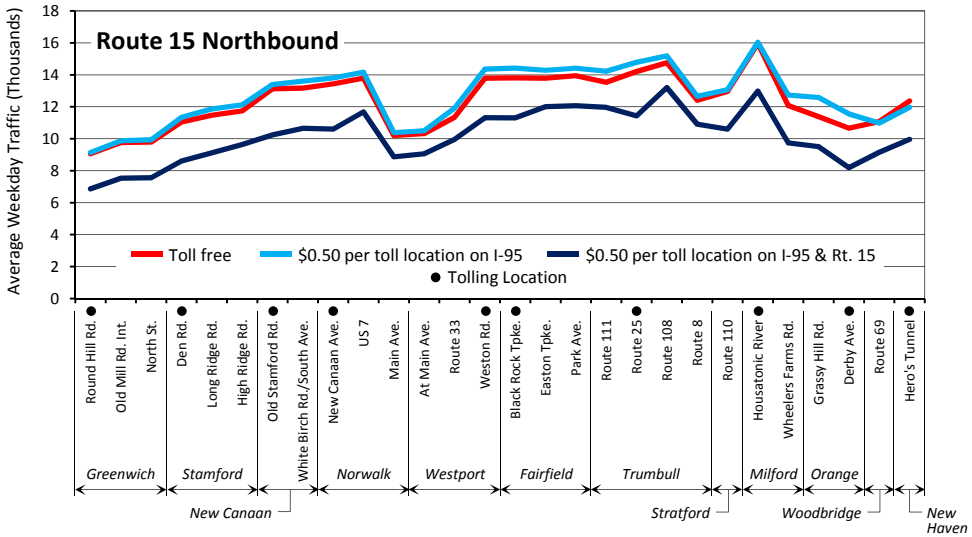
CDM Smith

FIGURE 6-6





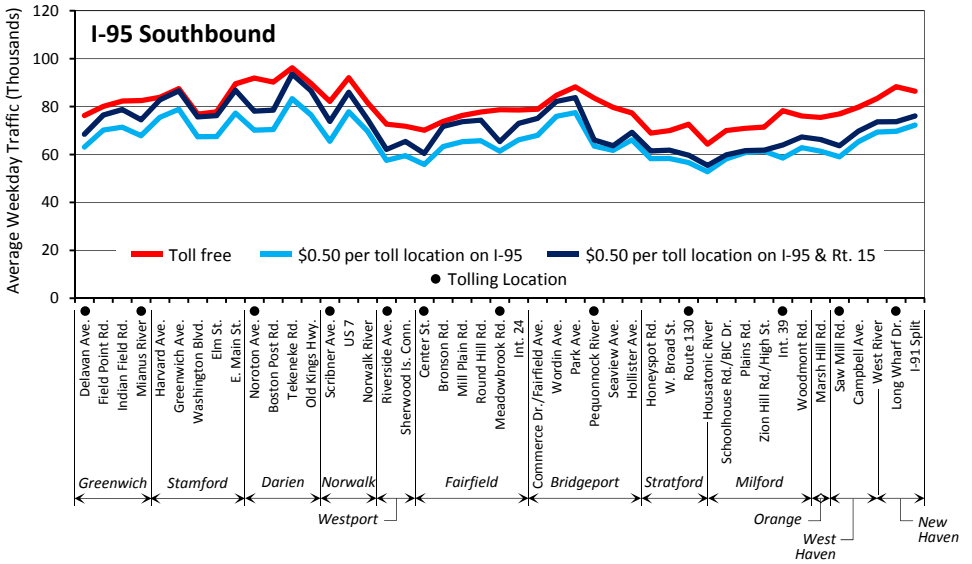


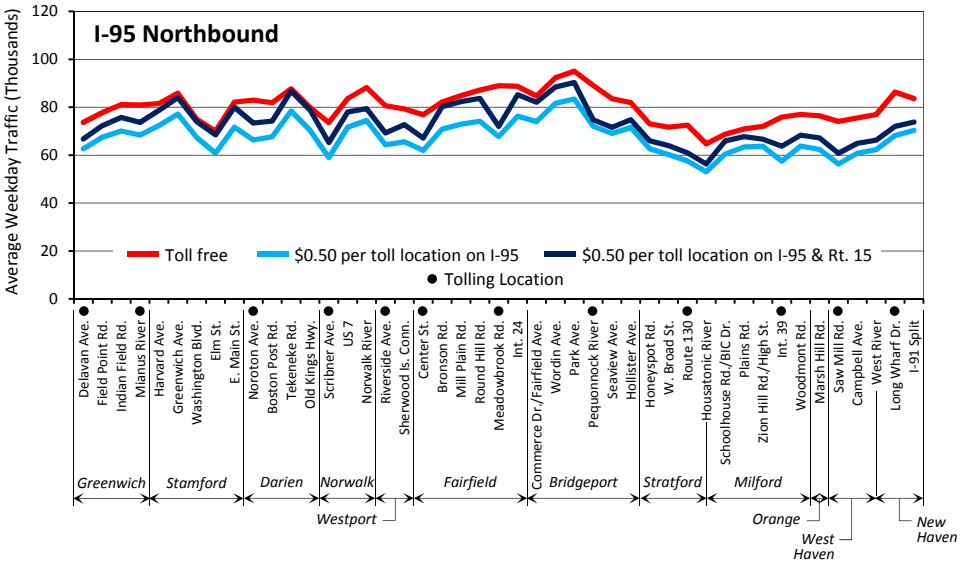


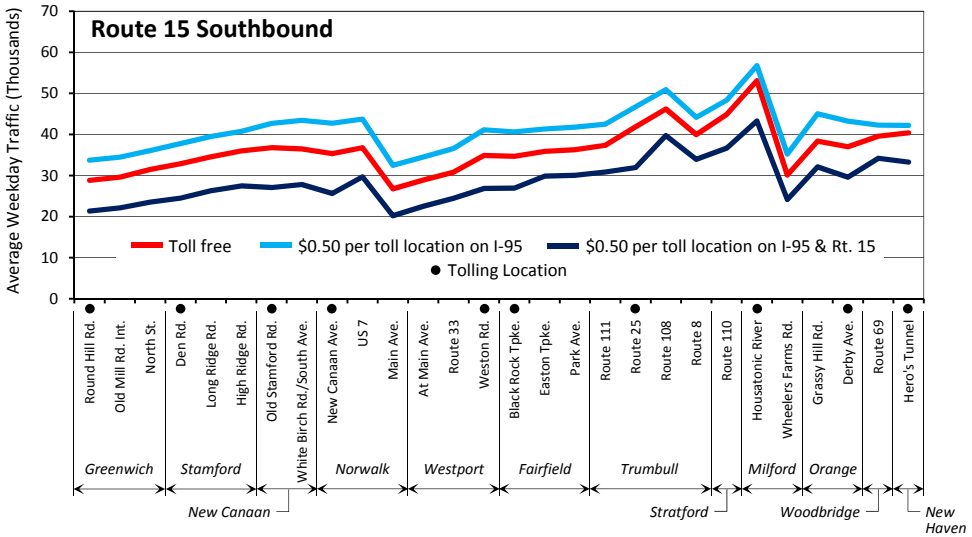
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
PM PEAK PERIOD (3 PM-7 PM)

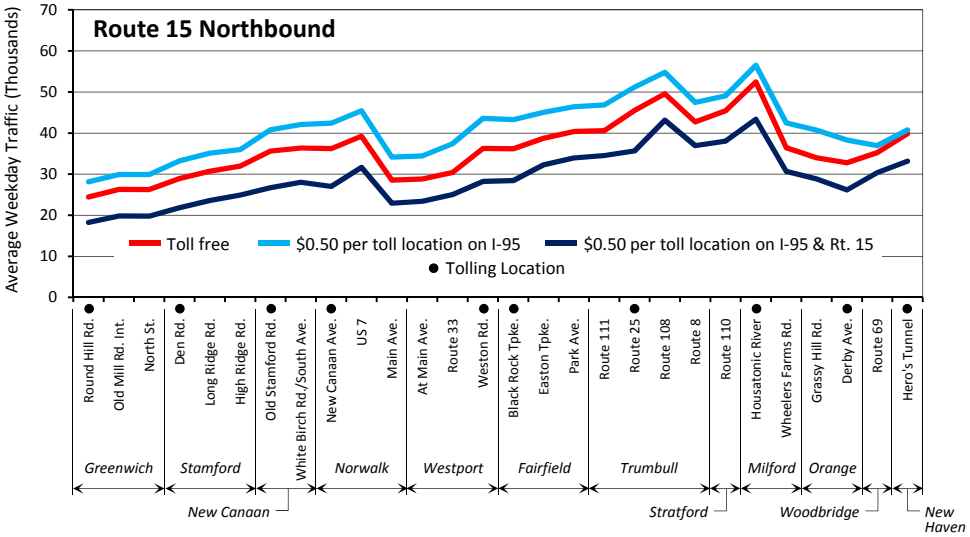
CDM Smith

FIGURE 6-7





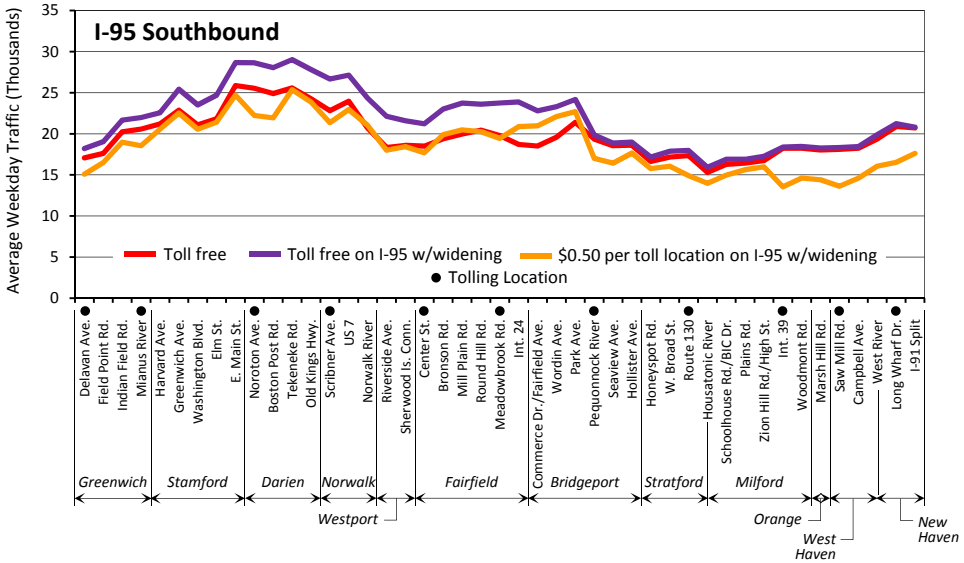


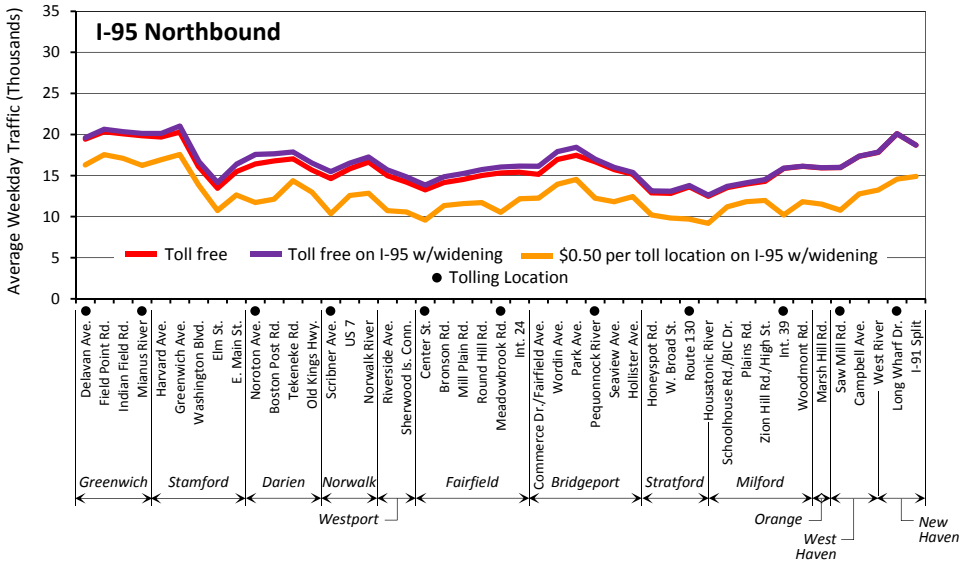


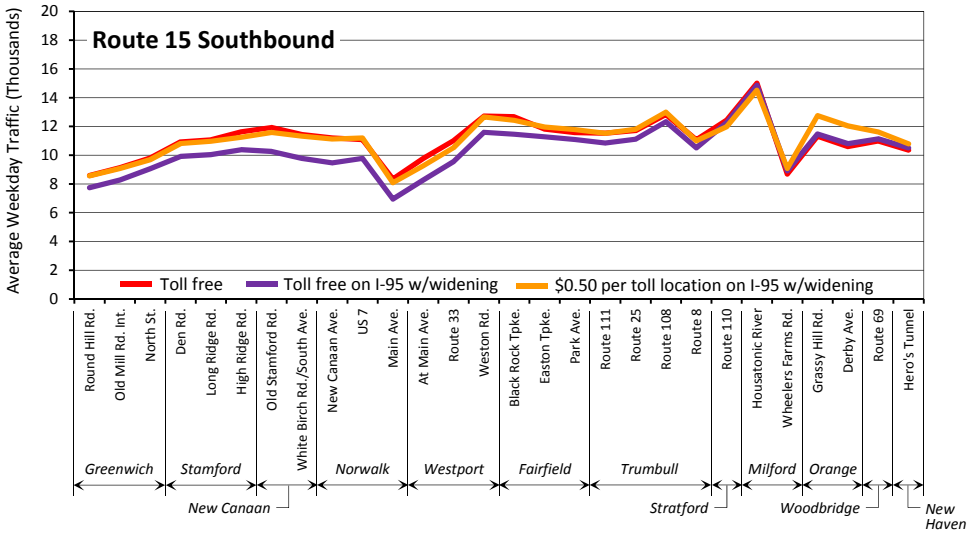
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
TOTAL AVERAGE WEEKDAY

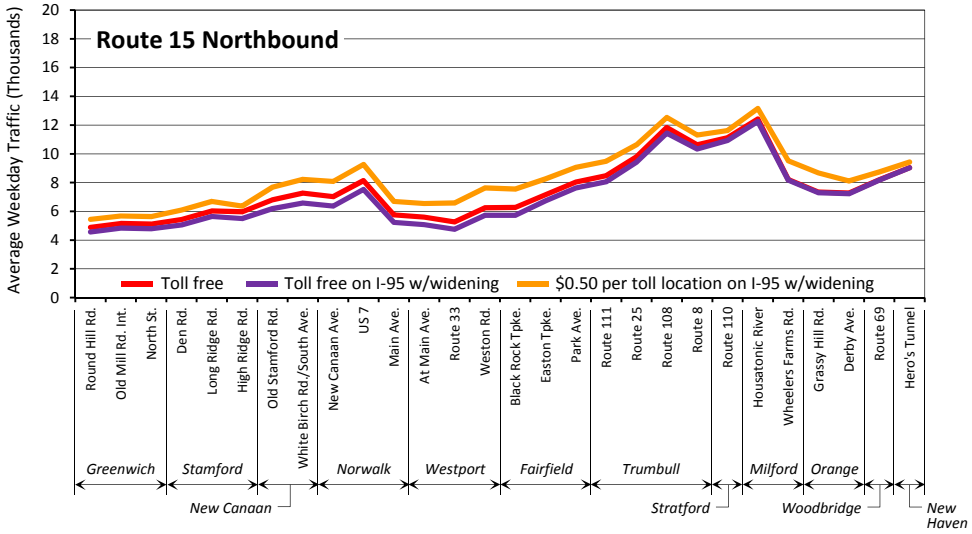
CDM Smith

FIGURE 6-8





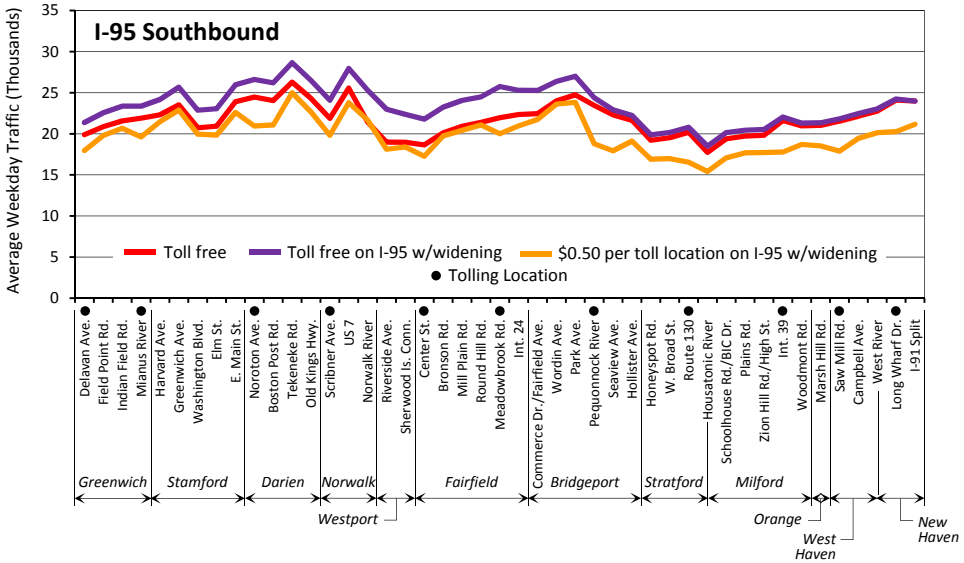


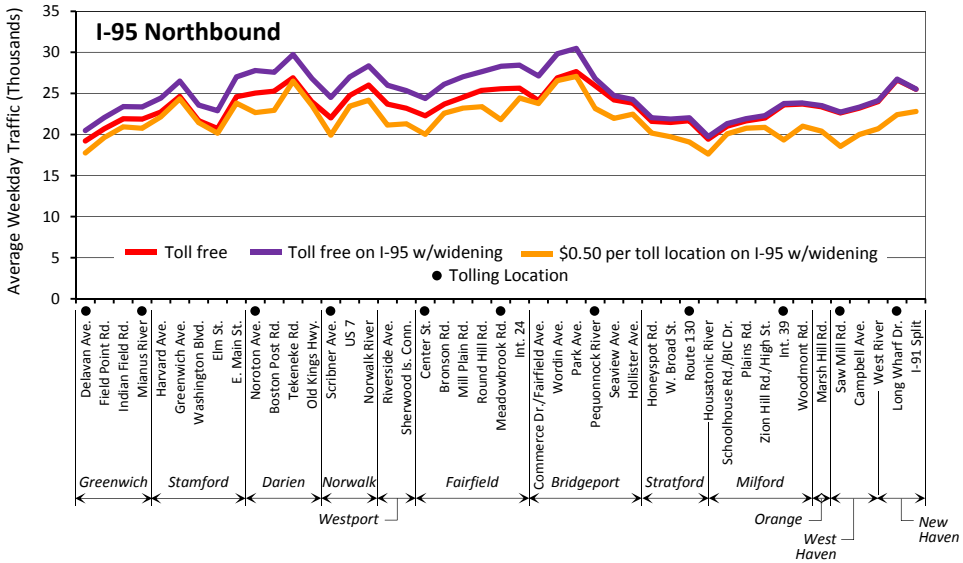


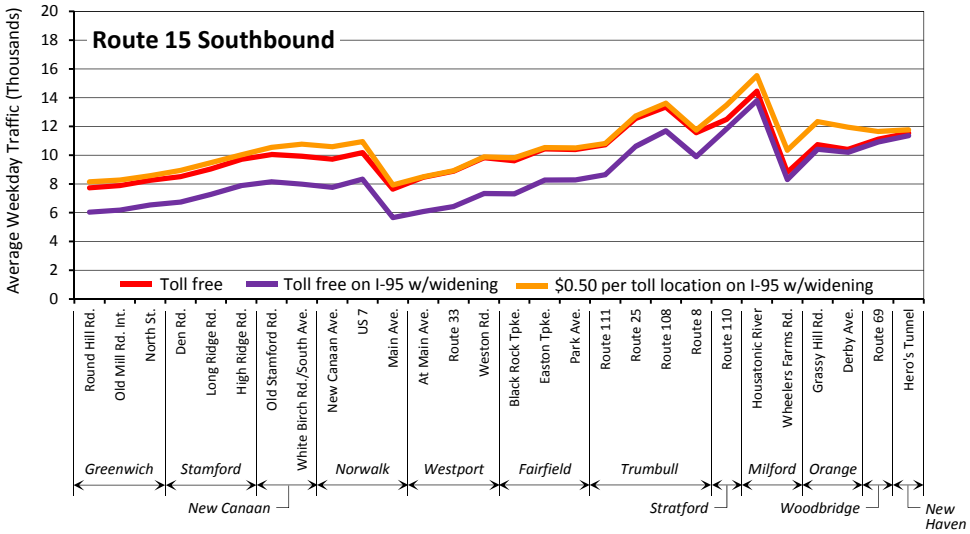
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, TOLL-FREE I-95 WIDENING, $0.50/TOLL LOCATION ON I-95 WITH WIDENING
AM PEAK PERIOD (6 AM-10 AM)

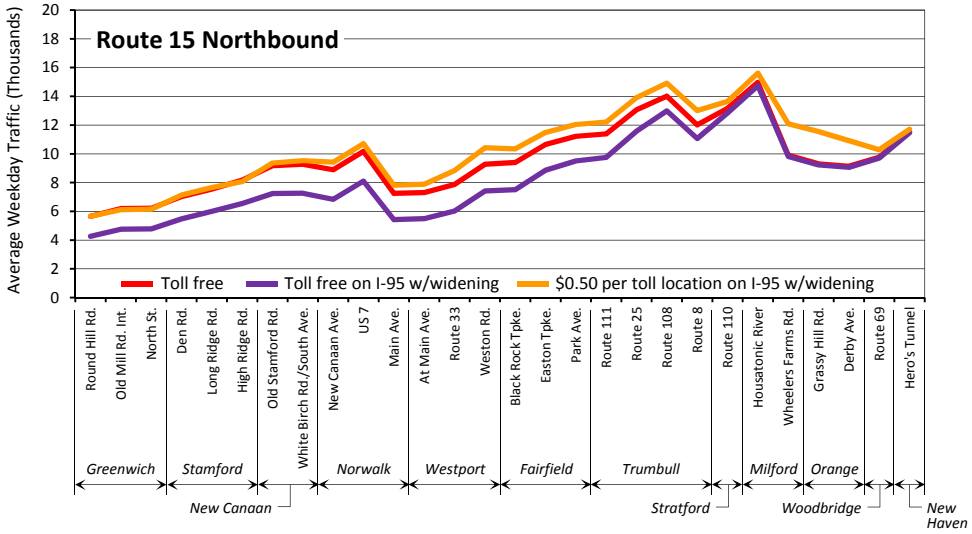
CDM Smith

FIGURE 6-9





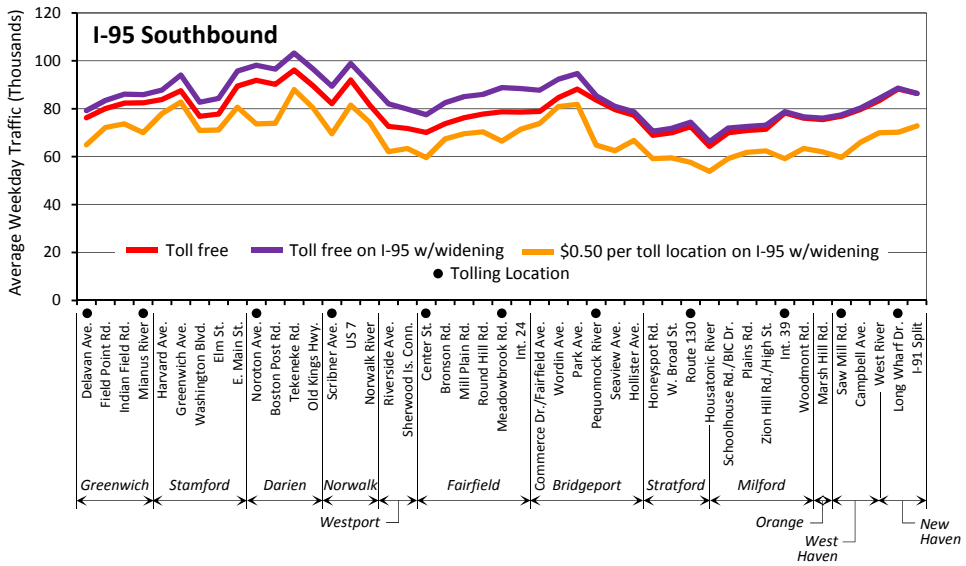


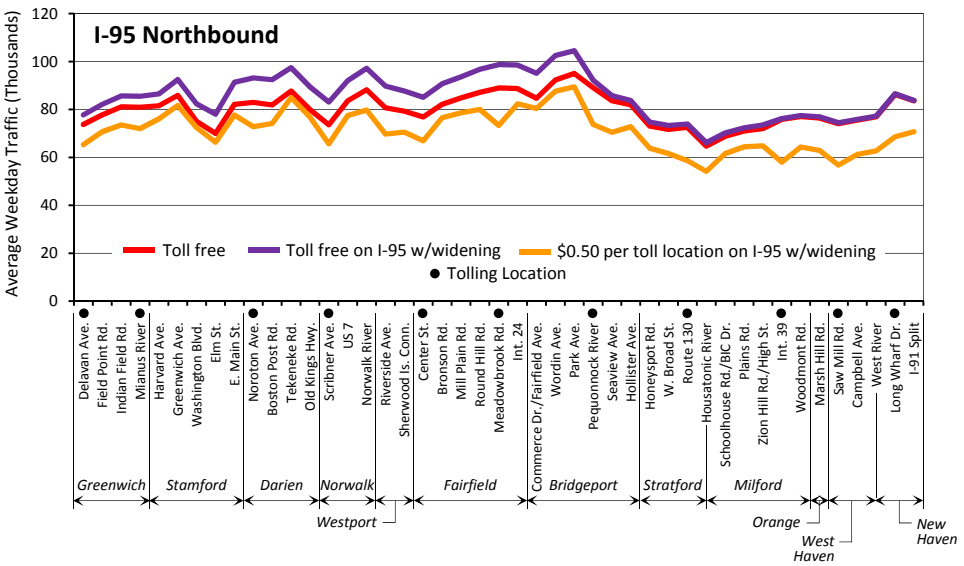


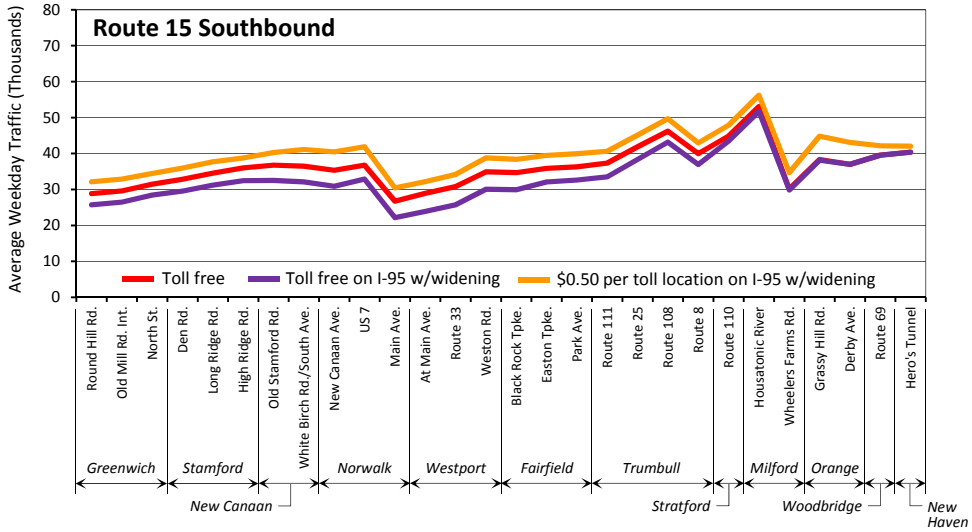
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, TOLL-FREE I-95 WIDENING, $0.50/TOLL LOCATION ON I-95 WITH WIDENING
MIDDAY PERIOD (10 AM-3 PM)

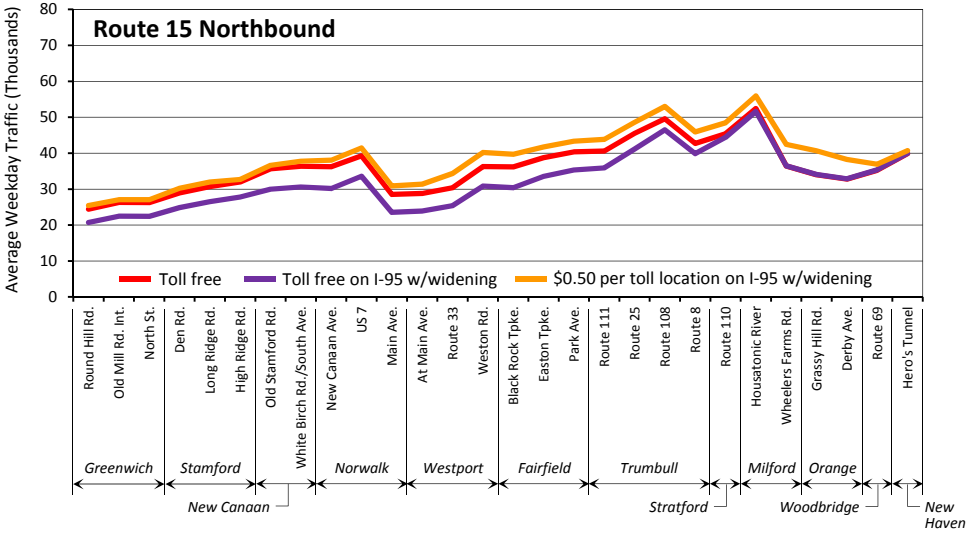
CDM Smith

FIGURE 6-10









2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
TOLL-FREE, TOLL-FREE I-95 WIDENING, $0.50/TOLL LOCATION ON I-95 WITH WIDENING
TOTAL AVERAGE WEEKDAY

CDM Smith

FIGURE 6-11

Toll Free I-95 Widening, Alternative 4, and Alternative 5

Figure 6-12 shows the 2020 estimated average weekday traffic by direction during the AM Peak Period for I-95 and Route 15 under Toll Free I-95 Widening, Alternative 4, and Alternative 5 conditions. The top half of the figure shows estimated volumes on I-95, while the bottom half shows volumes on Route 15. Tolling locations on I-95 and Route 15 (if applicable) are shown on the x-axis labelling with black dots. The southbound direction is shown on the left half of the figure and the northbound direction on the right half of the figure.

Figure 6-13 shows the 2020 estimated average weekday traffic by direction during the PM Peak Period for I-95 and Route 15 under Toll Free I-95 Widening, Alternative 4, and Alternative 5 conditions.

Figure 6-14 shows the 2020 estimated average weekday traffic by direction for I-95 and Route 15 under Toll Free I-95 Widening, Alternative 4, and Alternative 5 conditions.

Estimated Transactions, Trips, and Gross Toll Revenue

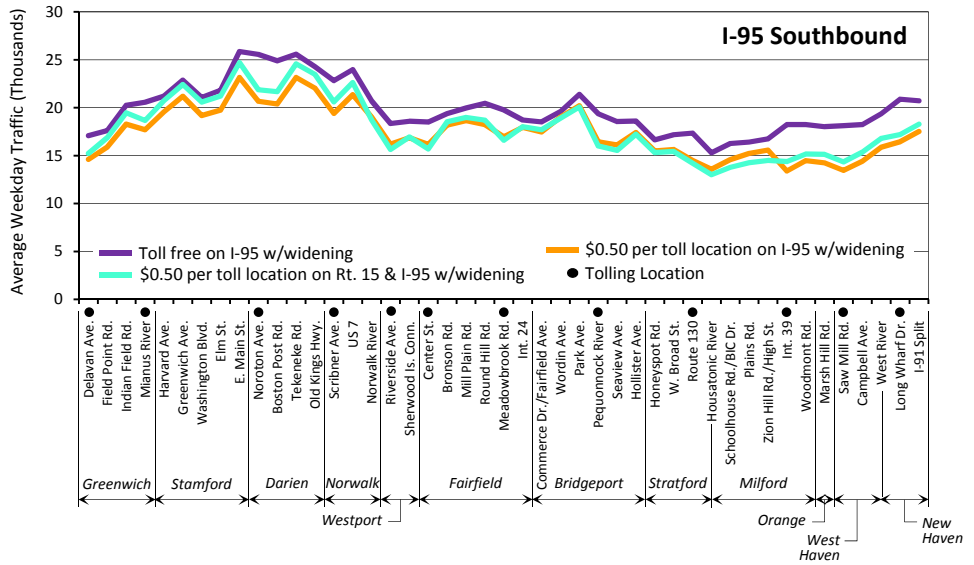
Average Weekday Transactions and Toll Revenue

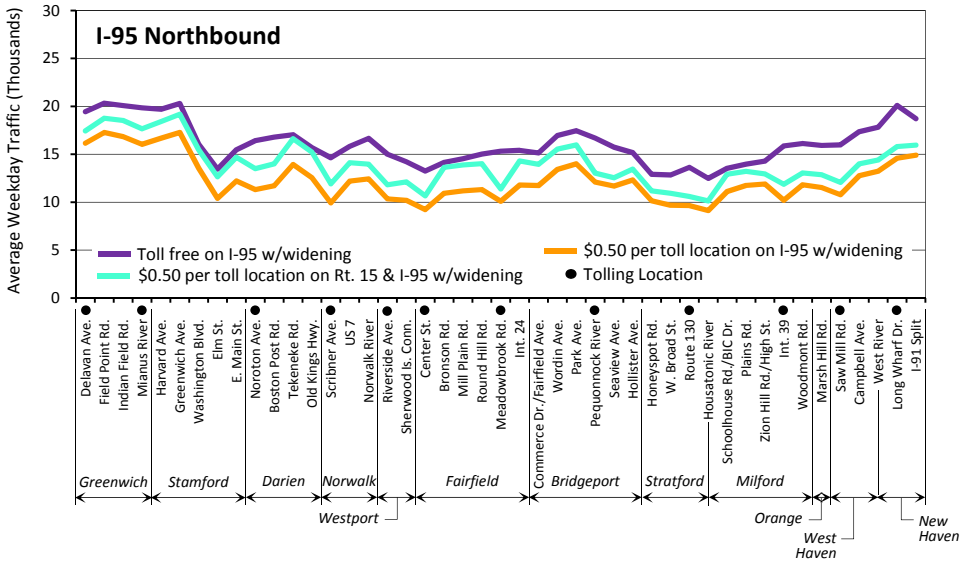
Average Weekday transactions and toll revenue were summarized for each alternative. Transactions are simply the amount of traffic passing through a tolling location. Average weekday revenue is a product of the toll rate for that time period and vehicle class multiplied by the traffic at each tolling location.

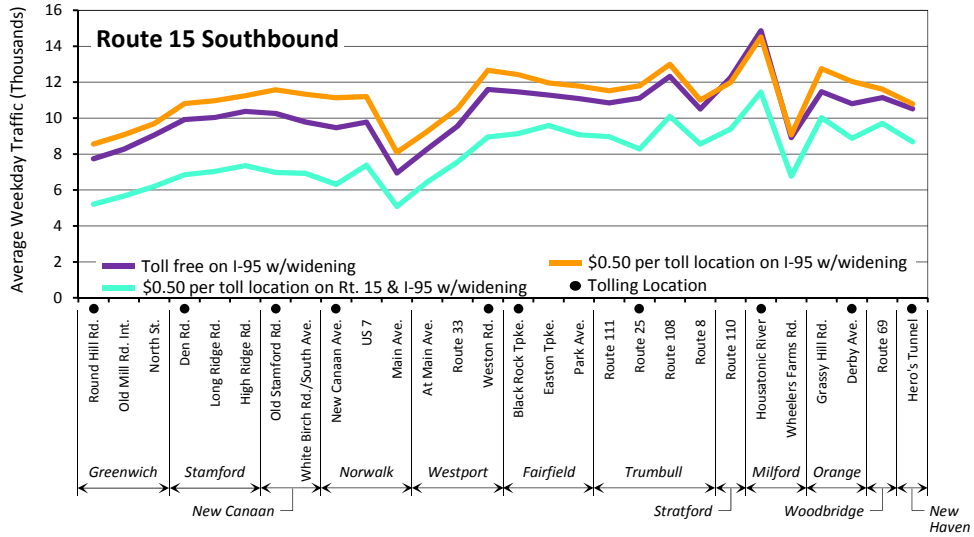
Alternative 1

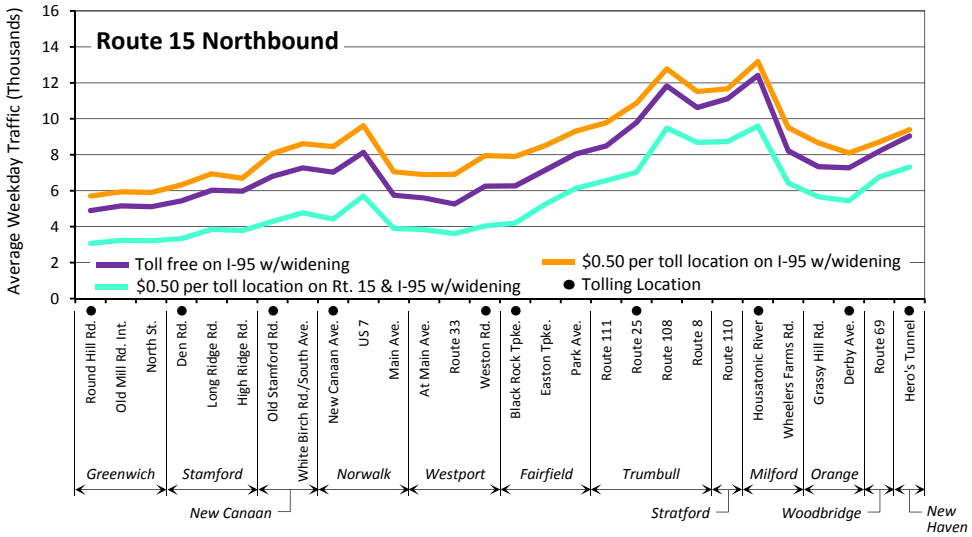
Tables 6-14 summarize the results of Alternative 1 at 2020 conditions. All four time periods (6-10AM, 10AM-3PM, 3-7PM, 7PM-6AM) are shown and broken down further to show passenger car ETC (transponder) and video tolling traffic and commercial vehicle ETC and video tolling traffic. For Alternative 1, toll rates during the AM and PM Peak Periods are $0.50 per tolling location for passenger vehicles. Commercial vehicles are assumed to have an average toll rate of 3 times the passenger vehicle toll rate ($1.50 per tolling location). During the off peak periods, the toll rate is $0.35 and $1.05 per tolling location for passenger and commercial vehicles, respectively. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate. This was used within the traffic assignment process to reflect the higher toll cost for travelers without a transponder. However, for revenue calculations, the ETC toll rate is being applied to the all traffic regardless of payment type. The assumption is being made that the extra toll surcharge associated with video tolling would be set to provide revenue neutrality with the addition cost to collect from video toll users and revenue leakage associated with video toll collection.

More than 1.5 million transactions are estimated to occur on an average weekday. The AM, PM, and Midday time periods all produce relatively similar levels of toll revenue of roughly $200 thousand per average weekday. Although the night period produces the least amount of revenue, it is still substantial at $160 thousand per average weekday. The total average weekday revenue is estimated at $771 thousand. Utilizing an average weekday to annual total expansion factor of 340 days, this translates into an estimated annual gross toll revenue for 2020 of $262 million (in 2014 dollars). The 340 days assumes 250 weekday and 115 weekend/holidays. This assumes that weekends would have slightly less than 80 percent of the weekday traffic.





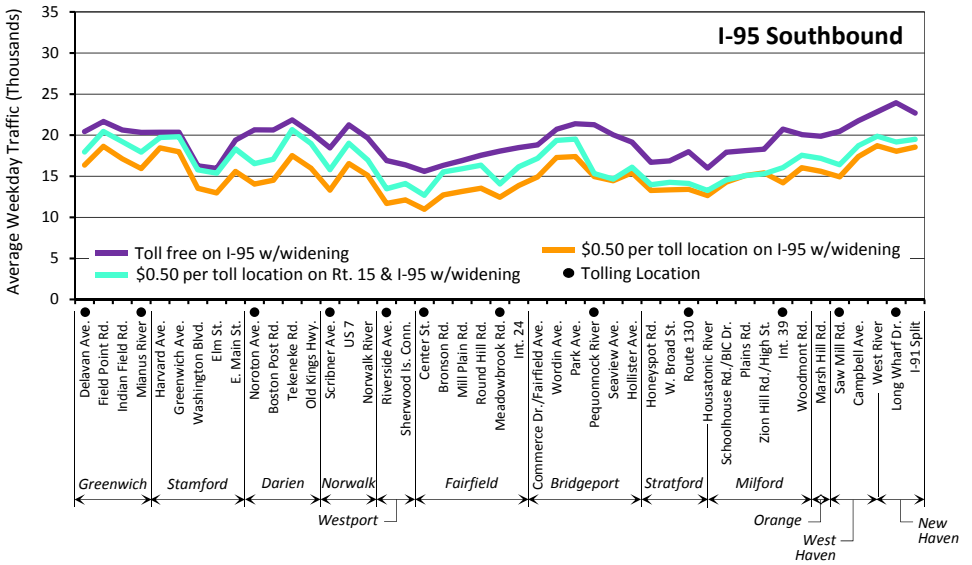


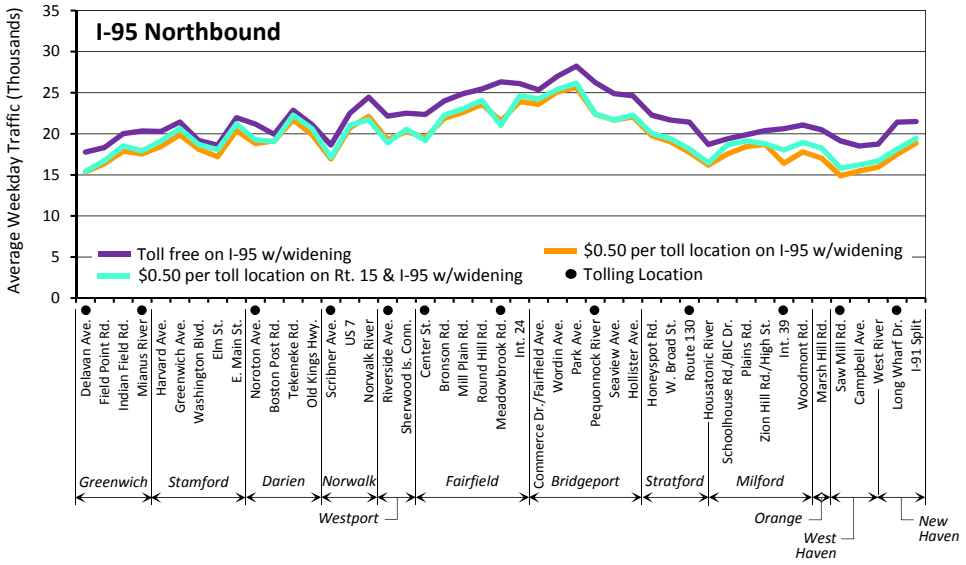


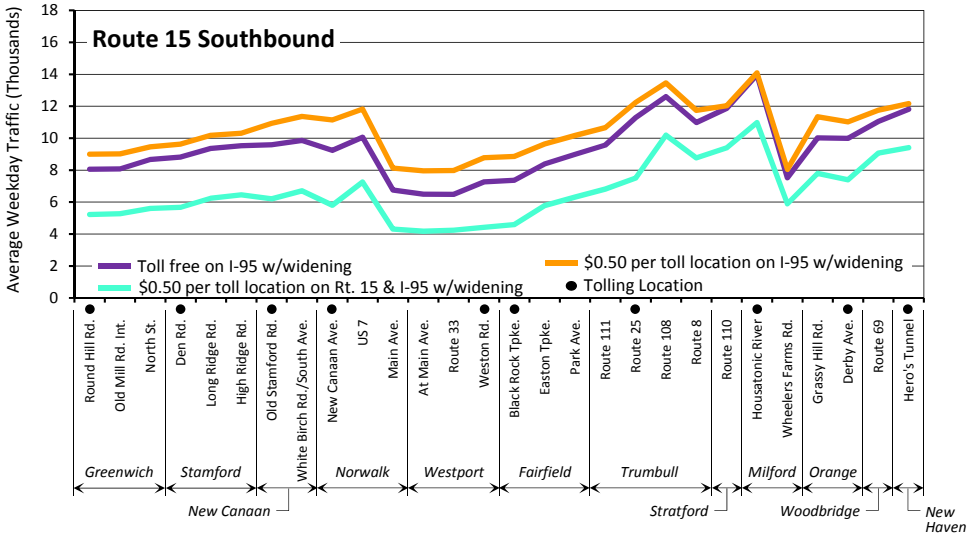
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
I-95 WIDENING - TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
AM PEAK PERIOD (6 AM-10 AM)

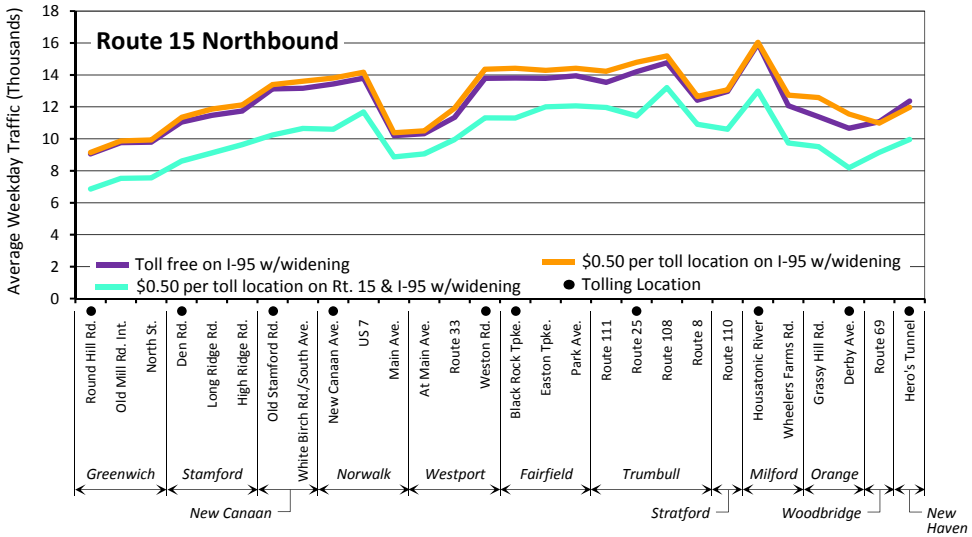
CDM Smith

FIGURE 6-12





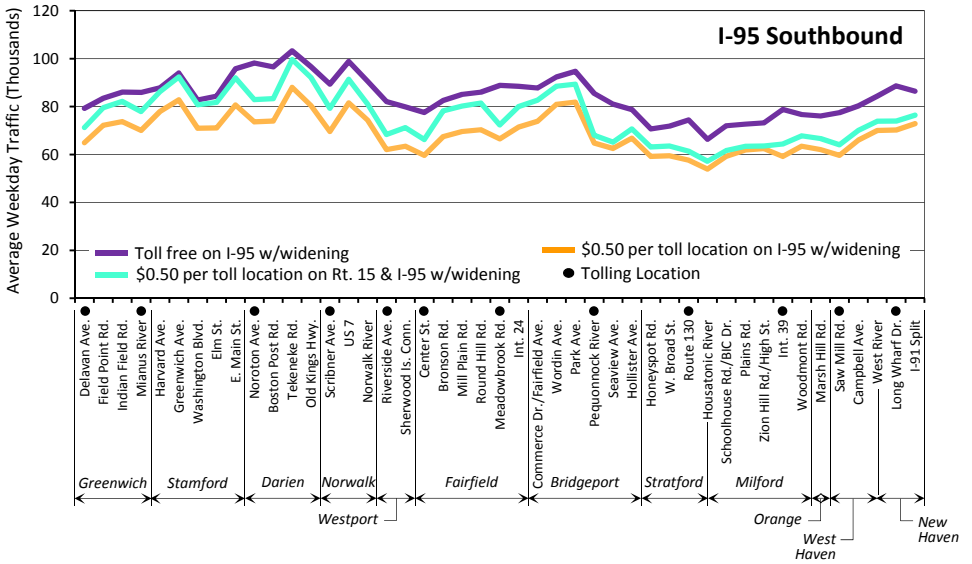


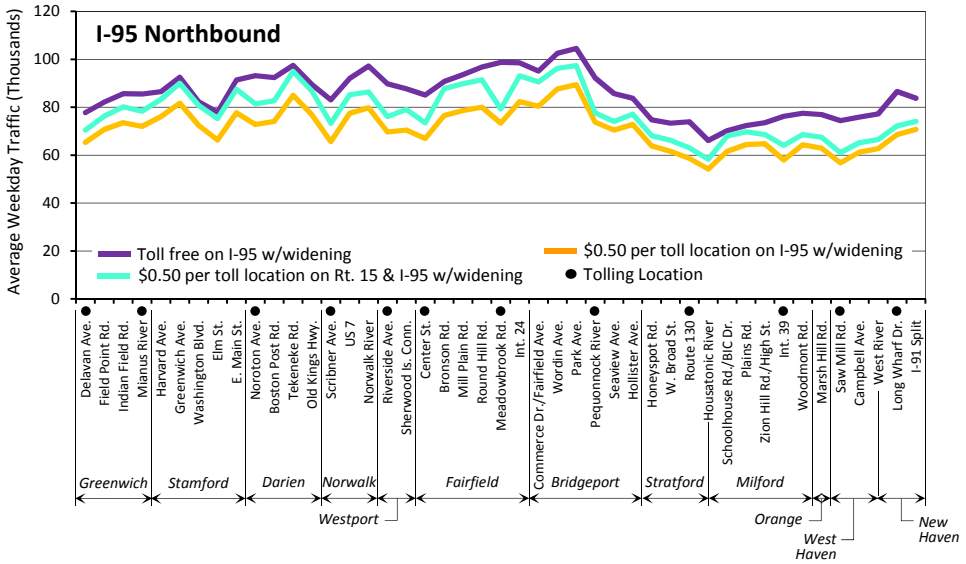


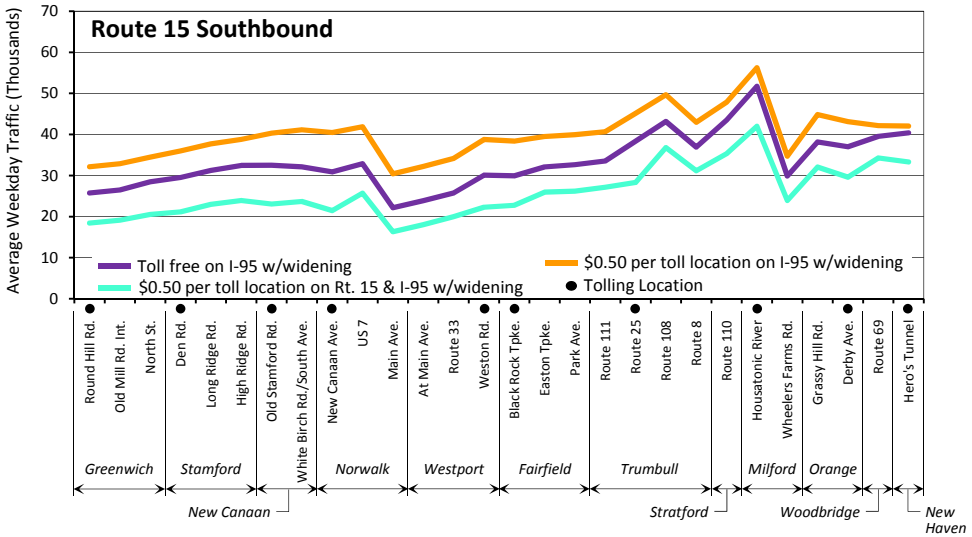
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
I-95 WIDENING - TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
PM PEAK PERIOD (3 PM-7 PM)

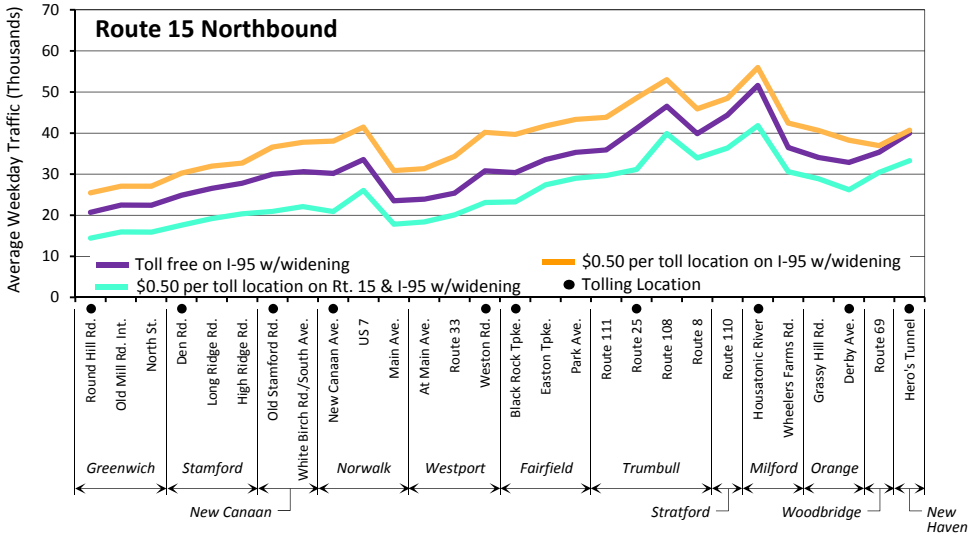
CDM Smith

FIGURE 6-13









2020 ESTIMATED AVERAGE DAILY TRAFFIC
I-95 WIDENING - TOLL-FREE, $0.50/TOLL LOCATION ON I-95, $0.50/TOLL LOCATION ON I-95 AND RT 15
TOTAL AVERAGE WEEKDAY

CDM Smith

FIGURE 6-14

Tables 6-15 summarize the results of Alternative 1 at 2040 conditions. More than 1.6 million transactions are estimated to occur on an average weekday. The total average weekday revenue is estimated at $833 thousand. Estimated annual gross toll revenue for 2040 is $283 million (2014 dollars). Estimated revenue growth between 2020 and 2040 is 0.5 percent per year.

Table 6-14
Year 2020 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternatvie 1 - No Build Toll I-95
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	20,948	6,171	27,120	$0.50	$13,560	2,776	864	3,640	$1.50	$5,460	23,725	7,035	30,760	$0.62	$19,020
2	23,456	6,734	30,191	$0.50	$15,095	2,712	837	3,549	$1.50	$5,324	26,169	7,571	33,740	$0.61	$20,419
3	22,448	6,126	28,574	$0.50	$14,287	2,618	789	3,406	$1.50	$5,110	25,065	6,915	31,981	$0.61	$19,397
4	20,745	5,663	26,408	$0.50	$13,204	2,246	675	2,921	$1.50	$4,381	22,991	6,338	29,329	$0.60	$17,585
5	18,900	5,124	24,023	$0.50	$12,012	1,947	579	2,525	$1.50	$3,788	20,846	5,702	26,549	$0.60	$15,800
6	18,251	4,954	23,204	$0.50	$11,602	1,681	500	2,181	$1.50	$3,271	19,932	5,454	25,385	$0.59	$14,873
7	19,330	5,209	24,539	$0.50	$12,270	1,943	575	2,518	$1.50	$3,776	21,273	5,784	27,057	$0.59	$16,046
8	20,199	5,337	25,536	$0.50	$12,768	2,332	680	3,012	$1.50	$4,517	22,531	6,017	28,548	$0.61	$17,286
9	17,258	4,546	21,805	$0.50	$10,902	1,823	532	2,354	$1.50	$3,532	19,081	5,078	24,159	$0.60	$14,434
10	17,056	4,552	21,608	$0.50	$10,804	1,534	452	1,986	$1.50	$2,979	18,589	5,005	23,594	$0.58	$13,783
11	17,375	4,709	22,084	$0.50	$11,042	1,658	494	2,152	$1.50	$3,227	19,033	5,203	24,236	$0.59	$14,270
12	22,158	6,225	28,383	$0.50	$14,192	2,035	611	2,646	$1.50	$3,969	24,193	6,836	31,029	$0.59	$18,161
Total	238,124	65,352	303,477	$0.50	$151,738	25,303	7,586	32,890	$1.50	$49,335	263,428	72,939	336,366	$0.60	$201,073

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	21,934	6,392	28,325	$0.35	$9,914	4,291	1,339	5,631	$1.05	$5,912	26,225	7,731	33,956	$0.47	$15,826
2	25,569	7,243	32,812	$0.35	$11,484	4,269	1,321	5,590	$1.05	$5,870	29,839	8,564	38,403	$0.45	$17,354
3	27,579	7,453	35,033	$0.35	$12,261	4,270	1,296	5,566	$1.05	$5,844	31,849	8,750	40,599	$0.45	$18,106
4	24,819	6,750	31,568	$0.35	$11,049	3,956	1,200	5,156	$1.05	$5,414	28,775	7,950	36,725	$0.45	$16,463
5	24,517	6,637	31,155	$0.35	$10,904	3,511	1,060	4,571	$1.05	$4,800	28,029	7,697	35,726	$0.44	$15,704
6	23,584	6,422	30,005	$0.35	$10,502	3,228	975	4,203	$1.05	$4,413	26,811	7,397	34,208	$0.44	$14,915
7	26,405	7,019	33,425	$0.35	$11,699	3,663	1,099	4,761	$1.05	$5,000	30,068	8,118	38,186	$0.44	$16,698
8	28,194	7,297	35,492	$0.35	$12,422	3,875	1,142	5,017	$1.05	$5,268	32,070	8,439	40,509	$0.44	$17,690
9	23,971	6,289	30,261	$0.35	$10,591	3,428	1,017	4,446	$1.05	$4,668	27,400	7,307	34,706	$0.44	$15,259
10	25,784	6,952	32,736	$0.35	$11,458	2,791	833	3,623	$1.05	$3,805	28,574	7,785	36,359	$0.42	$15,262
11	25,207	6,875	32,082	$0.35	$11,229	2,869	859	3,728	$1.05	$3,914	28,076	7,734	35,810	$0.42	$15,143
12	29,823	8,222	38,045	$0.35	$13,316	3,122	936	4,058	$1.05	$4,261	32,945	9,158	42,102	$0.42	$17,576
Total	307,387	83,552	390,938	$0.35	$136,828	43,274	13,077	56,351	$1.05	$59,169	350,660	96,629	447,289	$0.44	$195,997

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	22,828	6,647	29,475	$0.50	$14,738	1,712	534	2,247	$1.50	$3,370	24,541	7,181	31,722	$0.57	$18,108
2	24,496	6,948	31,444	$0.50	$15,722	1,558	481	2,039	$1.50	$3,058	26,053	7,429	33,482	$0.56	$18,780
3	24,394	6,654	31,048	$0.50	$15,524	1,377	415	1,793	$1.50	$2,689	25,771	7,069	32,841	$0.55	$18,213
4	22,497	6,154	28,651	$0.50	$14,325	1,218	366	1,584	$1.50	$2,377	23,715	6,520	30,235	$0.55	$16,702
5	23,131	6,311	29,443	$0.50	$14,721	1,161	347	1,508	$1.50	$2,263	24,292	6,659	30,951	$0.55	$16,984
6	22,858	6,265	29,123	$0.50	$14,561	1,048	314	1,361	$1.50	$2,042	23,905	6,579	30,484	$0.54	$16,603
7	25,472	6,900	32,371	$0.50	$16,186	1,272	377	1,649	$1.50	$2,473	26,743	7,277	34,020	$0.55	$18,659
8	27,999	7,404	35,403	$0.50	$17,701	1,495	438	1,933	$1.50	$2,900	29,493	7,842	37,336	$0.55	$20,601
9	23,443	6,188	29,631	$0.50	$14,816	1,174	345	1,519	$1.50	$2,279	24,617	6,533	31,150	$0.55	$17,094
10	23,112	6,244	29,356	$0.50	$14,678	965	286	1,251	$1.50	$1,877	24,078	6,530	30,608	$0.54	$16,555
11	22,382	6,132	28,514	$0.50	$14,257	1,006	300	1,306	$1.50	$1,959	23,388	6,432	29,820	$0.54	$16,216
12	26,567	7,437	34,004	$0.50	$17,002	1,194	358	1,552	$1.50	$2,327	27,760	7,795	35,556	$0.54	$19,329
Total	289,178	79,284	368,462	$0.50	$184,231	15,180	4,562	19,743	$1.50	$29,614	304,358	83,847	388,205	$0.55	$213,845

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	18,276	5,187	23,463	$0.35	$8,212	4,477	1,382	5,858	$1.05	$6,151	22,752	6,569	29,321	$0.49	$14,363
2	19,795	5,477	25,272	$0.35	$8,845	4,112	1,253	5,365	$1.05	$5,633	23,907	6,730	30,637	$0.47	$14,478
3	20,370	5,376	25,746	$0.35	$9,011	4,079	1,210	5,290	$1.05	$5,554	24,449	6,587	31,036	$0.47	$14,565
4	18,452	4,927	23,379	$0.35	$8,183	3,719	1,103	4,822	$1.05	$5,063	22,171	6,030	28,201	$0.47	$13,246
5	18,962	5,052	24,014	$0.35	$8,405	3,636	1,076	4,711	$1.05	$4,947	22,598	6,128	28,725	$0.46	$13,352
6	18,412	4,956	23,367	$0.35	$8,179	3,411	1,012	4,423	$1.05	$4,644	21,823	5,968	27,791	$0.46	$12,823
7	19,528	5,121	24,650	$0.35	$8,627	4,009	1,182	5,191	$1.05	$5,450	23,537	6,303	29,840	$0.47	$14,078
8	19,017	4,823	23,840	$0.35	$8,344	4,126	1,203	5,329	$1.05	$5,596	23,144	6,026	29,170	$0.48	$13,940
9	15,461	3,936	19,397	$0.35	$6,789	3,717	1,087	4,803	$1.05	$5,043	19,178	5,022	24,200	$0.49	$11,832
10	16,943	4,475	21,418	$0.35	$7,496	3,113	915	4,028	$1.05	$4,230	20,056	5,390	25,446	$0.46	$11,726
11	16,648	4,441	21,089	$0.35	$7,381	3,423	1,013	4,436	$1.05	$4,657	20,071	5,453	25,525	$0.47	$12,039
12	19,084	5,179	24,264	$0.35	$8,492	3,769	1,120	4,889	$1.05	$5,133	22,853	6,299	29,152	$0.47	$13,625
Total	220,948	58,951	279,898	$0.35	$97,964	45,592	13,554	59,146	$1.05	$62,103	266,539	72,505	339,044	$0.47	$160,067
Total Day	1,055,637	287,139	1,342,776	$0.43	$570,762	129,349	38,780	168,129	$1.19	$200,220	1,184,986	325,919	1,510,905	$0.51	$770,982
Annual (000)	358,916	97,627	456,544	$0.43	$194,059	43,979	13,185	57,164	$1.19	$68,075	402,895	110,812	513,708	$0.51	$262,134

Note: Revenue in 2014 dollars

Table 6-15
Year 2040 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternatvie 1 - No Build Toll I-95
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	25,676	2,550	28,227	$0.50	$14,113	3,427	360	3,787	$1.50	$5,681	29,103	2,911	32,014	$0.62	$19,794
2	28,615	2,778	31,394	$0.50	$15,697	3,377	352	3,729	$1.50	$5,594	31,992	3,131	35,123	$0.61	$21,291
3	28,125	2,621	30,746	$0.50	$15,373	3,355	344	3,699	$1.50	$5,549	31,480	2,965	34,445	$0.61	$20,921
4	25,940	2,418	28,358	$0.50	$14,179	2,874	294	3,168	$1.50	$4,752	28,814	2,712	31,526	$0.60	$18,931
5	23,809	2,203	26,012	$0.50	$13,006	2,543	258	2,801	$1.50	$4,202	26,352	2,461	28,813	$0.60	$17,208
6	22,843	2,117	24,960	$0.50	$12,480	2,185	222	2,407	$1.50	$3,610	25,028	2,339	27,367	$0.59	$16,090
7	24,359	2,246	26,606	$0.50	$13,303	2,511	254	2,765	$1.50	$4,148	26,871	2,500	29,371	$0.59	$17,451
8	25,698	2,327	28,025	$0.50	$14,013	3,003	300	3,302	$1.50	$4,954	28,701	2,627	31,328	$0.61	$18,966
9	22,116	2,002	24,118	$0.50	$12,059	2,400	240	2,640	$1.50	$3,961	24,516	2,242	26,759	$0.60	$16,020
10	21,982	2,020	24,002	$0.50	$12,001	2,002	202	2,204	$1.50	$3,306	23,984	2,222	26,206	$0.58	$15,307
11	22,645	2,105	24,751	$0.50	$12,375	2,138	217	2,355	$1.50	$3,533	24,783	2,323	27,106	$0.59	$15,908
12	28,342	2,709	31,051	$0.50	$15,525	2,579	264	2,843	$1.50	$4,264	30,921	2,972	33,894	$0.58	$19,790
Total	300,150	28,098	328,249	$0.50	$164,124	32,395	3,307	35,702	$1.50	$53,553	332,546	31,405	363,951	$0.60	$217,677

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	27,018	2,662	29,680	$0.35	$10,388	5,309	560	5,869	$1.05	$6,162	32,327	3,222	35,549	$0.47	$16,550
2	31,389	3,015	34,404	$0.35	$12,041	5,277	552	5,829	$1.05	$6,120	36,666	3,567	40,233	$0.45	$18,162
3	34,425	3,176	37,601	$0.35	$13,160	5,332	550	5,882	$1.05	$6,176	39,757	3,726	43,483	$0.44	$19,336
4	30,601	2,839	33,440	$0.35	$11,704	4,918	507	5,425	$1.05	$5,696	35,519	3,346	38,865	$0.45	$17,400
5	30,867	2,844	33,711	$0.35	$11,799	4,521	464	4,985	$1.05	$5,235	35,388	3,308	38,696	$0.44	$17,033
6	29,090	2,702	31,792	$0.35	$11,127	4,091	420	4,512	$1.05	$4,737	33,181	3,122	36,303	$0.44	$15,864
7	33,326	3,030	36,356	$0.35	$12,725	4,671	478	5,149	$1.05	$5,407	37,997	3,508	41,505	$0.44	$18,131
8	36,249	3,216	39,465	$0.35	$13,813	4,952	499	5,450	$1.05	$5,723	41,201	3,714	44,915	$0.43	$19,536
9	30,507	2,742	33,249	$0.35	$11,637	4,376	443	4,819	$1.05	$5,060	34,884	3,185	38,068	$0.44	$16,698
10	32,392	2,985	35,376	$0.35	$12,382	3,552	361	3,913	$1.05	$4,109	35,943	3,346	39,290	$0.42	$16,491
11	31,899	2,967	34,866	$0.35	$12,203	3,620	370	3,990	$1.05	$4,189	35,519	3,337	38,856	$0.42	$16,393
12	37,947	3,564	41,511	$0.35	$14,529	3,949	404	4,353	$1.05	$4,570	41,896	3,968	45,864	$0.42	$19,099
Total	385,710	35,741	421,452	$0.35	$147,508	54,568	5,607	60,176	$1.05	$63,185	440,279	41,349	481,627	$0.44	$210,693

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	27,625	2,717	30,341	$0.50	$15,171	2,113	223	2,335	$1.50	$3,503	29,737	2,939	32,677	$0.57	$18,674
2	29,597	2,843	32,440	$0.50	$16,220	1,929	201	2,131	$1.50	$3,196	31,527	3,044	34,571	$0.56	$19,416
3	30,414	2,825	33,239	$0.50	$16,619	1,744	179	1,922	$1.50	$2,883	32,158	3,003	35,161	$0.55	$19,503
4	27,885	2,597	30,482	$0.50	$15,241	1,535	157	1,692	$1.50	$2,538	29,420	2,754	32,174	$0.55	$17,779
5	29,406	2,729	32,136	$0.50	$16,068	1,535	156	1,691	$1.50	$2,537	30,942	2,885	33,827	$0.55	$18,605
6	28,337	2,644	30,980	$0.50	$15,490	1,348	137	1,485	$1.50	$2,228	29,684	2,781	32,466	$0.55	$17,718
7	32,168	2,971	35,139	$0.50	$17,570	1,639	166	1,805	$1.50	$2,708	33,807	3,137	36,944	$0.55	$20,277
8	36,383	3,291	39,674	$0.50	$19,837	1,943	195	2,137	$1.50	$3,206	38,325	3,486	41,812	$0.55	$23,043
9	30,353	2,752	33,105	$0.50	$16,553	1,532	154	1,686	$1.50	$2,529	31,885	2,906	34,791	$0.55	$19,082
10	29,778	2,754	32,532	$0.50	$16,266	1,258	127	1,385	$1.50	$2,078	31,036	2,881	33,918	$0.54	$18,344
11	29,000	2,712	31,712	$0.50	$15,856	1,298	132	1,430	$1.50	$2,145	30,297	2,844	33,142	$0.54	$18,001
12	34,494	3,284	37,779	$0.50	$18,889	1,511	154	1,666	$1.50	$2,499	36,006	3,439	39,444	$0.54	$21,388
Total	365,440	34,120	399,560	$0.50	$199,780	19,385	1,982	21,367	$1.50	$32,050	384,825	36,101	420,927	$0.55	$231,830

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	22,206	2,139	24,345	$0.35	$8,521	5,443	570	6,013	$1.05	$6,313	27,649	2,709	30,358	$0.49	$14,834
2	24,238	2,280	26,518	$0.35	$9,281	5,059	524	5,582	$1.05	$5,861	29,296	2,804	32,100	$0.47	$15,143
3	25,473	2,293	27,766	$0.35	$9,718	5,226	530	5,756	$1.05	$6,044	30,699	2,823	33,522	$0.47	$15,762
4	22,857	2,078	24,935	$0.35	$8,727	4,702	476	5,179	$1.05	$5,438	27,559	2,554	30,113	$0.47	$14,165
5	23,619	2,144	25,762	$0.35	$9,017	4,721	477	5,198	$1.05	$5,458	28,339	2,621	30,961	$0.47	$14,475
6	22,773	2,089	24,862	$0.35	$8,702	4,398	446	4,844	$1.05	$5,086	27,171	2,535	29,706	$0.46	$13,788
7	24,491	2,194	26,685	$0.35	$9,340	5,205	525	5,731	$1.05	$6,017	29,696	2,719	32,415	$0.47	$15,357
8	23,924	2,078	26,002	$0.35	$9,101	5,323	532	5,855	$1.05	$6,148	29,247	2,610	31,857	$0.48	$15,248
9	19,418	1,695	21,113	$0.35	$7,390	4,858	487	5,345	$1.05	$5,612	24,275	2,183	26,458	$0.49	$13,002
10	21,100	1,906	23,006	$0.35	$8,052	4,062	409	4,471	$1.05	$4,695	25,162	2,315	27,477	$0.46	$12,747
11	21,028	1,915	22,943	$0.35	$8,030	4,466	452	4,918	$1.05	$5,164	25,493	2,368	27,861	$0.47	$13,194
12	24,272	2,244	26,516	$0.35	$9,281	4,909	499	5,407	$1.05	$5,678	29,181	2,743	31,923	$0.47	$14,958
Total	275,397	25,056	300,453	$0.35	$105,158	58,371	5,928	64,299	$1.05	$67,514	333,768	30,984	364,751	$0.47	$172,672
Total Day	1,326,698	123,016	1,449,713	$0.43	$616,571	164,720	16,824	181,543	$1.19	$216,301	1,491,417	139,839	1,631,256	$0.51	$832,872
Annual (000)	451,077	41,825	492,903	$0.43	$209,634	56,005	5,720	61,725	$1.19	$73,542	507,082	47,545	554,627	$0.51	$283,177

Note: Revenue in 2014 dollars

Alternative 2

Tables 6-16 summarize the results of Alternative 2 at 2020 conditions. All four time periods (6-10AM, 10AM-3PM, 3-7PM, 7PM-6AM) are shown and broken down further to show passenger car ETC (transponder) and video tolling traffic and commercial vehicle ETC and video tolling traffic. For Alternative 2, toll rates during the AM and PM Peak Periods are $0.80 per tolling location for passenger vehicles. Commercial vehicles are assumed to have an average toll rate of 3 times the passenger vehicle toll rate ($2.40 per tolling location). During the off peak periods, the toll rate is $0.56 and $1.68 per tolling location for passenger and commercial vehicles, respectively.

Approximately 1.3 million transactions are estimated to occur on an average weekday. The AM, PM, and Midday time periods are estimated to all produce relatively similar levels of toll revenue of between $270 and $290 thousand per average weekday. Although the night period produces the least amount of revenue, it is still substantial at more than $213 thousand per average weekday. The total average weekday revenue is estimated at $1.05 million. Utilizing an average weekday to annual total expansion factor of 340 days, this translates into an estimated annual gross toll revenue for 2020 of $357 million (in 2014 dollars).

Tables 6-17 summarize the results of Alternative 2 at 2040 conditions. More than 1.4 million transactions are estimated to occur on an average weekday. The total average weekday revenue is estimated at $1.17 million. Estimated annual gross toll revenue for 2040 is $396 million (2014 dollars). Estimated revenue growth between 2020 and 2040 is 0.5 percent per year.

Alternative 3

Table 6-18 summarizes the results of Alternative 3 at 2020 conditions for I-95. Alternative 3 assumes that both I-95 and Route 15 are tolled. All four time periods (6-10AM, 10AM-3PM, 3-7PM, 7PM-6AM) are shown and broken down further to show passenger car ETC (transponder) and video tolling traffic and commercial vehicle ETC and video tolling traffic. For Alternative 3, toll rates during the AM and PM Peak Periods are $0.50 per tolling location for passenger vehicles. Commercial vehicles are assumed to have an average toll rate of 3 times the passenger vehicle toll rate ($1.50 per tolling location). During the off peak periods, the toll rate is $0.35 and $1.05 per tolling location for passenger and commercial vehicles, respectively. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

More than 1.6 million transactions are estimated to occur on an average weekday on I-95, generating $825 thousand. Annual gross toll revenue on I-95 is estimated at $281 million. By 2040 **(Table 6-19)**, annual revenue is estimate at $297 million. Alternative 3, which includes the tolling of Route 15 increases I-95 toll revenue by about 5 to 7 percent when compared to Alternative 1.

Table 6-20 summarizes the T&R results of Alternative 3 for Route 15 at 2020 levels. More than 575 thousand transactions are estimated to occur on an average weekday, generating $250 thousand. 2020 annual gross toll revenue on Route 15 is estimated at $85 million. By 2040 **(Table 6-21),** annual revenue is estimate at $97 million, which equates to an average annual percent growth rate of about 0.7. Total gross toll revenue (I-95 plus Route 15) from Alternative 3 is about 40 percent higher than Alternative 1.

Alternative 4

Table 6-22 summarizes the results of Alternative 4 for I-95 at 2020 levels. Alternative 4 assumes a widening of I-95 between Bridgeport and Stamford and a tolling of I-95 between New Haven and New

Table 6-16
Year 2020 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 2 - No Build Toll I-95
$0.80 Peak/$0.56 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	18,585	5,426	24,011	$0.80	$19,209	2,529	783	3,311	$2.40	$7,947	21,113	6,209	27,322	$0.99	$27,156
2	20,483	5,809	26,292	$0.80	$21,033	2,470	758	3,227	$2.40	$7,746	22,953	6,567	29,519	$0.97	$28,779
3	18,441	4,940	23,381	$0.80	$18,705	2,296	685	2,982	$2.40	$7,156	20,737	5,625	26,363	$0.98	$25,861
4	17,410	4,663	22,074	$0.80	$17,659	2,004	596	2,600	$2.40	$6,239	19,414	5,259	24,673	$0.97	$23,898
5	15,527	4,121	19,648	$0.80	$15,718	1,665	488	2,153	$2.40	$5,167	17,192	4,608	21,801	$0.96	$20,886
6	15,193	4,037	19,230	$0.80	$15,384	1,480	434	1,914	$2.40	$4,593	16,673	4,471	21,144	$0.94	$19,977
7	16,160	4,280	20,440	$0.80	$16,352	1,685	491	2,176	$2.40	$5,223	17,846	4,771	22,616	$0.95	$21,575
8	16,043	4,185	20,228	$0.80	$16,182	1,960	563	2,523	$2.40	$6,055	18,003	4,748	22,751	$0.98	$22,237
9	13,537	3,492	17,029	$0.80	$13,623	1,496	428	1,924	$2.40	$4,619	15,033	3,921	18,954	$0.96	$18,242
10	13,556	3,538	17,094	$0.80	$13,676	1,266	366	1,632	$2.40	$3,918	14,823	3,904	18,727	$0.94	$17,594
11	14,123	3,762	17,884	$0.80	$14,308	1,397	409	1,806	$2.40	$4,335	15,519	4,171	19,690	$0.95	$18,642
12	19,110	5,334	24,444	$0.80	$19,556	1,784	531	2,315	$2.40	$5,555	20,894	5,865	26,759	$0.94	$25,111
Total	198,169	53,587	251,756	$0.80	$201,404	22,032	6,531	28,564	$2.40	$68,553	220,201	60,118	280,319	$0.96	$269,957

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	19,846	5,733	25,580	$0.56	$14,325	4,052	1,259	5,311	$1.68	$8,923	23,898	6,993	30,891	$0.75	$23,248
2	22,841	6,394	29,234	$0.56	$16,371	4,016	1,236	5,252	$1.68	$8,824	26,857	7,630	34,487	$0.73	$25,195
3	23,726	6,288	30,013	$0.56	$16,807	3,952	1,191	5,143	$1.68	$8,641	27,678	7,479	35,157	$0.72	$25,448
4	21,501	5,732	27,234	$0.56	$15,251	3,661	1,102	4,763	$1.68	$8,002	25,163	6,834	31,997	$0.73	$23,253
5	21,256	5,635	26,892	$0.56	$15,059	3,212	961	4,173	$1.68	$7,010	24,468	6,596	31,064	$0.71	$22,069
6	20,502	5,464	25,966	$0.56	$14,541	2,967	888	3,855	$1.68	$6,476	23,469	6,352	29,821	$0.70	$21,018
7	22,375	5,842	28,217	$0.56	$15,802	3,307	983	4,290	$1.68	$7,208	25,683	6,825	32,508	$0.71	$23,010
8	24,248	6,163	30,411	$0.56	$17,030	3,492	1,018	4,510	$1.68	$7,577	27,740	7,181	34,921	$0.70	$24,607
9	20,809	5,332	26,141	$0.56	$14,639	3,064	897	3,961	$1.68	$6,654	23,873	6,229	30,102	$0.71	$21,294
10	21,809	5,743	27,552	$0.56	$15,429	2,498	735	3,233	$1.68	$5,432	24,308	6,478	30,786	$0.68	$20,861
11	21,613	5,783	27,396	$0.56	$15,342	2,589	766	3,355	$1.68	$5,636	24,202	6,549	30,751	$0.68	$20,978
12	26,162	7,132	33,294	$0.56	$18,645	2,878	855	3,733	$1.68	$6,271	29,040	7,987	37,027	$0.67	$24,916
Total	266,690	71,241	337,932	$0.56	$189,242	39,689	11,891	51,580	$1.68	$86,655	306,379	83,133	389,512	$0.71	$275,897

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	20,322	5,857	26,179	$0.80	$20,943	1,591	493	2,085	$2.40	$5,003	21,913	6,350	28,263	$0.92	$25,946
2	21,627	6,053	27,680	$0.80	$22,144	1,448	444	1,893	$2.40	$4,542	23,075	6,497	29,572	$0.90	$26,686
3	20,738	5,547	26,284	$0.80	$21,027	1,253	373	1,626	$2.40	$3,902	21,990	5,920	27,910	$0.89	$24,929
4	19,603	5,256	24,859	$0.80	$19,887	1,108	329	1,437	$2.40	$3,448	20,711	5,585	26,296	$0.89	$23,336
5	19,371	5,188	24,559	$0.80	$19,647	1,024	302	1,326	$2.40	$3,182	20,395	5,489	25,885	$0.88	$22,829
6	19,111	5,145	24,256	$0.80	$19,404	933	275	1,208	$2.40	$2,899	20,044	5,420	25,464	$0.88	$22,304
7	20,900	5,579	26,479	$0.80	$21,183	1,099	322	1,421	$2.40	$3,411	22,000	5,900	27,900	$0.88	$24,594
8	22,384	5,835	28,219	$0.80	$22,576	1,283	371	1,654	$2.40	$3,970	23,667	6,206	29,873	$0.89	$26,545
9	18,685	4,818	23,504	$0.80	$18,803	998	288	1,286	$2.40	$3,086	19,683	5,106	24,790	$0.88	$21,889
10	19,085	5,023	24,108	$0.80	$19,286	831	241	1,072	$2.40	$2,573	19,916	5,264	25,180	$0.87	$21,860
11	18,921	5,086	24,007	$0.80	$19,206	875	257	1,131	$2.40	$2,715	19,796	5,343	25,139	$0.87	$21,921
12	23,196	6,434	29,630	$0.80	$23,704	1,069	317	1,386	$2.40	$3,326	24,265	6,751	31,016	$0.87	$27,030
Total	243,944	65,820	309,764	$0.80	$247,811	13,512	4,013	17,524	$2.40	$42,058	257,455	69,833	327,288	$0.89	$289,869

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	15,690	4,395	20,085	$0.56	$11,247	4,126	1,267	5,393	$1.68	$9,060	19,816	5,661	25,477	$0.80	$20,308
2	16,763	4,558	21,321	$0.56	$11,940	3,756	1,136	4,892	$1.68	$8,219	20,520	5,694	26,213	$0.77	$20,159
3	16,452	4,228	20,680	$0.56	$11,581	3,613	1,058	4,671	$1.68	$7,847	20,065	5,286	25,351	$0.77	$19,428
4	15,022	3,904	18,927	$0.56	$10,599	3,267	955	4,221	$1.68	$7,092	18,289	4,859	23,148	$0.76	$17,691
5	15,270	3,958	19,228	$0.56	$10,767	3,177	925	4,102	$1.68	$6,892	18,447	4,883	23,330	$0.76	$17,659
6	14,965	3,917	18,883	$0.56	$10,574	2,992	874	3,866	$1.68	$6,494	17,957	4,791	22,748	$0.75	$17,068
7	15,530	3,985	19,515	$0.56	$10,929	3,469	1,008	4,477	$1.68	$7,521	18,999	4,993	23,992	$0.77	$18,450
8	14,844	3,673	18,518	$0.56	$10,370	3,572	1,026	4,598	$1.68	$7,724	18,416	4,700	23,115	$0.78	$18,094
9	12,004	2,954	14,958	$0.56	$8,377	3,202	920	4,123	$1.68	$6,926	15,206	3,875	19,081	$0.80	$15,303
10	13,566	3,479	17,045	$0.56	$9,545	2,684	775	3,459	$1.68	$5,811	16,250	4,254	20,504	$0.75	$15,356
11	13,461	3,501	16,962	$0.56	$9,499	2,984	870	3,854	$1.68	$6,474	16,445	4,371	20,816	$0.77	$15,973
12	15,713	4,199	19,912	$0.56	$11,151	3,293	967	4,260	$1.68	$7,157	19,006	5,166	24,172	$0.76	$18,307
Total	179,280	46,752	226,033	$0.56	$126,578	40,136	11,780	51,916	$1.68	$87,218	219,416	58,532	277,948	$0.77	$213,797
Total Day	888,083	237,400	1,125,483	$0.68	$765,035	115,369	34,215	149,584	$1.90	$284,484	1,003,452	271,615	1,275,067	$0.82	$1,049,519
Annual (000)	301,948	80,716	382,664	$0.68	$260,112	39,225	11,633	50,858	$1.90	$96,724	341,174	92,349	433,523	$0.82	$356,836

Note: Revenue in 2014 dollars

Table 6-17
Year 2040 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 2 - No Build Toll I-95
$0.80 Peak/$0.56 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,262	2,292	25,553	$0.80	$20,443	3,242	340	3,581	$2.40	$8,595	26,503	2,632	29,135	$1.00	$29,038
2	25,391	2,439	27,830	$0.80	$22,264	3,194	332	3,526	$2.40	$8,463	28,585	2,771	31,357	$0.98	$30,727
3	23,621	2,166	25,787	$0.80	$20,629	3,090	314	3,404	$2.40	$8,170	26,711	2,480	29,191	$0.99	$28,800
4	22,233	2,039	24,272	$0.80	$19,417	2,686	273	2,959	$2.40	$7,101	24,919	2,311	27,230	$0.97	$26,518
5	20,187	1,837	22,023	$0.80	$17,619	2,329	234	2,563	$2.40	$6,152	22,516	2,070	24,587	$0.97	$23,770
6	19,385	1,765	21,151	$0.80	$16,921	2,007	202	2,209	$2.40	$5,302	21,393	1,967	23,360	$0.95	$22,222
7	20,920	1,900	22,820	$0.80	$18,256	2,303	231	2,533	$2.40	$6,080	23,223	2,131	25,353	$0.96	$24,336
8	21,283	1,904	23,187	$0.80	$18,550	2,678	265	2,943	$2.40	$7,063	23,961	2,169	26,130	$0.98	$25,612
9	18,293	1,627	19,920	$0.80	$15,936	2,115	209	2,324	$2.40	$5,578	20,409	1,836	22,244	$0.97	$21,514
10	18,285	1,648	19,933	$0.80	$15,946	1,767	176	1,943	$2.40	$4,662	20,052	1,824	21,876	$0.94	$20,608
11	19,222	1,760	20,982	$0.80	$16,786	1,914	192	2,106	$2.40	$5,054	21,136	1,952	23,088	$0.95	$21,840
12	24,966	2,371	27,337	$0.80	$21,869	2,370	241	2,611	$2.40	$6,267	27,336	2,611	29,948	$0.94	$28,136
Total	257,048	23,746	280,795	$0.80	$224,636	29,695	3,008	32,703	$2.40	$78,487	286,743	26,754	313,498	$0.97	$303,123

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	24,624	2,409	27,034	$0.56	$15,139	5,063	532	5,595	$1.68	$9,400	29,687	2,942	32,629	$0.75	$24,539
2	28,321	2,694	31,015	$0.56	$17,369	5,023	524	5,546	$1.68	$9,318	33,344	3,218	36,562	$0.73	$26,687
3	30,075	2,731	32,806	$0.56	$18,372	5,008	514	5,521	$1.68	$9,276	35,083	3,245	38,328	$0.72	$27,647
4	27,104	2,474	29,578	$0.56	$16,564	4,639	476	5,114	$1.68	$8,592	31,743	2,949	34,693	$0.73	$25,156
5	27,283	2,471	29,755	$0.56	$16,663	4,194	427	4,621	$1.68	$7,764	31,477	2,899	34,376	$0.71	$24,426
6	25,828	2,356	28,184	$0.56	$15,783	3,810	389	4,199	$1.68	$7,054	29,638	2,745	32,383	$0.71	$22,837
7	28,955	2,594	31,548	$0.56	$17,667	4,302	437	4,738	$1.68	$7,961	33,256	3,030	36,287	$0.71	$25,628
8	32,090	2,805	34,895	$0.56	$19,541	4,568	457	5,025	$1.68	$8,441	36,658	3,262	39,920	$0.70	$27,983
9	27,209	2,402	29,610	$0.56	$16,582	3,995	401	4,396	$1.68	$7,385	31,203	2,803	34,006	$0.70	$23,967
10	27,955	2,527	30,482	$0.56	$17,070	3,247	328	3,575	$1.68	$6,006	31,203	2,854	34,057	$0.68	$23,076
11	27,932	2,558	30,490	$0.56	$17,074	3,344	339	3,682	$1.68	$6,186	31,276	2,896	34,172	$0.68	$23,260
12	34,007	3,165	37,172	$0.56	$20,816	3,703	376	4,080	$1.68	$6,854	37,710	3,541	41,252	$0.67	$27,670
Total	341,384	31,186	372,570	$0.56	$208,639	50,895	5,199	56,094	$1.68	$94,238	392,279	36,385	428,664	$0.71	$302,877

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	24,821	2,420	27,241	$0.80	$21,793	1,990	209	2,199	$2.40	$5,277	26,810	2,629	29,439	$0.92	$27,069
2	26,437	2,512	28,949	$0.80	$23,160	1,819	189	2,009	$2.40	$4,821	28,256	2,702	30,958	$0.90	$27,980
3	26,303	2,406	28,709	$0.80	$22,967	1,619	165	1,783	$2.40	$4,280	27,921	2,570	30,492	$0.89	$27,246
4	24,617	2,257	26,874	$0.80	$21,499	1,430	145	1,576	$2.40	$3,781	26,047	2,402	28,450	$0.89	$25,281
5	24,729	2,260	26,989	$0.80	$21,591	1,385	140	1,525	$2.40	$3,660	26,115	2,399	28,514	$0.89	$25,251
6	24,127	2,216	26,343	$0.80	$21,074	1,238	125	1,363	$2.40	$3,272	25,366	2,341	27,706	$0.88	$24,346
7	27,062	2,467	29,530	$0.80	$23,624	1,479	149	1,627	$2.40	$3,906	28,541	2,616	31,157	$0.88	$27,529
8	29,749	2,654	32,402	$0.80	$25,922	1,745	173	1,919	$2.40	$4,605	31,494	2,827	34,321	$0.89	$30,527
9	24,941	2,219	27,160	$0.80	$21,728	1,374	137	1,510	$2.40	$3,625	26,315	2,355	28,670	$0.88	$25,353
10	25,144	2,277	27,421	$0.80	$21,937	1,123	112	1,235	$2.40	$2,965	26,267	2,389	28,656	$0.87	$24,901
11	25,171	2,317	27,488	$0.80	$21,990	1,174	118	1,293	$2.40	$3,103	26,345	2,435	28,780	$0.87	$25,093
12	30,810	2,909	33,719	$0.80	$26,976	1,410	143	1,553	$2.40	$3,727	32,220	3,052	35,272	$0.87	$30,702
Total	313,911	28,913	342,824	$0.80	$274,259	17,787	1,805	19,592	$2.40	$47,020	331,697	30,719	362,416	$0.89	$321,279

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	19,337	1,843	21,180	$0.56	$11,861	5,154	537	5,691	$1.68	$9,562	24,492	2,380	26,872	$0.80	$21,423
2	20,850	1,934	22,785	$0.56	$12,759	4,758	490	5,248	$1.68	$8,816	25,608	2,424	28,032	$0.77	$21,575
3	20,978	1,848	22,826	$0.56	$12,783	4,778	480	5,258	$1.68	$8,833	25,756	2,328	28,084	$0.77	$21,616
4	19,002	1,692	20,694	$0.56	$11,589	4,314	433	4,747	$1.68	$7,974	23,316	2,125	25,440	$0.77	$19,563
5	19,450	1,727	21,177	$0.56	$11,859	4,316	432	4,748	$1.68	$7,976	23,766	2,159	25,925	$0.77	$19,835
6	18,904	1,696	20,600	$0.56	$11,536	4,037	405	4,442	$1.68	$7,463	22,941	2,101	25,042	$0.76	$18,998
7	19,952	1,756	21,707	$0.56	$12,156	4,708	470	5,178	$1.68	$8,699	24,659	2,226	26,885	$0.78	$20,855
8	19,234	1,637	20,871	$0.56	$11,688	4,811	476	5,287	$1.68	$8,883	24,046	2,113	26,158	$0.79	$20,570
9	15,585	1,325	16,910	$0.56	$9,469	4,380	434	4,814	$1.68	$8,088	19,965	1,759	21,724	$0.81	$17,558
10	17,431	1,537	18,968	$0.56	$10,622	3,675	366	4,041	$1.68	$6,789	21,106	1,903	23,009	$0.76	$17,411
11	17,523	1,563	19,087	$0.56	$10,689	4,063	408	4,471	$1.68	$7,511	21,587	1,971	23,558	$0.77	$18,200
12	20,461	1,869	22,329	$0.56	$12,504	4,472	451	4,923	$1.68	$8,271	24,933	2,319	27,252	$0.76	$20,775
Total	228,708	20,426	249,134	$0.56	$139,515	53,466	5,382	58,848	$1.68	$98,864	282,174	25,808	307,982	$0.77	$238,379
Total Day	1,141,051	104,271	1,245,323	$0.68	$847,049	151,842	15,395	167,236	$1.91	$318,609	1,292,893	119,666	1,412,559	$0.83	$1,165,658
Annual (000)	387,957	35,452	423,410	$0.68	$287,997	51,626	5,234	56,860	$1.91	$108,327	439,584	40,686	480,270	$0.83	$396,324

Note: Revenue in 2014 dollars

Table 6-18
Year 2020 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 3 - No Build Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	22,119	6,749	28,868	$0.50	$14,434	2,886	907	3,793	$1.50	$5,690	25,006	7,656	32,661	$0.62	$20,124
2	25,046	7,545	32,591	$0.50	$16,296	2,840	890	3,730	$1.50	$5,595	27,886	8,435	36,321	$0.60	$21,890
3	24,569	7,169	31,738	$0.50	$15,869	2,789	857	3,646	$1.50	$5,469	27,358	8,026	35,384	$0.60	$21,338
4	22,711	6,644	29,355	$0.50	$14,678	2,424	744	3,168	$1.50	$4,752	25,136	7,388	32,524	$0.60	$19,430
5	19,165	5,573	24,738	$0.50	$12,369	2,089	634	2,723	$1.50	$4,084	21,253	6,207	27,461	$0.60	$16,453
6	18,558	5,412	23,970	$0.50	$11,985	1,838	558	2,396	$1.50	$3,594	20,396	5,970	26,366	$0.59	$15,579
7	19,624	5,646	25,271	$0.50	$12,635	2,084	626	2,710	$1.50	$4,065	21,708	6,272	27,980	$0.60	$16,700
8	20,147	5,651	25,798	$0.50	$12,899	2,503	742	3,245	$1.50	$4,867	22,649	6,394	29,043	$0.61	$17,766
9	17,260	4,879	22,139	$0.50	$11,070	2,043	609	2,652	$1.50	$3,978	19,303	5,488	24,791	$0.61	$15,047
10	18,819	5,331	24,150	$0.50	$12,075	1,620	484	2,104	$1.50	$3,156	20,439	5,815	26,254	$0.58	$15,231
11	18,818	5,335	24,153	$0.50	$12,077	1,727	519	2,246	$1.50	$3,369	20,545	5,854	26,399	$0.59	$15,446
12	23,479	6,778	30,257	$0.50	$15,128	2,107	636	2,744	$1.50	$4,116	25,586	7,415	33,001	$0.58	$19,244
Total	250,315	72,714	323,029	$0.50	$161,515	26,951	8,205	35,156	$1.50	$52,734	277,266	80,919	358,185	$0.60	$214,249

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,668	7,203	30,871	$0.35	$10,805	4,379	1,378	5,758	$1.05	$6,046	28,048	8,581	36,628	$0.46	$16,850
2	27,517	8,211	35,728	$0.35	$12,505	4,374	1,370	5,744	$1.05	$6,031	31,891	9,581	41,471	$0.45	$18,535
3	30,306	8,778	39,084	$0.35	$13,679	4,425	1,365	5,790	$1.05	$6,080	34,731	10,143	44,874	$0.44	$19,759
4	27,547	8,056	35,603	$0.35	$12,461	4,105	1,266	5,370	$1.05	$5,639	31,651	9,322	40,973	$0.44	$18,100
5	26,511	7,731	34,242	$0.35	$11,985	3,625	1,113	4,738	$1.05	$4,975	30,136	8,844	38,980	$0.44	$16,960
6	25,705	7,538	33,243	$0.35	$11,635	3,377	1,037	4,414	$1.05	$4,634	29,082	8,575	37,657	$0.43	$16,270
7	28,077	8,029	36,106	$0.35	$12,637	3,742	1,139	4,881	$1.05	$5,125	31,819	9,168	40,987	$0.43	$17,762
8	29,048	8,005	37,053	$0.35	$12,968	4,028	1,203	5,230	$1.05	$5,492	33,075	9,208	42,283	$0.44	$18,460
9	25,119	7,084	32,203	$0.35	$11,271	3,601	1,084	4,685	$1.05	$4,919	28,720	8,168	36,888	$0.44	$16,190
10	28,170	8,070	36,240	$0.35	$12,684	2,886	871	3,757	$1.05	$3,945	31,056	8,941	39,997	$0.42	$16,629
11	27,006	7,724	34,730	$0.35	$12,155	2,944	888	3,832	$1.05	$4,024	29,950	8,612	38,562	$0.42	$16,179
12	31,462	8,990	40,452	$0.35	$14,158	3,192	962	4,154	$1.05	$4,362	34,655	9,952	44,606	$0.42	$18,520
Total	330,136	95,418	425,554	$0.35	$148,944	44,678	13,675	58,353	$1.05	$61,271	374,814	109,094	483,908	$0.43	$210,215

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,798	7,249	31,047	$0.50	$15,524	1,767	557	2,324	$1.50	$3,486	25,565	7,807	33,371	$0.57	$19,010
2	25,960	7,786	33,746	$0.50	$16,873	1,626	510	2,137	$1.50	$3,205	27,586	8,297	35,883	$0.56	$20,078
3	26,246	7,662	33,909	$0.50	$16,954	1,462	450	1,913	$1.50	$2,869	27,709	8,113	35,821	$0.55	$19,823
4	24,150	7,086	31,236	$0.50	$15,618	1,297	399	1,696	$1.50	$2,544	25,447	7,485	32,932	$0.55	$18,162
5	23,814	6,964	30,778	$0.50	$15,389	1,231	376	1,607	$1.50	$2,411	25,045	7,341	32,386	$0.55	$17,800
6	23,489	6,906	30,396	$0.50	$15,198	1,121	343	1,464	$1.50	$2,196	24,611	7,249	31,860	$0.55	$17,394
7	25,877	7,484	33,361	$0.50	$16,681	1,324	400	1,724	$1.50	$2,587	27,201	7,884	35,085	$0.55	$19,267
8	27,854	7,813	35,668	$0.50	$17,834	1,592	475	2,067	$1.50	$3,101	29,447	8,289	37,735	$0.55	$20,935
9	23,824	6,758	30,583	$0.50	$15,291	1,309	394	1,702	$1.50	$2,554	25,133	7,152	32,285	$0.55	$17,845
10	25,445	7,302	32,747	$0.50	$16,373	1,022	308	1,330	$1.50	$1,994	26,467	7,610	34,077	$0.54	$18,368
11	24,006	6,861	30,867	$0.50	$15,434	1,049	316	1,365	$1.50	$2,047	25,055	7,177	32,232	$0.54	$17,481
12	27,714	7,988	35,703	$0.50	$17,851	1,229	371	1,600	$1.50	$2,400	28,944	8,359	37,303	$0.54	$20,251
Total	302,178	87,862	390,040	$0.50	$195,020	16,030	4,900	20,929	$1.50	$31,394	318,208	92,762	410,969	$0.55	$226,414

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	20,421	6,092	26,513	$0.35	$9,280	4,579	1,424	6,003	$1.05	$6,303	25,000	7,516	32,516	$0.48	$15,582
2	22,413	6,554	28,968	$0.35	$10,139	4,245	1,306	5,551	$1.05	$5,828	26,658	7,860	34,518	$0.46	$15,967
3	23,236	6,598	29,834	$0.35	$10,442	4,237	1,275	5,512	$1.05	$5,788	27,473	7,873	35,346	$0.46	$16,230
4	21,405	6,151	27,556	$0.35	$9,644	3,913	1,177	5,090	$1.05	$5,345	25,318	7,328	32,646	$0.46	$14,989
5	21,502	6,158	27,661	$0.35	$9,681	3,784	1,134	4,918	$1.05	$5,164	25,286	7,293	32,579	$0.46	$14,845
6	20,942	6,057	26,999	$0.35	$9,450	3,598	1,081	4,678	$1.05	$4,912	24,539	7,138	31,677	$0.45	$14,362
7	21,867	6,185	28,052	$0.35	$9,818	4,110	1,224	5,334	$1.05	$5,600	25,977	7,409	33,386	$0.46	$15,419
8	20,640	5,651	26,291	$0.35	$9,202	4,207	1,236	5,443	$1.05	$5,715	24,847	6,887	31,734	$0.47	$14,917
9	17,068	4,740	21,808	$0.35	$7,633	3,810	1,125	4,935	$1.05	$5,182	20,878	5,865	26,743	$0.48	$12,815
10	18,197	5,117	23,315	$0.35	$8,160	3,154	934	4,088	$1.05	$4,293	21,352	6,052	27,403	$0.45	$12,453
11	17,759	5,004	22,763	$0.35	$7,967	3,447	1,025	4,472	$1.05	$4,695	21,206	6,029	27,235	$0.46	$12,662
12	20,146	5,703	25,849	$0.35	$9,047	3,794	1,130	4,924	$1.05	$5,170	23,939	6,834	30,773	$0.46	$14,217
Total	245,597	70,012	315,609	$0.35	$110,463	46,877	14,071	60,948	$1.05	$63,996	292,474	84,083	376,557	$0.46	$174,459
Total Day	1,128,226	326,006	1,454,232	$0.42	$615,942	134,536	40,851	175,387	$1.19	$209,395	1,262,762	366,858	1,629,619	$0.51	$825,337
Annual (000)	383,597	110,842	494,439	$0.42	$209,420	45,742	13,889	59,632	$1.19	$71,194	429,339	124,732	554,071	$0.51	$280,614

Note: Revenue in 2014 dollars

Table 6-19
Year 2040 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 3 - No Build Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	26,760	2,746	29,506	$0.50	$14,753	3,528	374	3,902	$1.50	$5,853	30,289	3,119	33,408	$0.62	$20,606
2	29,969	3,038	33,007	$0.50	$16,504	3,495	369	3,864	$1.50	$5,797	33,465	3,407	36,872	$0.60	$22,300
3	29,993	2,956	32,949	$0.50	$16,474	3,497	364	3,861	$1.50	$5,792	33,490	3,320	36,810	$0.60	$22,266
4	27,675	2,734	30,409	$0.50	$15,205	3,025	314	3,339	$1.50	$5,009	30,700	3,048	33,748	$0.60	$20,213
5	23,804	2,337	26,141	$0.50	$13,070	2,691	277	2,968	$1.50	$4,452	26,495	2,614	29,109	$0.60	$17,523
6	22,840	2,251	25,091	$0.50	$12,546	2,332	240	2,572	$1.50	$3,858	25,172	2,491	27,663	$0.59	$16,403
7	24,286	2,365	26,650	$0.50	$13,325	2,631	269	2,900	$1.50	$4,350	26,917	2,633	29,550	$0.60	$17,675
8	25,385	2,417	27,802	$0.50	$13,901	3,166	320	3,487	$1.50	$5,230	28,551	2,737	31,288	$0.61	$19,131
9	22,054	2,123	24,176	$0.50	$12,088	2,631	268	2,898	$1.50	$4,347	24,684	2,390	27,075	$0.61	$16,435
10	23,750	2,290	26,040	$0.50	$13,020	2,089	213	2,302	$1.50	$3,453	25,839	2,503	28,342	$0.58	$16,473
11	23,900	2,305	26,205	$0.50	$13,103	2,204	226	2,430	$1.50	$3,645	26,104	2,531	28,635	$0.58	$16,747
12	29,522	2,890	32,412	$0.50	$16,206	2,647	272	2,919	$1.50	$4,378	32,169	3,162	35,331	$0.58	$20,584
Total	309,939	30,450	340,389	$0.50	$170,194	33,936	3,506	37,442	$1.50	$56,163	343,875	33,956	377,830	$0.60	$226,357

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	28,583	2,931	31,514	$0.35	$11,030	5,404	574	5,978	$1.05	$6,277	33,987	3,504	37,492	$0.46	$17,306
2	33,225	3,342	36,568	$0.35	$12,799	5,398	570	5,968	$1.05	$6,266	38,623	3,912	42,535	$0.45	$19,065
3	37,062	3,630	40,692	$0.35	$14,242	5,493	573	6,066	$1.05	$6,370	42,555	4,203	46,758	$0.44	$20,612
4	33,168	3,275	36,442	$0.35	$12,755	5,070	529	5,599	$1.05	$5,878	38,237	3,804	42,041	$0.44	$18,633
5	32,771	3,221	35,992	$0.35	$12,597	4,641	482	5,123	$1.05	$5,379	37,412	3,703	41,115	$0.44	$17,977
6	31,230	3,092	34,322	$0.35	$12,013	4,252	442	4,694	$1.05	$4,929	35,482	3,534	39,017	$0.43	$16,942
7	34,901	3,373	38,274	$0.35	$13,396	4,745	490	5,235	$1.05	$5,497	39,646	3,863	43,509	$0.43	$18,893
8	36,502	3,418	39,920	$0.35	$13,972	5,100	519	5,619	$1.05	$5,900	41,602	3,937	45,539	$0.44	$19,872
9	31,222	2,994	34,215	$0.35	$11,975	4,558	467	5,025	$1.05	$5,276	35,780	3,461	39,241	$0.44	$17,252
10	35,167	3,421	38,588	$0.35	$13,506	3,660	376	4,036	$1.05	$4,238	38,827	3,797	42,624	$0.42	$17,743
11	34,031	3,303	37,334	$0.35	$13,067	3,708	381	4,089	$1.05	$4,293	37,739	3,684	41,423	$0.42	$17,360
12	39,830	3,862	43,692	$0.35	$15,292	4,018	412	4,430	$1.05	$4,652	43,848	4,275	48,123	$0.41	$19,944
Total	407,692	39,862	447,554	$0.35	$156,644	56,046	5,815	61,862	$1.05	$64,955	463,739	45,678	509,416	$0.44	$221,599

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	28,602	2,930	31,532	$0.50	$15,766	2,176	231	2,407	$1.50	$3,610	30,778	3,161	33,939	$0.57	$19,376
2	30,995	3,127	34,122	$0.50	$17,061	2,010	213	2,223	$1.50	$3,334	33,005	3,340	36,345	$0.56	$20,395
3	32,280	3,180	35,460	$0.50	$17,730	1,828	190	2,019	$1.50	$3,028	34,108	3,371	37,479	$0.55	$20,758
4	29,593	2,929	32,522	$0.50	$16,261	1,628	169	1,797	$1.50	$2,696	31,221	3,099	34,319	$0.55	$18,957
5	29,804	2,935	32,739	$0.50	$16,370	1,610	167	1,777	$1.50	$2,665	31,414	3,102	34,516	$0.55	$19,035
6	28,721	2,845	31,565	$0.50	$15,783	1,428	148	1,576	$1.50	$2,364	30,149	2,993	33,141	$0.55	$18,146
7	32,250	3,146	35,395	$0.50	$17,698	1,695	174	1,869	$1.50	$2,803	33,945	3,320	37,264	$0.55	$20,501
8	35,386	3,365	38,751	$0.50	$19,376	2,040	207	2,247	$1.50	$3,370	37,426	3,572	40,998	$0.55	$22,746
9	30,026	2,897	32,924	$0.50	$16,462	1,681	172	1,853	$1.50	$2,780	31,707	3,070	34,777	$0.55	$19,242
10	32,056	3,127	35,183	$0.50	$17,591	1,317	135	1,452	$1.50	$2,179	33,373	3,262	36,635	$0.54	$19,770
11	30,377	2,948	33,325	$0.50	$16,663	1,341	138	1,479	$1.50	$2,219	31,718	3,086	34,804	$0.54	$18,881
12	35,317	3,452	38,769	$0.50	$19,385	1,545	159	1,703	$1.50	$2,555	36,862	3,611	40,473	$0.54	$21,940
Total	375,407	36,882	412,289	$0.50	$206,145	20,299	2,103	22,402	$1.50	$33,603	395,706	38,985	434,691	$0.55	$239,748

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	24,498	2,466	26,964	$0.35	$9,437	5,544	583	6,126	$1.05	$6,432	30,042	3,049	33,090	$0.48	$15,870
2	27,033	2,669	29,702	$0.35	$10,396	5,190	540	5,731	$1.05	$6,017	32,223	3,209	35,433	$0.46	$16,413
3	28,595	2,744	31,339	$0.35	$10,969	5,372	550	5,922	$1.05	$6,218	33,968	3,294	37,262	$0.46	$17,187
4	26,054	2,528	28,582	$0.35	$10,004	4,899	501	5,400	$1.05	$5,670	30,953	3,029	33,982	$0.46	$15,674
5	26,293	2,544	28,837	$0.35	$10,093	4,889	499	5,388	$1.05	$5,657	31,182	3,043	34,225	$0.46	$15,750
6	25,407	2,479	27,886	$0.35	$9,760	4,575	467	5,043	$1.05	$5,295	29,982	2,947	32,929	$0.46	$15,055
7	26,868	2,568	29,436	$0.35	$10,303	5,301	538	5,839	$1.05	$6,131	32,169	3,106	35,275	$0.47	$16,433
8	25,710	2,390	28,100	$0.35	$9,835	5,426	545	5,971	$1.05	$6,269	31,136	2,935	34,071	$0.47	$16,104
9	21,161	1,996	23,157	$0.35	$8,105	4,938	498	5,436	$1.05	$5,708	26,099	2,494	28,593	$0.48	$13,813
10	22,633	2,161	24,794	$0.35	$8,678	4,101	415	4,516	$1.05	$4,742	26,734	2,576	29,310	$0.46	$13,420
11	22,410	2,141	24,551	$0.35	$8,593	4,491	456	4,947	$1.05	$5,194	26,900	2,597	29,498	$0.47	$13,787
12	25,331	2,432	27,764	$0.35	$9,717	4,911	500	5,410	$1.05	$5,681	30,242	2,932	33,174	$0.46	$15,398
Total	301,994	29,118	331,112	$0.35	$115,889	59,636	6,093	65,729	$1.05	$69,015	361,630	35,211	396,841	$0.47	$184,904
Total Day	1,395,032	136,312	1,531,344	$0.42	$648,872	169,917	17,517	187,434	$1.19	$223,736	1,564,949	153,829	1,718,778	$0.51	$872,608
Annual (000)	474,311	46,346	520,657	$0.42	$220,617	57,772	5,956	63,728	$1.19	$76,070	532,083	52,302	584,385	$0.51	$296,687

Note: Revenue in 2014 dollars

Table 6-20
Year 2020 Route 15 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 3 - No Build Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	7,089	2,172	9,261	$0.50	$4,631	0	0	0	$1.50	$0	7,089	2,172	9,261	$0.50	$4,631
2	8,753	2,670	11,423	$0.50	$5,712	0	0	0	$1.50	$0	8,753	2,670	11,423	$0.50	$5,712
3	10,013	2,981	12,994	$0.50	$6,497	0	0	0	$1.50	$0	10,013	2,981	12,994	$0.50	$6,497
4	9,719	2,863	12,582	$0.50	$6,291	0	0	0	$1.50	$0	9,719	2,863	12,582	$0.50	$6,291
5	11,506	3,420	14,927	$0.50	$7,463	0	0	0	$1.50	$0	11,506	3,420	14,927	$0.50	$7,463
6	11,497	3,465	14,963	$0.50	$7,481	0	0	0	$1.50	$0	11,497	3,465	14,963	$0.50	$7,481
7	12,854	3,823	16,677	$0.50	$8,338	0	0	0	$1.50	$0	12,854	3,823	16,677	$0.50	$8,338
8	16,631	4,925	21,556	$0.50	$10,778	0	0	0	$1.50	$0	16,631	4,925	21,556	$0.50	$10,778
9	10,884	3,258	14,143	$0.50	$7,071	0	0	0	$1.50	$0	10,884	3,258	14,143	$0.50	$7,071
10	12,139	3,684	15,823	$0.50	$7,912	0	0	0	$1.50	$0	12,139	3,684	15,823	$0.50	$7,912
Total	111,085	33,263	144,349	$0.50	$72,174	0	0	0	$0.00	$0	111,085	33,263	144,349	$0.50	$72,174

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	8,284	2,539	10,822	$0.35	$3,788	0	0	0	$1.05	$0	8,284	2,539	10,822	$0.35	$3,788
2	9,664	2,955	12,619	$0.35	$4,417	0	0	0	$1.05	$0	9,664	2,955	12,619	$0.35	$4,417
3	11,696	3,496	15,192	$0.35	$5,317	0	0	0	$1.05	$0	11,696	3,496	15,192	$0.35	$5,317
4	11,115	3,291	14,406	$0.35	$5,042	0	0	0	$1.05	$0	11,115	3,291	14,406	$0.35	$5,042
5	11,649	3,442	15,091	$0.35	$5,282	0	0	0	$1.05	$0	11,649	3,442	15,091	$0.35	$5,282
6	11,686	3,536	15,223	$0.35	$5,328	0	0	0	$1.05	$0	11,686	3,536	15,223	$0.35	$5,328
7	15,892	4,677	20,569	$0.35	$7,199	0	0	0	$1.05	$0	15,892	4,677	20,569	$0.35	$7,199
8	19,391	5,766	25,158	$0.35	$8,805	0	0	0	$1.05	$0	19,391	5,766	25,158	$0.35	$8,805
9	12,390	3,709	16,099	$0.35	$5,635	0	0	0	$1.05	$0	12,390	3,709	16,099	$0.35	$5,635
10	15,045	4,555	19,601	$0.35	$6,860	0	0	0	$1.05	$0	15,045	4,555	19,601	$0.35	$6,860
Total	126,813	37,965	164,778	$0.35	$57,672	0	0	0	$0.00	$0	126,813	37,965	164,778	$0.35	$57,672

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	9,255	2,827	12,082	$0.50	$6,041	0	0	0	$1.50	$0	9,255	2,827	12,082	$0.50	$6,041
2	10,951	3,339	14,290	$0.50	$7,145	0	0	0	$1.50	$0	10,951	3,339	14,290	$0.50	$7,145
3	12,661	3,779	16,440	$0.50	$8,220	0	0	0	$1.50	$0	12,661	3,779	16,440	$0.50	$8,220
4	12,656	3,746	16,402	$0.50	$8,201	0	0	0	$1.50	$0	12,656	3,746	16,402	$0.50	$8,201
5	12,117	3,611	15,728	$0.50	$7,864	0	0	0	$1.50	$0	12,117	3,611	15,728	$0.50	$7,864
6	12,197	3,699	15,896	$0.50	$7,948	0	0	0	$1.50	$0	12,197	3,699	15,896	$0.50	$7,948
7	14,599	4,341	18,940	$0.50	$9,470	0	0	0	$1.50	$0	14,599	4,341	18,940	$0.50	$9,470
8	18,438	5,524	23,962	$0.50	$11,981	0	0	0	$1.50	$0	18,438	5,524	23,962	$0.50	$11,981
9	11,978	3,599	15,577	$0.50	$7,789	0	0	0	$1.50	$0	11,978	3,599	15,577	$0.50	$7,789
10	14,845	4,516	19,361	$0.50	$9,680	0	0	0	$1.50	$0	14,845	4,516	19,361	$0.50	$9,680
Total	129,698	38,982	168,680	$0.50	$84,340	0	0	0	$0.00	$0	129,698	38,982	168,680	$0.50	$84,340

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	5,725	1,712	7,437	$0.35	$2,603	0	0	0	$1.05	$0	5,725	1,712	7,437	$0.35	$2,603
2	6,142	1,834	7,976	$0.35	$2,792	0	0	0	$1.05	$0	6,142	1,834	7,976	$0.35	$2,792
3	7,097	2,075	9,172	$0.35	$3,210	0	0	0	$1.05	$0	7,097	2,075	9,172	$0.35	$3,210
4	7,176	2,074	9,249	$0.35	$3,237	0	0	0	$1.05	$0	7,176	2,074	9,249	$0.35	$3,237
5	7,203	2,080	9,282	$0.35	$3,249	0	0	0	$1.05	$0	7,203	2,080	9,282	$0.35	$3,249
6	7,125	2,119	9,243	$0.35	$3,235	0	0	0	$1.05	$0	7,125	2,119	9,243	$0.35	$3,235
7	8,875	2,538	11,413	$0.35	$3,994	0	0	0	$1.05	$0	8,875	2,538	11,413	$0.35	$3,994
8	12,362	3,611	15,973	$0.35	$5,590	0	0	0	$1.05	$0	12,362	3,611	15,973	$0.35	$5,590
9	7,702	2,253	9,955	$0.35	$3,484	0	0	0	$1.05	$0	7,702	2,253	9,955	$0.35	$3,484
10	8,999	2,663	11,662	$0.35	$4,082	0	0	0	$1.05	$0	8,999	2,663	11,662	$0.35	$4,082
Total	78,404	22,958	101,362	$0.35	$35,477	0	0	0	$0.00	$0	78,404	22,958	101,362	$0.35	$35,477
Total Day	446,001	133,168	579,169	$0.43	$249,663	0	0	0	$0.00	$0	446,001	133,168	579,169	$0.43	$249,663
Annual (000)	151,640	45,277	196,917	$0.43	$84,886	0	0	0	$0.00	$0	151,640	45,277	196,917	$0.43	$84,886

Note: Revenue in 2014 dollars

Table 6-21
Year 2040 Route 15 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 3 - No Build Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	10,029	1,031	11,060	$0.50	$5,530	0	0	0	$1.50	$0	10,029	1,031	11,060	$0.50	$5,530
2	12,350	1,265	13,615	$0.50	$6,807	0	0	0	$1.50	$0	12,350	1,265	13,615	$0.50	$6,807
3	14,048	1,412	15,460	$0.50	$7,730	0	0	0	$1.50	$0	14,048	1,412	15,460	$0.50	$7,730
4	13,524	1,347	14,870	$0.50	$7,435	0	0	0	$1.50	$0	13,524	1,347	14,870	$0.50	$7,435
5	15,305	1,535	16,840	$0.50	$8,420	0	0	0	$1.50	$0	15,305	1,535	16,840	$0.50	$8,420
6	15,009	1,523	16,531	$0.50	$8,266	0	0	0	$1.50	$0	15,009	1,523	16,531	$0.50	$8,266
7	17,337	1,742	19,079	$0.50	$9,540	0	0	0	$1.50	$0	17,337	1,742	19,079	$0.50	$9,540
8	21,991	2,206	24,196	$0.50	$12,098	0	0	0	$1.50	$0	21,991	2,206	24,196	$0.50	$12,098
9	14,953	1,514	16,466	$0.50	$8,233	0	0	0	$1.50	$0	14,953	1,514	16,466	$0.50	$8,233
10	16,595	1,698	18,293	$0.50	$9,146	0	0	0	$1.50	$0	16,595	1,698	18,293	$0.50	$9,146
Total	151,140	15,270	166,410	$0.50	$83,205	0	0	0	$0.00	$0	151,140	15,270	166,410	$0.50	$83,205

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	11,095	1,142	12,237	$0.35	$4,283	0	0	0	$1.05	$0	11,095	1,142	12,237	$0.35	$4,283
2	13,084	1,344	14,428	$0.35	$5,050	0	0	0	$1.05	$0	13,084	1,344	14,428	$0.35	$5,050
3	15,948	1,607	17,556	$0.35	$6,145	0	0	0	$1.05	$0	15,948	1,607	17,556	$0.35	$6,145
4	15,435	1,543	16,978	$0.35	$5,942	0	0	0	$1.05	$0	15,435	1,543	16,978	$0.35	$5,942
5	16,498	1,649	18,146	$0.35	$6,351	0	0	0	$1.05	$0	16,498	1,649	18,146	$0.35	$6,351
6	16,334	1,664	17,998	$0.35	$6,299	0	0	0	$1.05	$0	16,334	1,664	17,998	$0.35	$6,299
7	22,299	2,224	24,524	$0.35	$8,583	0	0	0	$1.05	$0	22,299	2,224	24,524	$0.35	$8,583
8	26,181	2,636	28,817	$0.35	$10,086	0	0	0	$1.05	$0	26,181	2,636	28,817	$0.35	$10,086
9	16,969	1,717	18,686	$0.35	$6,540	0	0	0	$1.05	$0	16,969	1,717	18,686	$0.35	$6,540
10	20,240	2,067	22,308	$0.35	$7,808	0	0	0	$1.05	$0	20,240	2,067	22,308	$0.35	$7,808
Total	174,083	17,593	191,676	$0.35	$67,087	0	0	0	$0.00	$0	174,083	17,593	191,676	$0.35	$67,087

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	11,869	1,218	13,086	$0.50	$6,543	0	0	0	$1.50	$0	11,869	1,218	13,086	$0.50	$6,543
2	14,181	1,452	15,633	$0.50	$7,817	0	0	0	$1.50	$0	14,181	1,452	15,633	$0.50	$7,817
3	16,443	1,653	18,096	$0.50	$9,048	0	0	0	$1.50	$0	16,443	1,653	18,096	$0.50	$9,048
4	16,579	1,654	18,232	$0.50	$9,116	0	0	0	$1.50	$0	16,579	1,654	18,232	$0.50	$9,116
5	15,863	1,593	17,456	$0.50	$8,728	0	0	0	$1.50	$0	15,863	1,593	17,456	$0.50	$8,728
6	16,045	1,637	17,682	$0.50	$8,841	0	0	0	$1.50	$0	16,045	1,637	17,682	$0.50	$8,841
7	20,299	2,037	22,337	$0.50	$11,168	0	0	0	$1.50	$0	20,299	2,037	22,337	$0.50	$11,168
8	24,995	2,534	27,529	$0.50	$13,764	0	0	0	$1.50	$0	24,995	2,534	27,529	$0.50	$13,764
9	16,665	1,692	18,357	$0.50	$9,178	0	0	0	$1.50	$0	16,665	1,692	18,357	$0.50	$9,178
10	19,972	2,049	22,020	$0.50	$11,010	0	0	0	$1.50	$0	19,972	2,049	22,020	$0.50	$11,010
Total	172,909	17,520	190,428	$0.50	$95,214	0	0	0	$0.00	$0	172,909	17,520	190,428	$0.50	$95,214

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	7,329	737	8,066	$0.35	$2,823	0	0	0	$1.05	$0	7,329	737	8,066	$0.35	$2,823
2	8,027	807	8,833	$0.35	$3,092	0	0	0	$1.05	$0	8,027	807	8,833	$0.35	$3,092
3	9,230	911	10,140	$0.35	$3,549	0	0	0	$1.05	$0	9,230	911	10,140	$0.35	$3,549
4	9,417	920	10,337	$0.35	$3,618	0	0	0	$1.05	$0	9,417	920	10,337	$0.35	$3,618
5	9,675	945	10,620	$0.35	$3,717	0	0	0	$1.05	$0	9,675	945	10,620	$0.35	$3,717
6	9,544	959	10,502	$0.35	$3,676	0	0	0	$1.05	$0	9,544	959	10,502	$0.35	$3,676
7	11,959	1,159	13,118	$0.35	$4,591	0	0	0	$1.05	$0	11,959	1,159	13,118	$0.35	$4,591
8	16,220	1,602	17,822	$0.35	$6,238	0	0	0	$1.05	$0	16,220	1,602	17,822	$0.35	$6,238
9	10,193	1,009	11,201	$0.35	$3,920	0	0	0	$1.05	$0	10,193	1,009	11,201	$0.35	$3,920
10	12,037	1,204	13,241	$0.35	$4,634	0	0	0	$1.05	$0	12,037	1,204	13,241	$0.35	$4,634
Total	103,628	10,253	113,881	$0.35	$39,858	0	0	0	$0.00	$0	103,628	10,253	113,881	$0.35	$39,858
Total Day	601,760	60,636	662,396	$0.43	$285,364	0	0	0	$0.00	$0	601,760	60,636	662,396	$0.43	$285,364
Annual (000)	204,598	20,616	225,215	$0.43	$97,024	0	0	0	$0.00	$0	204,598	20,616	225,215	$0.43	$97,024

Note: Revenue in 2014 dollars

Table 6-22
Year 2020 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 4 - Widen and Toll I-95
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	21,429	6,314	27,743	$0.50	$13,872	2,785	866	3,651	$1.50	$5,476	24,214	7,180	31,394	$0.62	$19,348
2	24,229	6,958	31,187	$0.50	$15,594	2,754	850	3,604	$1.50	$5,406	26,983	7,808	34,791	$0.60	$20,999
3	23,933	6,539	30,472	$0.50	$15,236	2,691	811	3,501	$1.50	$5,252	26,623	7,350	33,973	$0.60	$20,488
4	22,506	6,153	28,659	$0.50	$14,330	2,350	706	3,056	$1.50	$4,584	24,856	6,859	31,716	$0.60	$18,914
5	20,520	5,572	26,092	$0.50	$13,046	2,041	607	2,648	$1.50	$3,972	22,561	6,179	28,739	$0.59	$17,018
6	19,651	5,344	24,995	$0.50	$12,497	1,766	526	2,292	$1.50	$3,438	21,417	5,869	27,287	$0.58	$15,935
7	21,450	5,788	27,238	$0.50	$13,619	2,111	624	2,735	$1.50	$4,102	23,561	6,412	29,972	$0.59	$17,721
8	20,737	5,486	26,223	$0.50	$13,112	2,349	685	3,034	$1.50	$4,551	23,086	6,171	29,257	$0.60	$17,662
9	17,581	4,641	22,222	$0.50	$11,111	1,857	542	2,398	$1.50	$3,598	19,438	5,183	24,621	$0.60	$14,709
10	17,139	4,580	21,719	$0.50	$10,860	1,565	462	2,027	$1.50	$3,040	18,705	5,042	23,746	$0.59	$13,900
11	17,485	4,743	22,227	$0.50	$11,114	1,689	503	2,192	$1.50	$3,288	19,174	5,246	24,419	$0.59	$14,401
12	22,181	6,234	28,415	$0.50	$14,208	2,065	620	2,686	$1.50	$4,028	24,246	6,855	31,101	$0.59	$18,236
Total	248,841	68,352	317,193	$0.50	$158,596	26,023	7,801	33,823	$1.50	$50,735	274,864	76,153	351,016	$0.60	$209,331

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,289	6,787	30,076	$0.35	$10,527	4,306	1,344	5,650	$1.05	$5,932	27,595	8,131	35,726	$0.46	$16,459
2	27,100	7,678	34,778	$0.35	$12,172	4,280	1,324	5,604	$1.05	$5,884	31,380	9,002	40,382	$0.45	$18,057
3	29,883	8,078	37,961	$0.35	$13,286	4,336	1,316	5,652	$1.05	$5,935	34,218	9,395	43,613	$0.44	$19,221
4	27,115	7,377	34,492	$0.35	$12,072	4,023	1,220	5,243	$1.05	$5,505	31,138	8,597	39,735	$0.44	$17,578
5	27,218	7,372	34,590	$0.35	$12,106	3,598	1,086	4,685	$1.05	$4,919	30,816	8,458	39,274	$0.43	$17,026
6	25,948	7,068	33,016	$0.35	$11,556	3,281	991	4,272	$1.05	$4,486	29,229	8,059	37,288	$0.43	$16,041
7	29,164	7,756	36,920	$0.35	$12,922	3,769	1,131	4,900	$1.05	$5,145	32,934	8,887	41,821	$0.43	$18,067
8	29,307	7,589	36,896	$0.35	$12,913	3,917	1,154	5,071	$1.05	$5,325	33,223	8,743	41,967	$0.43	$18,238
9	24,690	6,481	31,171	$0.35	$10,910	3,443	1,022	4,465	$1.05	$4,689	28,133	7,503	35,636	$0.44	$15,598
10	26,340	7,105	33,446	$0.35	$11,706	2,813	839	3,652	$1.05	$3,834	29,153	7,945	37,098	$0.42	$15,540
11	25,684	7,008	32,692	$0.35	$11,442	2,891	865	3,756	$1.05	$3,944	28,575	7,873	36,448	$0.42	$15,386
12	30,250	8,341	38,591	$0.35	$13,507	3,140	941	4,081	$1.05	$4,285	33,389	9,283	42,672	$0.42	$17,792
Total	325,988	88,640	414,628	$0.35	$145,120	43,796	13,235	57,031	$1.05	$59,883	369,784	101,875	471,659	$0.43	$205,003

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,760	6,916	30,676	$0.50	$15,338	1,726	538	2,264	$1.50	$3,396	25,486	7,454	32,940	$0.57	$18,734
2	25,909	7,353	33,262	$0.50	$16,631	1,568	484	2,053	$1.50	$3,079	27,477	7,837	35,315	$0.56	$19,710
3	27,440	7,494	34,934	$0.50	$17,467	1,443	435	1,878	$1.50	$2,817	28,884	7,929	36,812	$0.55	$20,284
4	25,832	7,074	32,907	$0.50	$16,453	1,275	383	1,658	$1.50	$2,487	27,107	7,457	34,565	$0.55	$18,941
5	25,447	6,951	32,398	$0.50	$16,199	1,189	356	1,545	$1.50	$2,318	26,636	7,307	33,943	$0.55	$18,517
6	24,930	6,841	31,772	$0.50	$15,886	1,066	319	1,385	$1.50	$2,078	25,996	7,161	33,157	$0.54	$17,964
7	27,818	7,545	35,363	$0.50	$17,682	1,314	390	1,704	$1.50	$2,556	29,132	7,935	37,067	$0.55	$20,237
8	28,586	7,557	36,142	$0.50	$18,071	1,504	441	1,945	$1.50	$2,918	30,090	7,998	38,088	$0.55	$20,989
9	23,921	6,325	30,246	$0.50	$15,123	1,166	343	1,509	$1.50	$2,263	25,087	6,668	31,755	$0.55	$17,387
10	23,312	6,305	29,617	$0.50	$14,808	964	285	1,249	$1.50	$1,873	24,276	6,590	30,866	$0.54	$16,682
11	22,550	6,182	28,732	$0.50	$14,366	1,003	299	1,302	$1.50	$1,953	23,553	6,481	30,034	$0.54	$16,319
12	26,777	7,499	34,275	$0.50	$17,138	1,191	357	1,549	$1.50	$2,323	27,968	7,856	35,824	$0.54	$19,461
Total	306,283	84,042	390,324	$0.50	$195,162	15,410	4,631	20,041	$1.50	$30,061	321,692	88,673	410,365	$0.55	$225,224

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	18,932	5,374	24,305	$0.35	$8,507	4,527	1,398	5,925	$1.05	$6,221	23,459	6,772	30,230	$0.49	$14,728
2	20,457	5,661	26,118	$0.35	$9,141	4,156	1,266	5,422	$1.05	$5,693	24,613	6,927	31,540	$0.47	$14,835
3	21,116	5,574	26,690	$0.35	$9,342	4,141	1,229	5,369	$1.05	$5,638	25,257	6,802	32,059	$0.47	$14,979
4	19,184	5,123	24,307	$0.35	$8,507	3,781	1,121	4,902	$1.05	$5,147	22,964	6,244	29,208	$0.47	$13,654
5	19,756	5,263	25,019	$0.35	$8,757	3,697	1,094	4,791	$1.05	$5,031	23,453	6,357	29,810	$0.46	$13,787
6	19,188	5,165	24,354	$0.35	$8,524	3,473	1,030	4,502	$1.05	$4,728	22,661	6,195	28,856	$0.46	$13,251
7	20,374	5,344	25,717	$0.35	$9,001	4,091	1,206	5,296	$1.05	$5,561	24,464	6,549	31,014	$0.47	$14,562
8	19,057	4,833	23,890	$0.35	$8,362	4,146	1,209	5,355	$1.05	$5,622	23,203	6,042	29,245	$0.48	$13,984
9	15,493	3,944	19,437	$0.35	$6,803	3,746	1,095	4,841	$1.05	$5,083	19,239	5,039	24,278	$0.49	$11,886
10	16,939	4,474	21,413	$0.35	$7,495	3,140	923	4,063	$1.05	$4,266	20,079	5,397	25,476	$0.46	$11,761
11	16,652	4,442	21,094	$0.35	$7,383	3,451	1,021	4,472	$1.05	$4,695	20,103	5,463	25,566	$0.47	$12,078
12	19,095	5,183	24,278	$0.35	$8,497	3,793	1,127	4,920	$1.05	$5,166	22,889	6,310	29,198	$0.47	$13,664
Total	226,244	60,379	286,623	$0.35	$100,318	46,141	13,717	59,859	$1.05	$62,852	272,385	74,097	346,482	$0.47	$163,170
Total Day	1,107,355	301,413	1,408,768	$0.43	$599,196	131,370	39,384	170,754	$1.19	$203,531	1,238,725	340,798	1,579,523	$0.51	$802,727
Annual (000)	376,501	102,480	478,981	$0.43	$203,727	44,666	13,391	58,056	$1.19	$69,200	421,167	115,871	537,038	$0.51	$272,927

Note: Revenue in 2014 dollars

York. All four time periods (6-10AM, 10AM-3PM, 3-7PM, 7PM-6AM) are shown and broken down further to show passenger car ETC (transponder) and video tolling traffic and commercial vehicle ETC and video tolling traffic. For Alternative 4, toll rates during the AM and PM Peak Periods are $0.50 per tolling location for passenger vehicles. Commercial vehicles are assumed to have an average toll rate of 3 times the passenger vehicle toll rate ($1.50 per tolling location). During the off peak periods, the toll rate is $0.35 and $1.05 per tolling location for passenger and commercial vehicles, respectively. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

1.58 million transactions are estimated to occur on an average weekday, generating $800 thousand. Annual gross toll revenue on I-95 is estimated at $273 million. By 2040 **(Table 6-23),** annual revenue is estimate at $295 million. Alternative 4 is estimated to produce toll revenue that is about 4 percent higher than Alternative 1.

Alternative 5

Table 6-24 summarizes the results of Alternative 5 at 2020 conditions for I-95. Alternative 5 assumes I-95 widening between Bridgeport and Stamford and that both I-95 and Route 15 are tolled. All four time periods (6-10AM, 10AM-3PM, 3-7PM, 7PM-6AM) are shown and broken down further to show passenger car ETC (transponder) and video tolling traffic and commercial vehicle ETC and video tolling traffic. For Alternative 5, toll rates during the AM and PM Peak Periods are $0.50 per tolling location for passenger vehicles. Commercial vehicles are assumed to have an average toll rate of 3 times the passenger vehicle toll rate ($1.50 per tolling location). During the off peak periods, the toll rate is $0.35 and $1.05 per tolling location for passenger and commercial vehicles, respectively. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

More than 1.7 million transactions are estimated to occur on an average weekday, generating $867 thousand. Annual gross toll revenue on I-95 is estimated at $295 million. By 2040 **(Table 6-25)**, annual revenue is estimate at $312 million. I-95 toll revenue under Alternative 5 is about 5 percent higher than I-95 revenues under Alternative 3, which can be attributed entirely to the widening.

Table 6-26 summarizes the T&R results of Alternative 5 for Route 15 at 2020 levels. Nearly 515 thousand transactions are estimated to occur on an average weekday, generating $222 thousand. 2020 annual gross toll revenue on Route 15 is estimated at $75 million. By 2040 **(Table 6-27)**, annual revenue is estimate at $87 million, which equates to an average annual percent growth rate of about 0.7. Total gross toll revenue (I-95 plus Route 15) from Alternative 5 is about 35 percent higher than Alternative 4 which can be attributed entirely to the impact of tolling Route 15.

Annual Trips and Gross Toll Revenue

Utilizing the 2020 and 2040 annual estimates of transactions and revenue, a 25 year annual forecast for each Alternative was constructed. Transactions were converted to trips for these tables as they ultimately will be utilized in estimating a tolling operations and maintenance cost for each alternative which in turn will be used to estimate annual and cumulative net toll revenue. A trip can pass through 1 or more tolling locations, while a transaction is counted each time a trip passes through a tolling location. Trips will always be lower than transactions for all five alternatives.

Table 6-28 shows the 25 year annual trip and gross toll revenue stream for Alternatives 1, 2, 3, 4, and 5. The 25 year average annual estimates are included at the bottom of the table. Alternative 1 is estimated to produce 180 million trips and yield $275 million annually on average over the 25 years.

Table 6-23
Year 2040 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 4 - Widen and Toll I-95
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	26,513	2,632	29,145	$0.50	$14,573	3,430	360	3,791	$1.50	$5,686	29,944	2,993	32,936	$0.62	$20,259
2	29,762	2,889	32,651	$0.50	$16,326	3,400	355	3,755	$1.50	$5,633	33,162	3,244	36,406	$0.60	$21,958
3	30,097	2,805	32,901	$0.50	$16,451	3,419	350	3,770	$1.50	$5,655	33,516	3,155	36,671	$0.60	$22,105
4	28,260	2,635	30,895	$0.50	$15,447	2,962	303	3,266	$1.50	$4,898	31,222	2,938	34,160	$0.60	$20,346
5	26,191	2,426	28,617	$0.50	$14,308	2,680	272	2,952	$1.50	$4,428	28,871	2,698	31,569	$0.59	$18,736
6	24,819	2,303	27,122	$0.50	$13,561	2,261	230	2,490	$1.50	$3,735	27,080	2,532	29,612	$0.58	$17,296
7	27,430	2,528	29,959	$0.50	$14,979	2,726	276	3,002	$1.50	$4,503	30,156	2,804	32,960	$0.59	$19,482
8	26,495	2,398	28,894	$0.50	$14,447	2,985	298	3,282	$1.50	$4,924	29,480	2,696	32,176	$0.60	$19,370
9	22,648	2,052	24,700	$0.50	$12,350	2,389	239	2,628	$1.50	$3,943	25,037	2,291	27,329	$0.60	$16,293
10	22,198	2,041	24,239	$0.50	$12,120	2,005	202	2,207	$1.50	$3,311	24,203	2,243	26,447	$0.58	$15,431
11	22,894	2,130	25,024	$0.50	$12,512	2,142	218	2,360	$1.50	$3,540	25,037	2,347	27,384	$0.59	$16,052
12	28,373	2,712	31,085	$0.50	$15,542	2,575	263	2,839	$1.50	$4,258	30,948	2,975	33,923	$0.58	$19,800
Total	315,680	29,551	345,232	$0.50	$172,616	32,975	3,366	36,342	$1.50	$54,512	348,656	32,917	381,573	$0.60	$227,128

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	28,293	2,788	31,081	$0.35	$10,878	5,353	565	5,917	$1.05	$6,213	33,646	3,352	36,998	$0.46	$17,091
2	33,009	3,171	36,179	$0.35	$12,663	5,331	558	5,889	$1.05	$6,184	38,340	3,729	42,069	$0.45	$18,846
3	36,902	3,405	40,308	$0.35	$14,108	5,443	561	6,005	$1.05	$6,305	42,345	3,967	46,312	$0.44	$20,413
4	33,379	3,097	36,476	$0.35	$12,767	5,052	521	5,573	$1.05	$5,851	38,431	3,618	42,049	$0.44	$18,618
5	34,376	3,169	37,544	$0.35	$13,140	4,674	479	5,153	$1.05	$5,411	39,050	3,648	42,698	$0.43	$18,552
6	32,105	2,982	35,087	$0.35	$12,280	4,198	431	4,629	$1.05	$4,861	36,302	3,414	39,716	$0.43	$17,141
7	37,008	3,367	40,375	$0.35	$14,131	4,862	497	5,359	$1.05	$5,627	41,870	3,864	45,734	$0.43	$19,758
8	37,510	3,329	40,839	$0.35	$14,294	5,009	504	5,514	$1.05	$5,789	42,519	3,833	46,352	$0.43	$20,083
9	31,202	2,805	34,007	$0.35	$11,902	4,413	447	4,860	$1.05	$5,103	35,615	3,252	38,867	$0.44	$17,006
10	33,027	3,044	36,071	$0.35	$12,625	3,604	367	3,971	$1.05	$4,170	36,631	3,411	40,042	$0.42	$16,795
11	32,384	3,013	35,397	$0.35	$12,389	3,676	375	4,051	$1.05	$4,253	36,060	3,388	39,448	$0.42	$16,642
12	38,354	3,603	41,956	$0.35	$14,685	3,997	409	4,406	$1.05	$4,626	42,351	4,011	46,362	$0.42	$19,311
Total	407,548	37,772	445,320	$0.35	$155,862	55,612	5,715	61,327	$1.05	$64,393	463,160	43,487	506,647	$0.43	$220,255

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	28,826	2,834	31,660	$0.50	$15,830	2,130	224	2,355	$1.50	$3,532	30,956	3,058	34,014	$0.57	$19,362
2	31,395	3,018	34,413	$0.50	$17,206	1,947	203	2,150	$1.50	$3,226	33,342	3,221	36,563	$0.56	$20,432
3	34,149	3,175	37,324	$0.50	$18,662	1,826	187	2,013	$1.50	$3,019	35,974	3,362	39,336	$0.55	$21,681
4	32,055	2,989	35,044	$0.50	$17,522	1,620	166	1,785	$1.50	$2,678	33,675	3,155	36,829	$0.55	$20,200
5	32,185	2,991	35,176	$0.50	$17,588	1,574	160	1,735	$1.50	$2,602	33,759	3,151	36,910	$0.55	$20,190
6	31,042	2,899	33,941	$0.50	$16,970	1,376	140	1,516	$1.50	$2,274	32,418	3,039	35,457	$0.54	$19,245
7	35,623	3,293	38,916	$0.50	$19,458	1,728	175	1,903	$1.50	$2,854	37,351	3,469	40,819	$0.55	$22,313
8	37,051	3,345	40,396	$0.50	$20,198	1,960	196	2,156	$1.50	$3,234	39,011	3,541	42,552	$0.55	$23,432
9	30,989	2,815	33,804	$0.50	$16,902	1,523	153	1,676	$1.50	$2,514	32,511	2,968	35,480	$0.55	$19,415
10	30,067	2,784	32,852	$0.50	$16,426	1,256	127	1,383	$1.50	$2,074	31,323	2,911	34,234	$0.54	$18,500
11	29,346	2,747	32,093	$0.50	$16,046	1,297	132	1,428	$1.50	$2,143	30,642	2,879	33,521	$0.54	$18,189
12	34,824	3,318	38,142	$0.50	$19,071	1,513	155	1,668	$1.50	$2,502	36,338	3,472	39,810	$0.54	$21,573
Total	387,552	36,207	423,759	$0.50	$211,879	19,749	2,019	21,768	$1.50	$32,652	407,300	38,227	445,527	$0.55	$244,532

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,208	2,235	25,444	$0.35	$8,905	5,514	577	6,091	$1.05	$6,396	28,722	2,813	31,535	$0.49	$15,301
2	25,266	2,377	27,643	$0.35	$9,675	5,124	531	5,655	$1.05	$5,938	30,390	2,907	33,297	$0.47	$15,612
3	26,610	2,396	29,006	$0.35	$10,152	5,304	538	5,842	$1.05	$6,134	31,915	2,934	34,848	$0.47	$16,286
4	23,961	2,178	26,139	$0.35	$9,149	4,771	483	5,254	$1.05	$5,517	28,732	2,662	31,393	$0.47	$14,666
5	24,856	2,256	27,112	$0.35	$9,489	4,797	485	5,282	$1.05	$5,547	29,654	2,741	32,395	$0.46	$15,036
6	23,974	2,199	26,173	$0.35	$9,161	4,477	454	4,931	$1.05	$5,177	28,451	2,653	31,104	$0.46	$14,338
7	25,908	2,321	28,229	$0.35	$9,880	5,336	538	5,874	$1.05	$6,168	31,244	2,860	34,104	$0.47	$16,048
8	24,142	2,097	26,240	$0.35	$9,184	5,356	535	5,892	$1.05	$6,186	29,499	2,633	32,131	$0.48	$15,370
9	19,616	1,713	21,329	$0.35	$7,465	4,887	490	5,377	$1.05	$5,646	24,503	2,203	26,706	$0.49	$13,111
10	21,235	1,918	23,153	$0.35	$8,104	4,091	412	4,504	$1.05	$4,729	25,326	2,331	27,657	$0.46	$12,832
11	21,164	1,928	23,092	$0.35	$8,082	4,494	455	4,949	$1.05	$5,197	25,658	2,383	28,041	$0.47	$13,279
12	24,353	2,252	26,605	$0.35	$9,312	4,930	501	5,431	$1.05	$5,702	29,283	2,752	32,035	$0.47	$15,014
Total	284,294	25,871	310,165	$0.35	$108,558	59,082	6,000	65,082	$1.05	$68,336	343,376	31,871	375,247	$0.47	$176,894
Total Day	1,395,074	129,402	1,524,476	$0.43	$648,915	167,418	17,100	184,519	$1.19	$219,894	1,562,492	146,502	1,708,994	$0.51	$868,809
Annual (000)	474,325	43,997	518,322	$0.43	$220,631	56,922	5,814	62,736	$1.19	$74,764	531,247	49,811	581,058	$0.51	$295,395

Note: Revenue in 2014 dollars

Table 6-24
Year 2020 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 5 - Widen I-95 and Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	23,084	7,039	30,123	$0.50	$15,061	2,887	907	3,794	$1.50	$5,691	25,971	7,946	33,917	$0.61	$20,753
2	26,368	7,942	34,310	$0.50	$17,155	2,871	899	3,771	$1.50	$5,656	29,239	8,842	38,081	$0.60	$22,811
3	26,670	7,793	34,463	$0.50	$17,232	2,862	880	3,742	$1.50	$5,614	29,532	8,673	38,205	$0.60	$22,845
4	25,098	7,354	32,453	$0.50	$16,226	2,519	773	3,292	$1.50	$4,937	27,617	8,127	35,744	$0.59	$21,164
5	21,491	6,263	27,754	$0.50	$13,877	2,167	658	2,825	$1.50	$4,238	23,658	6,921	30,579	$0.59	$18,115
6	20,904	6,105	27,009	$0.50	$13,505	1,945	591	2,536	$1.50	$3,803	22,849	6,696	29,545	$0.59	$17,308
7	22,392	6,457	28,849	$0.50	$14,424	2,208	663	2,871	$1.50	$4,307	24,599	7,120	31,720	$0.59	$18,731
8	21,070	5,926	26,996	$0.50	$13,498	2,497	741	3,238	$1.50	$4,857	23,567	6,667	30,233	$0.61	$18,354
9	18,076	5,123	23,199	$0.50	$11,599	2,062	615	2,677	$1.50	$4,016	20,138	5,738	25,876	$0.60	$15,616
10	18,899	5,357	24,257	$0.50	$12,128	1,638	490	2,128	$1.50	$3,192	20,537	5,847	26,385	$0.58	$15,320
11	18,884	5,358	24,242	$0.50	$12,121	1,745	525	2,269	$1.50	$3,404	20,629	5,882	26,511	$0.59	$15,525
12	23,451	6,774	30,225	$0.50	$15,112	2,122	641	2,763	$1.50	$4,145	25,573	7,415	32,988	$0.58	$19,257
Total	266,387	77,492	343,879	$0.50	$171,940	27,523	8,384	35,906	$1.50	$53,859	293,909	85,876	379,785	$0.59	$225,799

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	25,419	7,727	33,146	$0.35	$11,601	4,410	1,388	5,798	$1.05	$6,088	29,830	9,115	38,944	$0.45	$17,689
2	29,625	8,839	38,464	$0.35	$13,462	4,399	1,378	5,777	$1.05	$6,066	34,024	10,217	44,241	$0.44	$19,529
3	33,179	9,618	42,797	$0.35	$14,979	4,504	1,390	5,894	$1.05	$6,189	37,683	11,008	48,691	$0.43	$21,168
4	30,453	8,907	39,360	$0.35	$13,776	4,194	1,294	5,488	$1.05	$5,762	34,647	10,201	44,848	$0.44	$19,538
5	29,841	8,712	38,552	$0.35	$13,493	3,728	1,146	4,874	$1.05	$5,117	33,569	9,857	43,426	$0.43	$18,611
6	28,635	8,404	37,039	$0.35	$12,964	3,451	1,060	4,511	$1.05	$4,737	32,086	9,465	41,551	$0.43	$17,701
7	31,567	9,044	40,611	$0.35	$14,214	3,875	1,179	5,055	$1.05	$5,308	35,442	10,224	45,666	$0.43	$19,521
8	30,197	8,350	38,547	$0.35	$13,491	4,069	1,215	5,284	$1.05	$5,548	34,266	9,565	43,831	$0.43	$19,040
9	25,849	7,313	33,162	$0.35	$11,607	3,620	1,090	4,710	$1.05	$4,946	29,469	8,403	37,873	$0.44	$16,553
10	28,449	8,151	36,599	$0.35	$12,810	2,914	880	3,794	$1.05	$3,984	31,363	9,031	40,393	$0.42	$16,793
11	27,265	7,799	35,064	$0.35	$12,272	2,971	896	3,868	$1.05	$4,061	30,237	8,695	38,932	$0.42	$16,334
12	31,685	9,055	40,739	$0.35	$14,259	3,214	969	4,183	$1.05	$4,392	34,899	10,023	44,922	$0.42	$18,651
Total	352,164	101,919	454,083	$0.35	$158,929	45,351	13,885	59,235	$1.05	$62,197	397,515	115,803	513,318	$0.43	$221,126

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	25,425	7,746	33,171	$0.50	$16,586	1,775	560	2,334	$1.50	$3,502	27,200	8,306	35,506	$0.57	$20,087
2	28,075	8,432	36,506	$0.50	$18,253	1,627	511	2,137	$1.50	$3,206	29,702	8,942	38,644	$0.56	$21,459
3	30,264	8,867	39,131	$0.50	$19,565	1,516	467	1,982	$1.50	$2,973	31,780	9,333	41,113	$0.55	$22,539
4	28,336	8,346	36,681	$0.50	$18,341	1,346	414	1,759	$1.50	$2,639	29,681	8,760	38,441	$0.55	$20,980
5	27,205	7,992	35,197	$0.50	$17,599	1,262	386	1,648	$1.50	$2,473	28,468	8,378	36,846	$0.54	$20,071
6	26,647	7,865	34,511	$0.50	$17,256	1,145	350	1,495	$1.50	$2,242	27,792	8,215	36,006	$0.54	$19,498
7	29,457	8,565	38,022	$0.50	$19,011	1,372	415	1,787	$1.50	$2,681	30,829	8,980	39,809	$0.54	$21,692
8	29,296	8,255	37,551	$0.50	$18,776	1,607	480	2,087	$1.50	$3,130	30,903	8,735	39,638	$0.55	$21,906
9	24,985	7,117	32,102	$0.50	$16,051	1,308	394	1,702	$1.50	$2,553	26,293	7,511	33,804	$0.55	$18,604
10	25,540	7,333	32,873	$0.50	$16,436	1,020	307	1,328	$1.50	$1,991	26,560	7,640	34,201	$0.54	$18,428
11	24,107	6,892	30,998	$0.50	$15,499	1,048	316	1,364	$1.50	$2,045	25,154	7,207	32,362	$0.54	$17,544
12	27,818	8,020	35,838	$0.50	$17,919	1,228	371	1,599	$1.50	$2,398	29,046	8,390	37,436	$0.54	$20,317
Total	327,155	95,428	422,583	$0.50	$211,291	16,253	4,969	21,223	$1.50	$31,834	343,408	100,397	443,805	$0.55	$243,126

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	21,024	6,272	27,296	$0.35	$9,554	4,615	1,435	6,050	$1.05	$6,352	25,639	7,707	33,346	$0.48	$15,906
2	23,026	6,735	29,761	$0.35	$10,416	4,273	1,315	5,588	$1.05	$5,868	27,300	8,049	35,349	$0.46	$16,284
3	23,921	6,797	30,717	$0.35	$10,751	4,286	1,290	5,576	$1.05	$5,855	28,207	8,086	36,294	$0.46	$16,606
4	22,049	6,339	28,388	$0.35	$9,936	3,954	1,189	5,143	$1.05	$5,400	26,003	7,528	33,531	$0.46	$15,336
5	22,188	6,357	28,544	$0.35	$9,991	3,836	1,150	4,986	$1.05	$5,235	26,023	7,507	33,530	$0.45	$15,226
6	21,600	6,248	27,848	$0.35	$9,747	3,647	1,096	4,743	$1.05	$4,980	25,247	7,344	32,591	$0.45	$14,727
7	22,606	6,397	29,003	$0.35	$10,151	4,183	1,245	5,428	$1.05	$5,699	26,789	7,642	34,431	$0.46	$15,850
8	20,733	5,683	26,415	$0.35	$9,245	4,219	1,240	5,459	$1.05	$5,732	24,951	6,923	31,874	$0.47	$14,977
9	17,155	4,769	21,924	$0.35	$7,673	3,828	1,131	4,958	$1.05	$5,206	20,983	5,899	26,882	$0.48	$12,880
10	18,239	5,130	23,370	$0.35	$8,179	3,170	939	4,108	$1.05	$4,314	21,409	6,069	27,478	$0.45	$12,493
11	17,807	5,019	22,825	$0.35	$7,989	3,463	1,030	4,493	$1.05	$4,718	21,270	6,049	27,319	$0.47	$12,707
12	20,164	5,710	25,874	$0.35	$9,056	3,807	1,135	4,942	$1.05	$5,189	23,971	6,844	30,815	$0.46	$14,244
Total	250,512	71,453	321,965	$0.35	$112,688	47,281	14,193	61,474	$1.05	$64,548	297,793	85,647	383,440	$0.46	$177,236
Total Day	1,196,217	346,293	1,542,510	$0.42	$654,848	136,408	41,431	177,839	$1.19	$212,439	1,332,625	387,724	1,720,348	$0.50	$867,286
Annual (000)	406,714	117,739	524,453	$0.42	$222,648	46,379	14,087	60,465	$1.19	$72,229	453,092	131,826	584,918	$0.50	$294,877

Note: Revenue in 2014 dollars

Table 6-25
Year 2040 I-95 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 5 - Widen I-95 and Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	28,049	2,876	30,925	$0.50	$15,462	3,526	374	3,900	$1.50	$5,849	31,575	3,249	34,824	$0.61	$21,312
2	31,786	3,222	35,008	$0.50	$17,504	3,512	371	3,883	$1.50	$5,824	35,298	3,593	38,891	$0.60	$23,328
3	32,667	3,224	35,891	$0.50	$17,945	3,583	373	3,956	$1.50	$5,934	36,250	3,597	39,847	$0.60	$23,879
4	30,661	3,033	33,694	$0.50	$16,847	3,134	326	3,459	$1.50	$5,189	33,795	3,358	37,153	$0.59	$22,036
5	26,780	2,633	29,413	$0.50	$14,706	2,798	288	3,086	$1.50	$4,628	29,577	2,921	32,499	$0.59	$19,335
6	25,672	2,533	28,205	$0.50	$14,103	2,449	252	2,702	$1.50	$4,052	28,122	2,785	30,907	$0.59	$18,155
7	27,966	2,728	30,694	$0.50	$15,347	2,831	289	3,120	$1.50	$4,680	30,797	3,017	33,814	$0.59	$20,027
8	26,121	2,492	28,613	$0.50	$14,306	3,137	317	3,455	$1.50	$5,182	29,258	2,809	32,067	$0.61	$19,488
9	22,566	2,176	24,741	$0.50	$12,371	2,612	266	2,878	$1.50	$4,317	25,178	2,442	27,620	$0.60	$16,688
10	23,833	2,299	26,132	$0.50	$13,066	2,087	213	2,301	$1.50	$3,451	25,921	2,512	28,432	$0.58	$16,517
11	24,051	2,321	26,372	$0.50	$13,186	2,205	226	2,431	$1.50	$3,646	26,256	2,547	28,803	$0.58	$16,832
12	29,357	2,874	32,231	$0.50	$16,115	2,641	271	2,912	$1.50	$4,368	31,998	3,145	35,143	$0.58	$20,484
Total	329,508	32,409	361,917	$0.50	$180,959	34,515	3,567	38,081	$1.50	$57,122	364,023	35,976	399,999	$0.60	$238,081

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	30,613	3,137	33,750	$0.35	$11,812	5,457	579	6,036	$1.05	$6,338	36,070	3,716	39,786	$0.46	$18,150
2	35,683	3,591	39,275	$0.35	$13,746	5,459	577	6,035	$1.05	$6,337	41,142	4,168	45,310	$0.44	$20,083
3	40,474	3,969	44,443	$0.35	$15,555	5,624	587	6,212	$1.05	$6,522	46,098	4,556	50,654	$0.44	$22,077
4	36,941	3,649	40,590	$0.35	$14,207	5,234	546	5,780	$1.05	$6,069	42,175	4,195	46,370	$0.44	$20,276
5	37,383	3,681	41,064	$0.35	$14,372	4,824	501	5,325	$1.05	$5,592	42,207	4,182	46,389	$0.43	$19,964
6	35,067	3,477	38,544	$0.35	$13,490	4,377	455	4,832	$1.05	$5,074	39,444	3,932	43,376	$0.43	$18,564
7	39,638	3,841	43,480	$0.35	$15,218	4,969	513	5,482	$1.05	$5,756	44,608	4,355	48,962	$0.43	$20,974
8	37,949	3,565	41,514	$0.35	$14,530	5,165	525	5,690	$1.05	$5,974	43,114	4,090	47,204	$0.43	$20,504
9	32,125	3,089	35,214	$0.35	$12,325	4,600	471	5,072	$1.05	$5,325	36,725	3,560	40,286	$0.44	$17,650
10	35,540	3,460	39,000	$0.35	$13,650	3,715	382	4,097	$1.05	$4,301	39,255	3,842	43,097	$0.42	$17,951
11	34,268	3,327	37,595	$0.35	$13,158	3,760	386	4,147	$1.05	$4,354	38,028	3,714	41,742	$0.42	$17,512
12	39,979	3,878	43,856	$0.35	$15,350	4,065	417	4,483	$1.05	$4,707	44,044	4,295	48,339	$0.41	$20,056
Total	435,661	42,664	478,325	$0.35	$167,414	57,249	5,941	63,190	$1.05	$66,349	492,910	48,605	541,515	$0.43	$233,763

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	30,395	3,112	33,507	$0.50	$16,754	2,178	231	2,409	$1.50	$3,614	32,573	3,343	35,916	$0.57	$20,368
2	33,435	3,377	36,812	$0.50	$18,406	2,008	212	2,221	$1.50	$3,331	35,443	3,589	39,032	$0.56	$21,737
3	36,996	3,657	40,653	$0.50	$20,327	1,902	198	2,100	$1.50	$3,150	38,898	3,855	42,753	$0.55	$23,476
4	34,403	3,416	37,819	$0.50	$18,910	1,684	175	1,859	$1.50	$2,789	36,087	3,591	39,678	$0.55	$21,698
5	33,865	3,347	37,213	$0.50	$18,606	1,654	171	1,826	$1.50	$2,739	35,520	3,519	39,038	$0.55	$21,345
6	32,646	3,243	35,889	$0.50	$17,945	1,457	151	1,608	$1.50	$2,411	34,103	3,394	37,497	$0.54	$20,356
7	36,932	3,620	40,552	$0.50	$20,276	1,777	183	1,960	$1.50	$2,940	38,709	3,803	42,512	$0.55	$23,216
8	37,185	3,546	40,731	$0.50	$20,366	2,074	211	2,284	$1.50	$3,427	39,259	3,757	43,016	$0.55	$23,792
9	31,522	3,053	34,575	$0.50	$17,288	1,681	172	1,854	$1.50	$2,780	33,203	3,226	36,429	$0.55	$20,068
10	32,239	3,146	35,386	$0.50	$17,693	1,316	135	1,451	$1.50	$2,176	33,555	3,281	36,836	$0.54	$19,869
11	30,489	2,960	33,449	$0.50	$16,725	1,338	137	1,476	$1.50	$2,214	31,828	3,098	34,925	$0.54	$18,938
12	35,438	3,464	38,902	$0.50	$19,451	1,546	159	1,705	$1.50	$2,557	36,984	3,623	40,607	$0.54	$22,008
Total	405,546	39,942	445,489	$0.50	$222,744	20,615	2,136	22,751	$1.50	$34,126	426,161	42,079	468,240	$0.55	$256,871

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	25,350	2,551	27,901	$0.35	$9,765	5,619	591	6,210	$1.05	$6,520	30,969	3,142	34,110	$0.48	$16,285
2	27,917	2,756	30,673	$0.35	$10,736	5,260	548	5,808	$1.05	$6,098	33,177	3,304	36,481	$0.46	$16,834
3	29,579	2,840	32,419	$0.35	$11,347	5,464	559	6,023	$1.05	$6,324	35,043	3,399	38,442	$0.46	$17,671
4	26,989	2,620	29,609	$0.35	$10,363	4,976	509	5,485	$1.05	$5,759	31,965	3,129	35,094	$0.46	$16,122
5	27,395	2,651	30,046	$0.35	$10,516	4,966	507	5,473	$1.05	$5,746	32,361	3,158	35,519	$0.46	$16,262
6	26,494	2,585	29,080	$0.35	$10,178	4,655	476	5,131	$1.05	$5,387	31,149	3,061	34,210	$0.45	$15,565
7	28,236	2,700	30,936	$0.35	$10,827	5,441	552	5,992	$1.05	$6,292	33,676	3,252	36,928	$0.46	$17,120
8	26,008	2,418	28,427	$0.35	$9,949	5,461	549	6,010	$1.05	$6,311	31,470	2,967	34,437	$0.47	$16,260
9	21,457	2,025	23,481	$0.35	$8,218	4,978	502	5,480	$1.05	$5,754	26,434	2,527	28,961	$0.48	$13,972
10	22,694	2,167	24,861	$0.35	$8,701	4,135	419	4,554	$1.05	$4,782	26,829	2,585	29,415	$0.46	$13,483
11	22,476	2,148	24,623	$0.35	$8,618	4,525	460	4,984	$1.05	$5,234	27,000	2,607	29,608	$0.47	$13,852
12	25,480	2,447	27,927	$0.35	$9,774	4,958	505	5,463	$1.05	$5,736	30,438	2,952	33,390	$0.46	$15,511
Total	310,074	29,908	339,982	$0.35	$118,994	60,438	6,175	66,613	$1.05	$69,943	370,511	36,083	406,595	$0.46	$188,937
Total Day	1,480,790	144,923	1,625,713	$0.42	$690,110	172,816	17,820	190,635	$1.19	$227,542	1,653,605	162,743	1,816,348	$0.51	$917,652
Annual (000)	503,468	49,274	552,742	$0.42	$234,638	58,757	6,059	64,816	$1.19	$77,364	562,226	55,333	617,558	$0.51	$312,002

Note: Revenue in 2014 dollars

Table 6-26
Year 2020 Route 15 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 5 - Widen I-95 and Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	6,146	1,885	8,031	$0.50	$4,016	0	0	0	$1.50	$0	6,146	1,885	8,031	$0.50	$4,016
2	7,601	2,321	9,922	$0.50	$4,961	0	0	0	$1.50	$0	7,601	2,321	9,922	$0.50	$4,961
3	8,382	2,492	10,874	$0.50	$5,437	0	0	0	$1.50	$0	8,382	2,492	10,874	$0.50	$5,437
4	7,983	2,345	10,327	$0.50	$5,164	0	0	0	$1.50	$0	7,983	2,345	10,327	$0.50	$5,164
5	9,764	2,898	12,662	$0.50	$6,331	0	0	0	$1.50	$0	9,764	2,898	12,662	$0.50	$6,331
6	9,973	3,008	12,980	$0.50	$6,490	0	0	0	$1.50	$0	9,973	3,008	12,980	$0.50	$6,490
7	11,483	3,411	14,895	$0.50	$7,447	0	0	0	$1.50	$0	11,483	3,411	14,895	$0.50	$7,447
8	16,091	4,762	20,853	$0.50	$10,427	0	0	0	$1.50	$0	16,091	4,762	20,853	$0.50	$10,427
9	10,992	3,291	14,283	$0.50	$7,142	0	0	0	$1.50	$0	10,992	3,291	14,283	$0.50	$7,142
10	12,275	3,726	16,000	$0.50	$8,000	0	0	0	$1.50	$0	12,275	3,726	16,000	$0.50	$8,000
Total	100,691	30,138	130,829	$0.50	$65,414	0	0	0	$0.00	$0	100,691	30,138	130,829	$0.50	$65,414

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	6,210	1,910	8,120	$0.35	$2,842	0	0	0	$1.05	$0	6,210	1,910	8,120	$0.35	$2,842
2	7,445	2,281	9,726	$0.35	$3,404	0	0	0	$1.05	$0	7,445	2,281	9,726	$0.35	$3,404
3	9,219	2,750	11,969	$0.35	$4,189	0	0	0	$1.05	$0	9,219	2,750	11,969	$0.35	$4,189
4	8,516	2,512	11,028	$0.35	$3,860	0	0	0	$1.05	$0	8,516	2,512	11,028	$0.35	$3,860
5	8,944	2,631	11,575	$0.35	$4,051	0	0	0	$1.05	$0	8,944	2,631	11,575	$0.35	$4,051
6	9,051	2,742	11,793	$0.35	$4,128	0	0	0	$1.05	$0	9,051	2,742	11,793	$0.35	$4,128
7	13,637	4,001	17,638	$0.35	$6,173	0	0	0	$1.05	$0	13,637	4,001	17,638	$0.35	$6,173
8	18,690	5,551	24,242	$0.35	$8,485	0	0	0	$1.05	$0	18,690	5,551	24,242	$0.35	$8,485
9	12,153	3,634	15,788	$0.35	$5,526	0	0	0	$1.05	$0	12,153	3,634	15,788	$0.35	$5,526
10	14,849	4,492	19,341	$0.35	$6,769	0	0	0	$1.05	$0	14,849	4,492	19,341	$0.35	$6,769
Total	108,714	32,505	141,220	$0.35	$49,427	0	0	0	$0.00	$0	108,714	32,505	141,220	$0.35	$49,427

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	7,615	2,324	9,939	$0.50	$4,970	0	0	0	$1.50	$0	7,615	2,324	9,939	$0.50	$4,970
2	9,040	2,756	11,796	$0.50	$5,898	0	0	0	$1.50	$0	9,040	2,756	11,796	$0.50	$5,898
3	9,782	2,901	12,682	$0.50	$6,341	0	0	0	$1.50	$0	9,782	2,901	12,682	$0.50	$6,341
4	9,606	2,815	12,421	$0.50	$6,210	0	0	0	$1.50	$0	9,606	2,815	12,421	$0.50	$6,210
5	9,662	2,857	12,520	$0.50	$6,260	0	0	0	$1.50	$0	9,662	2,857	12,520	$0.50	$6,260
6	9,683	2,932	12,615	$0.50	$6,308	0	0	0	$1.50	$0	9,683	2,932	12,615	$0.50	$6,308
7	12,433	3,671	16,103	$0.50	$8,052	0	0	0	$1.50	$0	12,433	3,671	16,103	$0.50	$8,052
8	17,564	5,253	22,817	$0.50	$11,409	0	0	0	$1.50	$0	17,564	5,253	22,817	$0.50	$11,409
9	12,132	3,644	15,776	$0.50	$7,888	0	0	0	$1.50	$0	12,132	3,644	15,776	$0.50	$7,888
10	15,027	4,570	19,597	$0.50	$9,799	0	0	0	$1.50	$0	15,027	4,570	19,597	$0.50	$9,799
Total	112,544	33,723	146,266	$0.50	$73,133	0	0	0	$0.00	$0	112,544	33,723	146,266	$0.50	$73,133

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	5,205	1,558	6,763	$0.35	$2,367	0	0	0	$1.05	$0	5,205	1,558	6,763	$0.35	$2,367
2	5,616	1,677	7,293	$0.35	$2,553	0	0	0	$1.05	$0	5,616	1,677	7,293	$0.35	$2,553
3	6,539	1,910	8,449	$0.35	$2,957	0	0	0	$1.05	$0	6,539	1,910	8,449	$0.35	$2,957
4	6,661	1,922	8,584	$0.35	$3,004	0	0	0	$1.05	$0	6,661	1,922	8,584	$0.35	$3,004
5	6,671	1,924	8,596	$0.35	$3,008	0	0	0	$1.05	$0	6,671	1,924	8,596	$0.35	$3,008
6	6,604	1,964	8,568	$0.35	$2,999	0	0	0	$1.05	$0	6,604	1,964	8,568	$0.35	$2,999
7	8,417	2,405	10,821	$0.35	$3,788	0	0	0	$1.05	$0	8,417	2,405	10,821	$0.35	$3,788
8	12,294	3,590	15,884	$0.35	$5,559	0	0	0	$1.05	$0	12,294	3,590	15,884	$0.35	$5,559
9	7,685	2,247	9,932	$0.35	$3,476	0	0	0	$1.05	$0	7,685	2,247	9,932	$0.35	$3,476
10	8,994	2,660	11,654	$0.35	$4,079	0	0	0	$1.05	$0	8,994	2,660	11,654	$0.35	$4,079
Total	74,686	21,858	96,544	$0.35	$33,790	0	0	0	$0.00	$0	74,686	21,858	96,544	$0.35	$33,790
Total Day	396,635	118,224	514,859	$0.43	$221,765	0	0	0	$0.00	$0	396,635	118,224	514,859	$0.43	$221,765
Annual (000)	134,856	40,196	175,052	$0.43	$75,400	0	0	0	$0.00	$0	134,856	40,196	175,052	$0.43	$75,400

Note: Revenue in 2014 dollars

Table 6-27
Year 2040 Route 15 Estimated Traffic and Toll Revenue by Tolling Location
Alternative 5 - Widen I-95 and Toll I-95 and Route 15
$0.50 Peak/$0.35 Off Peak Toll Rates

Tolling	AM Peak Period (6AM-10AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	8,869	912	9,781	$0.50	$4,891	0	0	0	$1.50	$0	8,869	912	9,781	$0.50	$4,891
2	10,864	1,114	11,978	$0.50	$5,989	0	0	0	$1.50	$0	10,864	1,114	11,978	$0.50	$5,989
3	12,055	1,210	13,265	$0.50	$6,632	0	0	0	$1.50	$0	12,055	1,210	13,265	$0.50	$6,632
4	11,517	1,144	12,661	$0.50	$6,330	0	0	0	$1.50	$0	11,517	1,144	12,661	$0.50	$6,330
5	13,398	1,342	14,740	$0.50	$7,370	0	0	0	$1.50	$0	13,398	1,342	14,740	$0.50	$7,370
6	13,449	1,365	14,814	$0.50	$7,407	0	0	0	$1.50	$0	13,449	1,365	14,814	$0.50	$7,407
7	15,876	1,593	17,469	$0.50	$8,735	0	0	0	$1.50	$0	15,876	1,593	17,469	$0.50	$8,735
8	21,721	2,177	23,898	$0.50	$11,949	0	0	0	$1.50	$0	21,721	2,177	23,898	$0.50	$11,949
9	15,063	1,524	16,588	$0.50	$8,294	0	0	0	$1.50	$0	15,063	1,524	16,588	$0.50	$8,294
10	16,675	1,706	18,381	$0.50	$9,190	0	0	0	$1.50	$0	16,675	1,706	18,381	$0.50	$9,190
Total	139,486	14,088	153,574	$0.50	$76,787	0	0	0	$0.00	$0	139,486	14,088	153,574	$0.50	$76,787

Tolling	Midday Period (10AM-3PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	8,727	900	9,628	$0.35	$3,370	0	0	0	$1.05	$0	8,727	900	9,628	$0.35	$3,370
2	10,585	1,089	11,674	$0.35	$4,086	0	0	0	$1.05	$0	10,585	1,089	11,674	$0.35	$4,086
3	13,086	1,316	14,402	$0.35	$5,041	0	0	0	$1.05	$0	13,086	1,316	14,402	$0.35	$5,041
4	12,346	1,229	13,575	$0.35	$4,751	0	0	0	$1.05	$0	12,346	1,229	13,575	$0.35	$4,751
5	12,881	1,283	14,163	$0.35	$4,957	0	0	0	$1.05	$0	12,881	1,283	14,163	$0.35	$4,957
6	12,946	1,319	14,265	$0.35	$4,993	0	0	0	$1.05	$0	12,946	1,319	14,265	$0.35	$4,993
7	19,561	1,946	21,507	$0.35	$7,527	0	0	0	$1.05	$0	19,561	1,946	21,507	$0.35	$7,527
8	25,327	2,547	27,874	$0.35	$9,756	0	0	0	$1.05	$0	25,327	2,547	27,874	$0.35	$9,756
9	16,809	1,699	18,508	$0.35	$6,478	0	0	0	$1.05	$0	16,809	1,699	18,508	$0.35	$6,478
10	20,092	2,051	22,143	$0.35	$7,750	0	0	0	$1.05	$0	20,092	2,051	22,143	$0.35	$7,750
Total	152,359	15,380	167,739	$0.35	$58,709	0	0	0	$0.00	$0	152,359	15,380	167,739	$0.35	$58,709

Tolling	PM Peak Period (3PM-7PM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	9,946	1,019	10,965	$0.50	$5,483	0	0	0	$1.50	$0	9,946	1,019	10,965	$0.50	$5,483
2	11,987	1,226	13,213	$0.50	$6,606	0	0	0	$1.50	$0	11,987	1,226	13,213	$0.50	$6,606
3	13,215	1,320	14,536	$0.50	$7,268	0	0	0	$1.50	$0	13,215	1,320	14,536	$0.50	$7,268
4	13,165	1,302	14,467	$0.50	$7,233	0	0	0	$1.50	$0	13,165	1,302	14,467	$0.50	$7,233
5	12,885	1,286	14,171	$0.50	$7,086	0	0	0	$1.50	$0	12,885	1,286	14,171	$0.50	$7,086
6	13,144	1,338	14,482	$0.50	$7,241	0	0	0	$1.50	$0	13,144	1,338	14,482	$0.50	$7,241
7	17,603	1,758	19,361	$0.50	$9,680	0	0	0	$1.50	$0	17,603	1,758	19,361	$0.50	$9,680
8	23,786	2,409	26,194	$0.50	$13,097	0	0	0	$1.50	$0	23,786	2,409	26,194	$0.50	$13,097
9	16,836	1,709	18,546	$0.50	$9,273	0	0	0	$1.50	$0	16,836	1,709	18,546	$0.50	$9,273
10	20,175	2,069	22,244	$0.50	$11,122	0	0	0	$1.50	$0	20,175	2,069	22,244	$0.50	$11,122
Total	152,742	15,437	168,179	$0.50	$84,089	0	0	0	$0.00	$0	152,742	15,437	168,179	$0.50	$84,089

Tolling	Night Period (7PM-6AM)														
Location	PC ETC	PC Video	PC Total	Toll	Revenue	CV ETC	CV Video	CV Total	Toll	Revenue	Tot ETC	Tot Video	Total	Avg Toll	Revenue
1	6,581	663	7,244	$0.35	$2,535	0	0	0	$1.05	$0	6,581	663	7,244	$0.35	$2,535
2	7,231	728	7,959	$0.35	$2,786	0	0	0	$1.05	$0	7,231	728	7,959	$0.35	$2,786
3	8,430	832	9,262	$0.35	$3,242	0	0	0	$1.05	$0	8,430	832	9,262	$0.35	$3,242
4	8,628	842	9,470	$0.35	$3,314	0	0	0	$1.05	$0	8,628	842	9,470	$0.35	$3,314
5	8,758	855	9,613	$0.35	$3,365	0	0	0	$1.05	$0	8,758	855	9,613	$0.35	$3,365
6	8,614	866	9,479	$0.35	$3,318	0	0	0	$1.05	$0	8,614	866	9,479	$0.35	$3,318
7	11,187	1,084	12,271	$0.35	$4,295	0	0	0	$1.05	$0	11,187	1,084	12,271	$0.35	$4,295
8	15,982	1,579	17,560	$0.35	$6,146	0	0	0	$1.05	$0	15,982	1,579	17,560	$0.35	$6,146
9	10,157	1,005	11,162	$0.35	$3,907	0	0	0	$1.05	$0	10,157	1,005	11,162	$0.35	$3,907
10	12,014	1,202	13,216	$0.35	$4,626	0	0	0	$1.05	$0	12,014	1,202	13,216	$0.35	$4,626
Total	97,582	9,654	107,236	$0.35	$37,533	0	0	0	$0.00	$0	97,582	9,654	107,236	$0.35	$37,533
Total Day	542,169	54,559	596,728	$0.43	$257,118	0	0	0	$0.00	$0	542,169	54,559	596,728	$0.43	$257,118
Annual (000)	184,338	18,550	202,887	$0.43	$87,420	0	0	0	$0.00	$0	184,338	18,550	202,887	$0.43	$87,420

Note: Revenue in 2014 dollars

Table 6-28
Estimated Annual Trips and Toll Revenue (in thousands)

	Alternative 1		Alernative 2		Alternative 3		Alternative 4		Alternative 5	
	I-95 Tolling		I-95 Tolling		I-95 and Route 15 Tolling		I-95 Tolling with Widening		I-95 & Rte 15 Tolling with Widening	
	$0.50 Peak/$0.35 Off Peak		$0.80 Peak/$0.56 Off Peak		$0.50 Peak/$0.35 Off Peak		$0.50 Peak/$0.35 Off Peak		$0.50 Peak/$0.35 Off Peak	
Year	Trips	Revenue	Trips	Revenue	Trips	Revenue	Trips	Revenue	Trips	Revenue
2020	170,498	$262,134	143,315	$356,836	264,692	$365,500	174,578	$272,927	266,613	$370,277
2021	171,274	$263,186	144,114	$358,811	265,877	$366,911	175,387	$274,051	267,829	$371,735
2022	172,054	$264,238	144,918	$360,785	267,067	$368,321	176,199	$275,174	269,050	$373,192
2023	172,837	$265,290	145,726	$362,760	268,262	$369,732	177,016	$276,297	270,277	$374,649
2024	173,623	$266,343	146,539	$364,734	269,462	$371,142	177,836	$277,421	271,510	$376,106
2025	174,413	$267,395	147,356	$366,708	270,668	$372,553	178,660	$278,544	272,748	$377,563
2026	175,207	$268,447	148,178	$368,683	271,879	$373,963	179,487	$279,668	273,992	$379,021
2027	176,005	$269,499	149,004	$370,657	273,096	$375,374	180,319	$280,791	275,242	$380,478
2028	176,806	$270,551	149,835	$372,631	274,318	$376,784	181,154	$281,914	276,497	$381,935
2029	177,610	$271,603	150,671	$374,606	275,546	$378,195	181,994	$283,038	277,758	$383,392
2030	178,419	$272,655	151,511	$376,580	276,779	$379,605	182,837	$284,161	279,024	$384,850
2031	179,231	$273,707	152,356	$378,555	278,017	$381,016	183,684	$285,285	280,297	$386,307
2032	180,046	$274,760	153,206	$380,529	279,262	$382,426	184,535	$286,408	281,575	$387,764
2033	180,866	$275,812	154,061	$382,503	280,511	$383,837	185,390	$287,531	282,859	$389,221
2034	181,689	$276,864	154,920	$384,478	281,767	$385,247	186,249	$288,655	284,149	$390,678
2035	182,516	$277,916	155,784	$386,452	283,028	$386,658	187,111	$289,778	285,445	$392,136
2036	183,346	$278,968	156,653	$388,426	284,294	$388,068	187,978	$290,901	286,747	$393,593
2037	184,181	$280,020	157,526	$390,401	285,566	$389,479	188,849	$292,025	288,054	$395,050
2038	185,019	$281,072	158,405	$392,375	286,844	$390,889	189,724	$293,148	289,368	$396,507
2039	185,861	$282,124	159,288	$394,349	288,128	$392,300	190,603	$294,272	290,688	$397,964
2040	186,707	$283,177	160,176	$396,324	289,417	$393,710	191,486	$295,395	292,013	$399,422
2041	187,557	$284,229	161,070	$398,298	290,712	$395,121	192,373	$296,518	293,345	$400,879
2042	188,410	$285,281	161,968	$400,273	292,013	$396,531	193,264	$297,642	294,683	$402,336
2043	189,268	$286,333	162,871	$402,247	293,320	$397,942	194,160	$298,765	296,027	$403,793
2044	190,129	$287,385	163,780	$404,221	294,633	$399,353	195,059	$299,889	297,377	$405,251
25 Yr Average	180,143	$274,760	153,329	$380,529	279,406	$382,426	184,637	$286,408	281,727	$387,764

Note:
Trips and Revenue in 1000's
Revenue in 2014 dollars

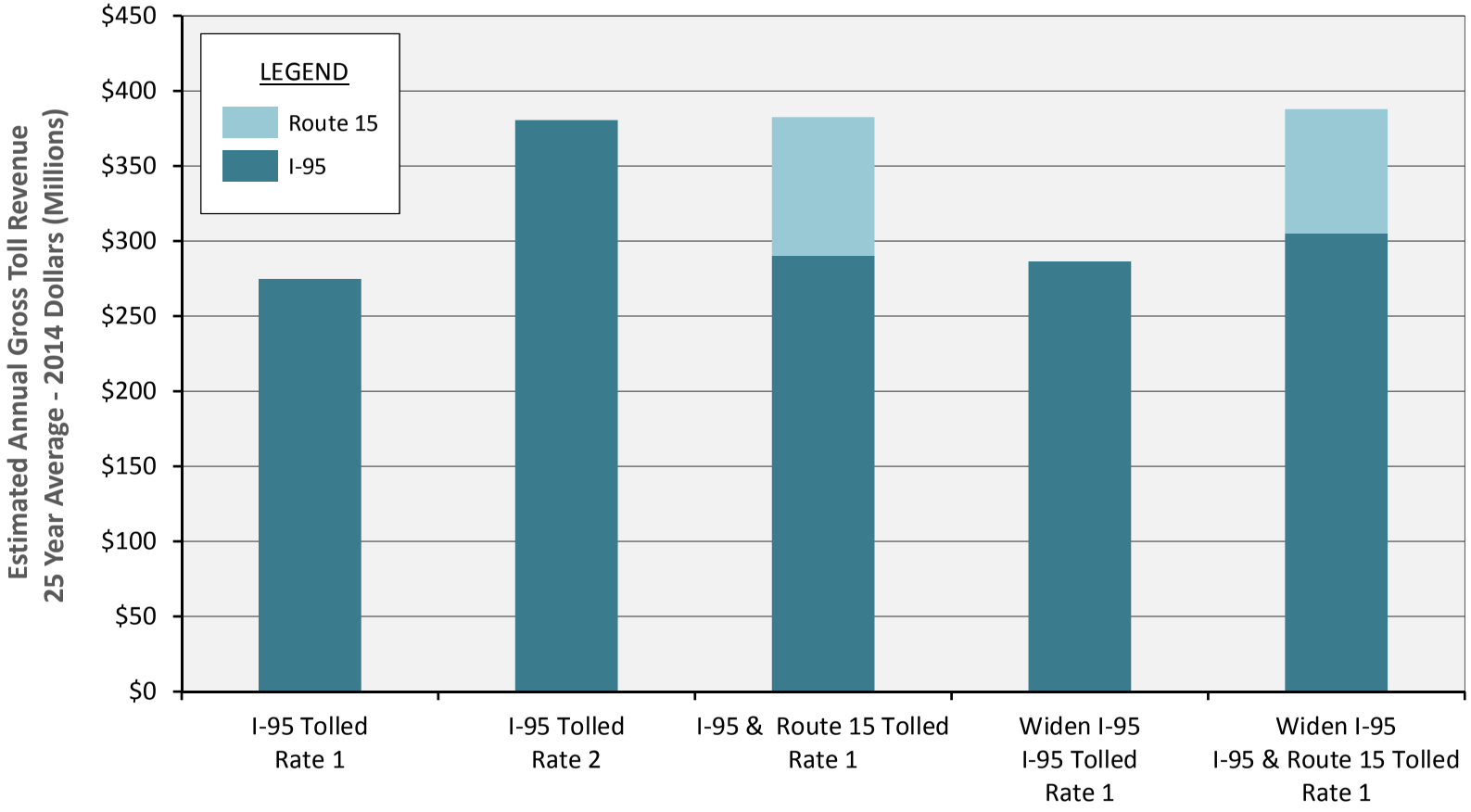
Alternative 2 is estimated to produce 153 million trips and yield more than $380 million annually on average over the 25 years. Alternative 3 is estimated to produce 279 million trips and yield more than $382 million annually on average over the 25 years. Alternative 4 is estimated to produce 185 million trips and yield $286 million annually on average over the 25 years. Alternative 5 is estimated to produce 282 million trips and yield nearly $388 million on average over the 25 years.

Figure 6-15 displays the estimated average annual gross toll revenue over a 25 year span (2020 through 2044) for each alternative.

Vehicle Miles Travelled (VMT), Vehicle Hours Travelled (VHT), and Average Speeds

After conducting the travel demand model runs for each of the alternatives, vehicle miles travelled (VMT) and vehicle hours travelled (VHT) on I-95, Route 15, and Route 1 were assembled. Average speed was then calculated by dividing VMT by VHT. A series of bar charts were created to illustrate the impact on VMT, VHT, and overall speed for each of the alternatives.

Figure 6-16 displays a bar chart displaying VMT, VHT, and average speeds for I-95 during the AM Peak Period in the southbound and northbound travel directions. Focusing on the southbound peak direction, VMT is lowest under Alternative 2 which assumes no widening and the highest toll rate. However, it was concluded that toll rates under Alternative 2 were on the high side of what would likely be required to manage demand. VMT is highest under a toll free widening condition (Alternative 4). Average speed shown at the bottom of the figure is the key statistic to view across alternatives. While Alternative 4 and 5 produce similar VMT values when compared to No Build Toll Free, the



ESTIMATED AVERAGE ANNUAL GROSS TOLL REVENUE (25 YEAR AVERAGE: 2020 - 2044)

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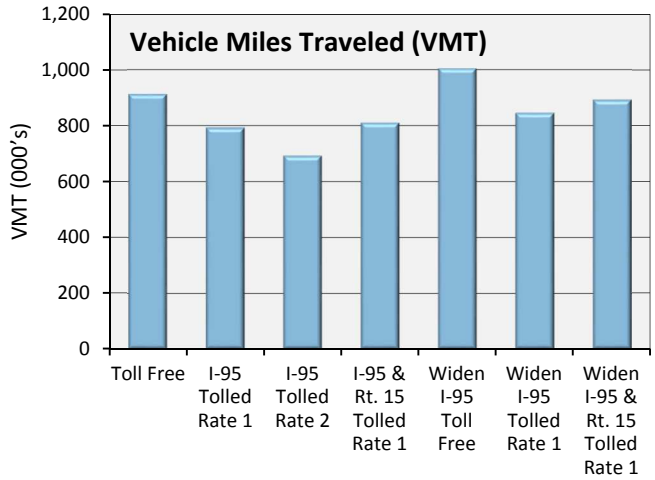
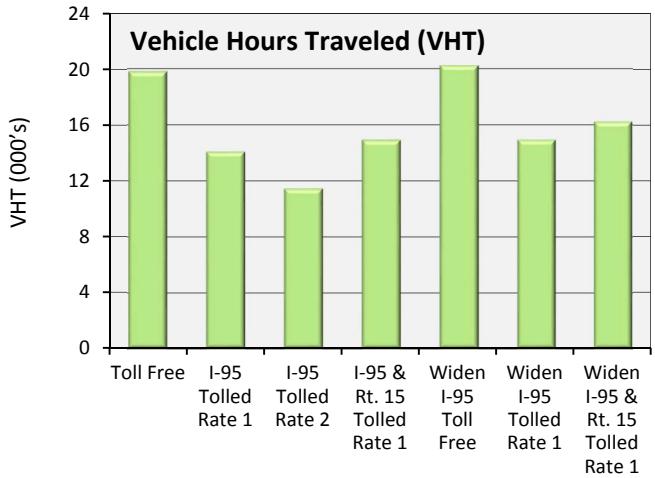
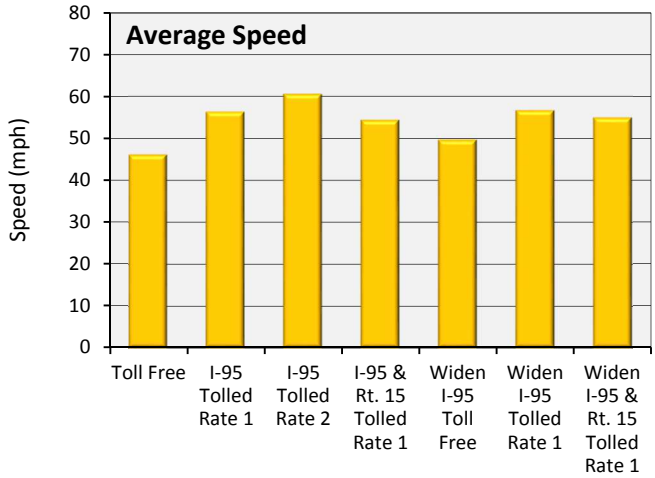
FIGURE 6-15

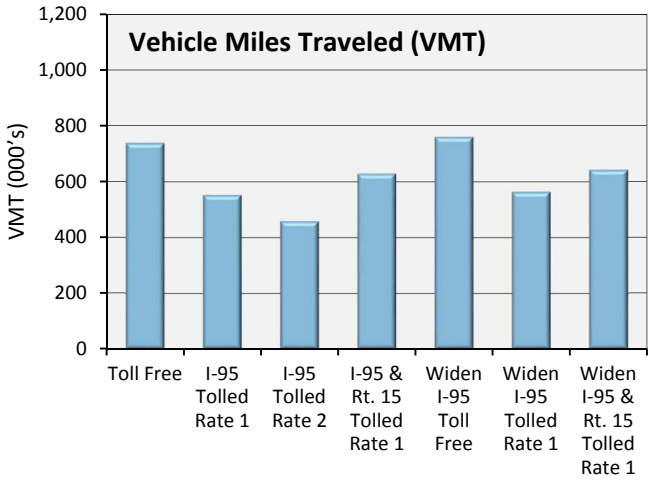
Southbound I-95
New Haven to New York

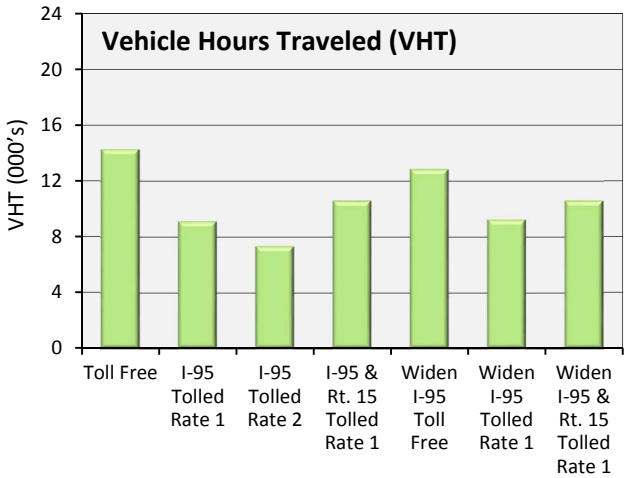


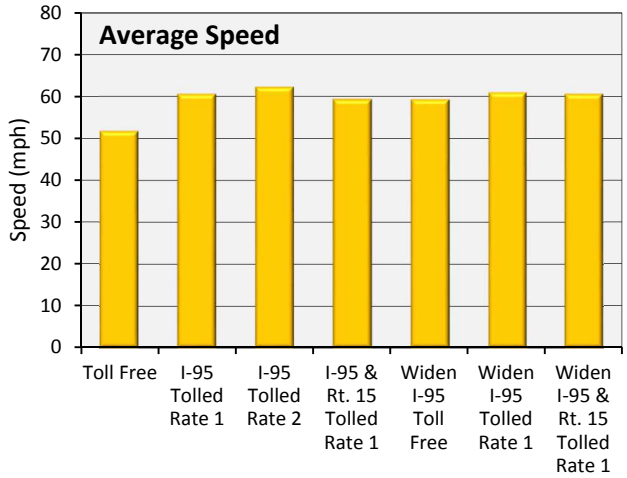




Northbound I-95
New Haven to New York







2020 I-95 ESTIMATED VMT, VHT AND AVERAGE SPEED AM PEAK PERIOD (6:00 AM - 10:00 AM)

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FIGURE 6-16

average speed under these two alternatives is estimated to be roughly 55 mph or about 10 mph faster than the do nothing condition. This is due to the result of managing demand to roughly the no build volumes through pricing, but now allowing that volume to flow on a widened facility.

Figure 6-17 displays a bar chart displaying VMT, VHT, and average speeds for Route 15 during the AM Peak Period in the southbound and northbound travel directions. Again, focusing on the southbound peak direction, VMT and VHT is highest under Alternative 2, which assumes no widening on I-95 and the highest toll rate. This condition would result in the highest amount of diversion to Route 15 among the alternatives. The highest speeds on Route 15 occur under Alternative 5 where both I-95 and Route 15 are priced and I-95 is widened.

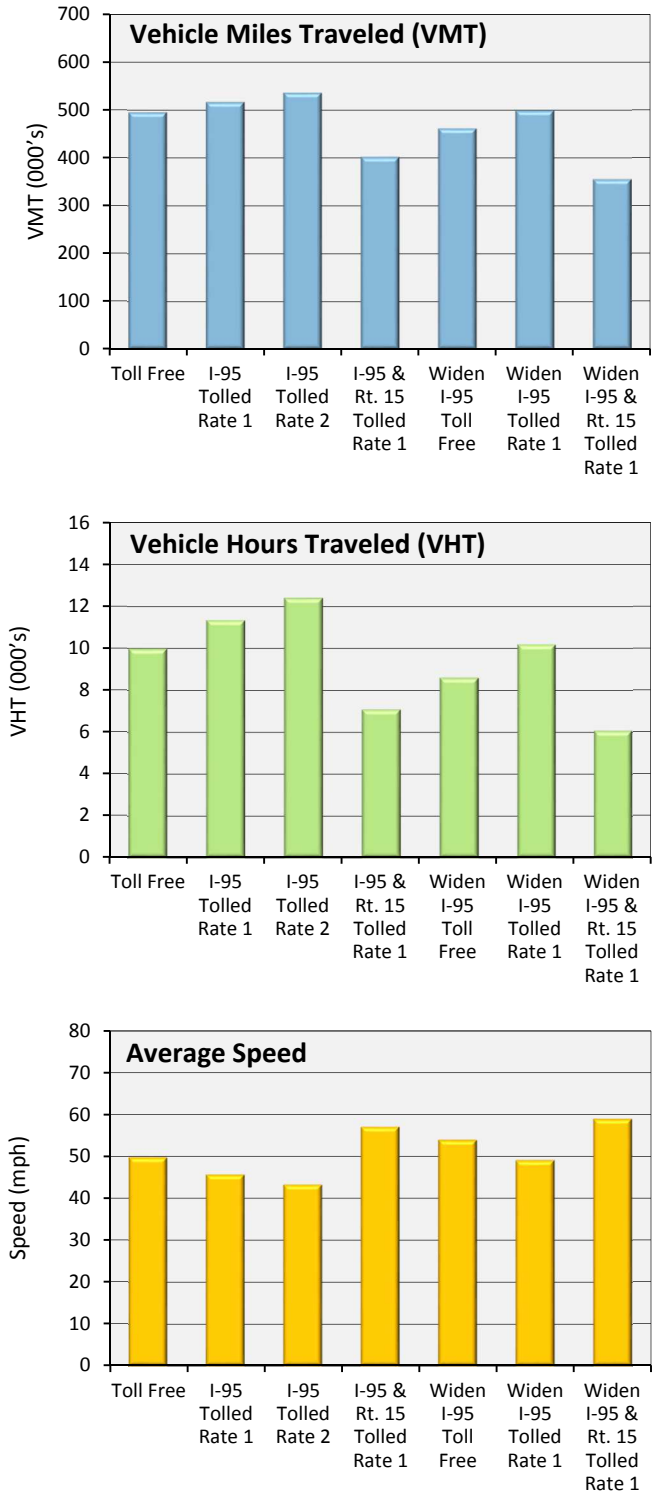
Figure 6-18 displays a bar chart displaying VMT, VHT, and average speeds for Route 1 during the AM Peak Period in the southbound and northbound travel directions. As would be expected, average speeds are lowest on Route 1 when both I-95 and Route 15 are tolled.

Figure 6-19 thru 6-21 displays the same information for the PM peak period. The northbound direction is the heavy travel direction during the PM peak period. The PM peak period analysis displays even larger improvements in travel speeds on I-95 through the use of pricing and widening as compared to the AM peak period.

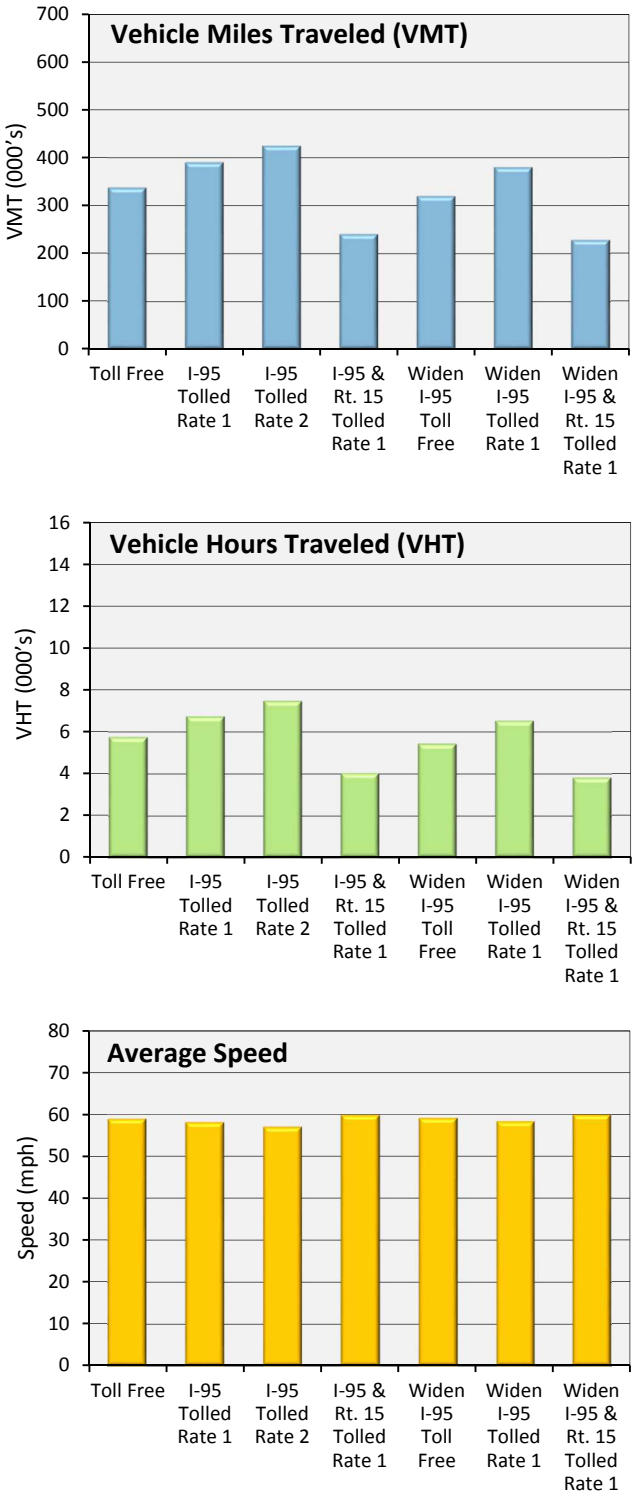
Figure 6-22 depicts the estimated average annual net time savings accumulated over I-95, Route 15, and Route 1 between New Haven and NY as compared to the No Build Alternative. The first bar shows the estimated annual time savings from tolling I-95 under the existing configuration. About 8 million hours are estimated to be saved annually. The largest amount of hours saved are estimated to occur under a widening of I-95 and a tolling of both I-95 and Route 15. More than 12 million hours of time savings annually are estimated under this alternative.

Figure 6-23 puts a dollar value to the time savings estimated for each alternative as depicted in Figure 6-22. A $15 per hour assumption was applied to the overall time savings in estimating the value of time savings. The lowest value of time savings is shown to be from a toll free widening at $60 million annually, while the highest value is achieved from a widening and tolling of both I-95 and Route 15 which is estimated at $180 million annually. The cumulative savings over 25 years (in billions) is shown at the bottom of the figure. This cumulative benefit ranges from $1.5 to $4.5 Billion depending on the alternative. It should be noted that this calculation does not represent nor attempt to represent the total potential economic or time savings value that might be realized under the pricing and or widening alternatives. This is purely assigning a value of time consistent with the average value from the Stated Preference survey to the overall aggregated time savings estimated across I-95, Route 15, and Route 1 for each alternative.

Southbound Route 15
New Haven to New York



Northbound Route 15
New Haven to New York

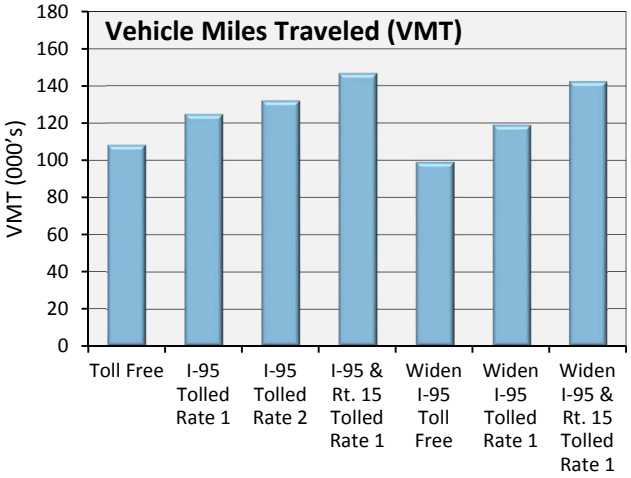


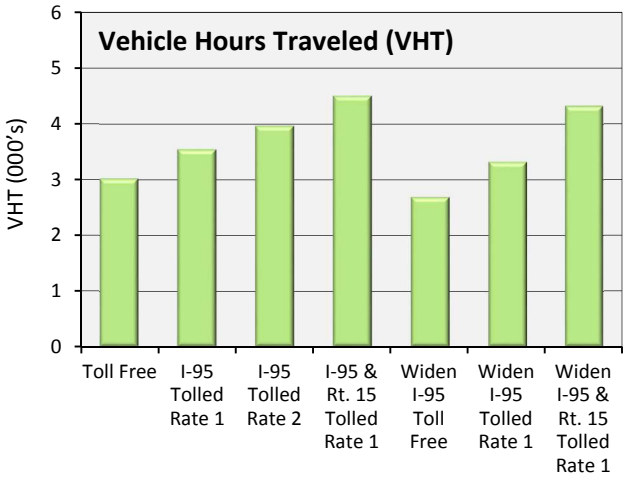
ROUTE 15 ESTIMATED VMT, VHT AND AVERAGE SPEED AM PEAK PERIOD (6:00 AM - 10:00 AM)

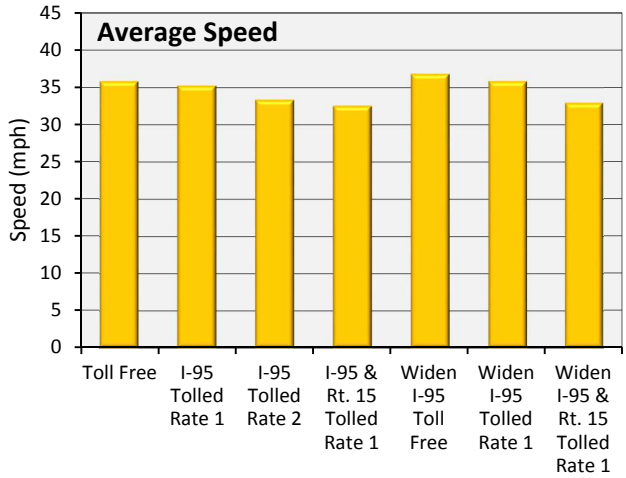
CDM Smith

FIGURE 6-17

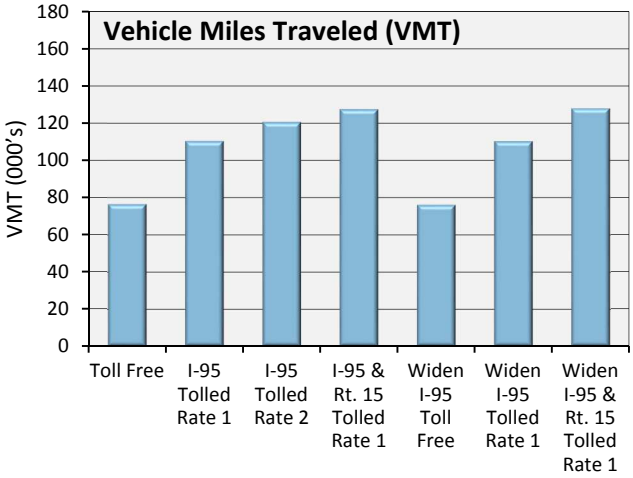
Southbound Route 1
New Haven to New York

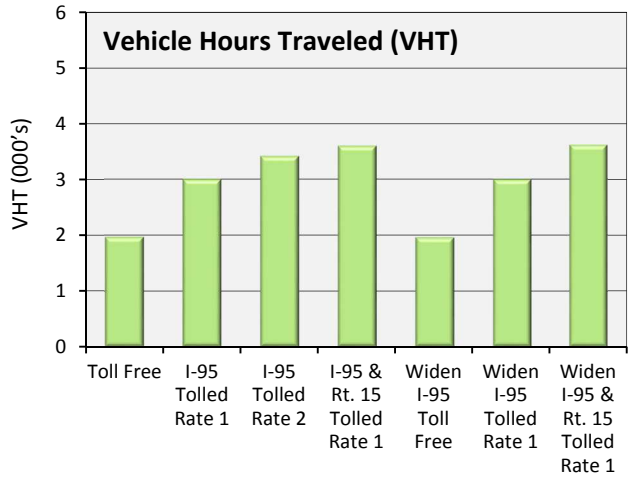


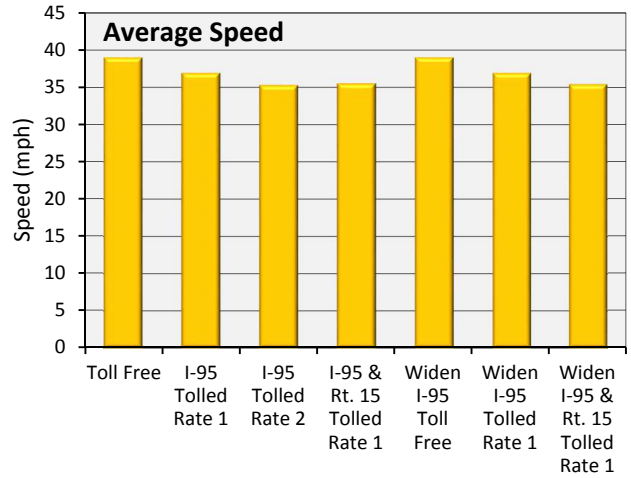




Northbound Route 1
New Haven to New York





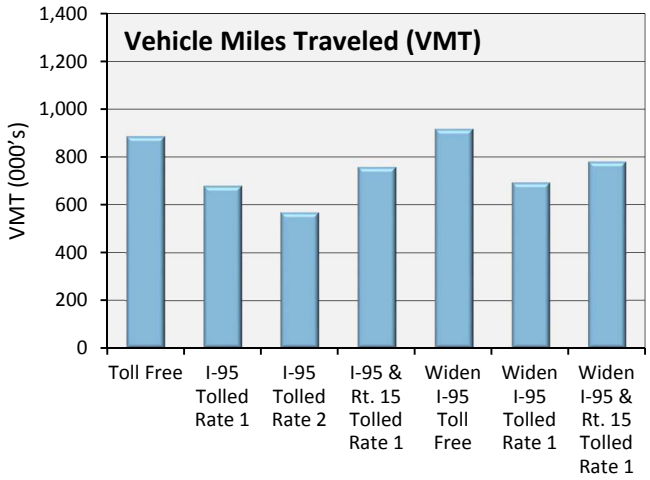


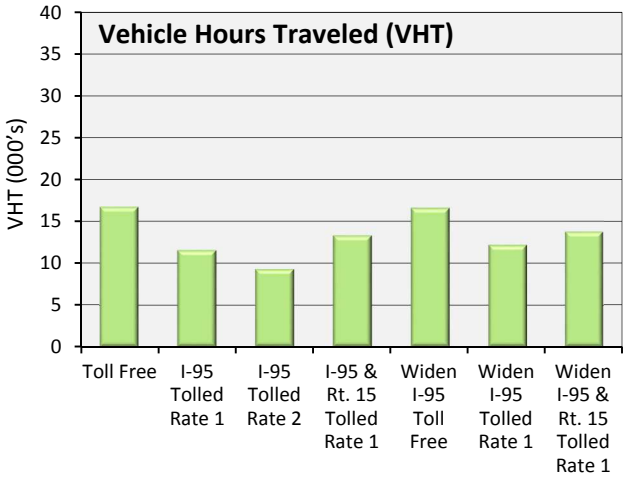
ROUTE 1 ESTIMATED VMT, VHT AND AVERAGE SPEED AM PEAK PERIOD (6:00 AM - 10:00 AM)

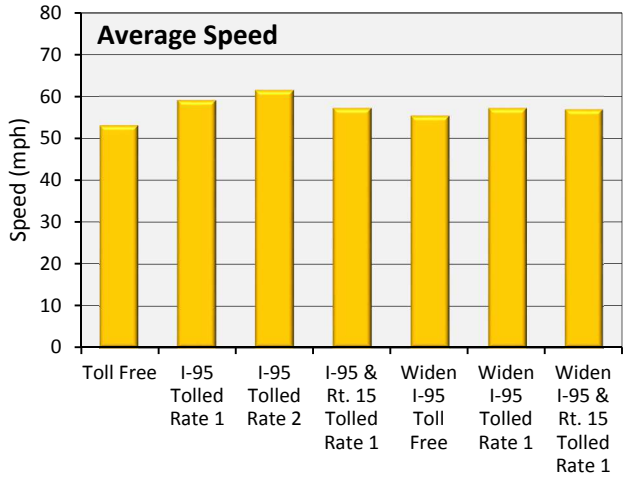
CDM Smith

FIGURE 6-18

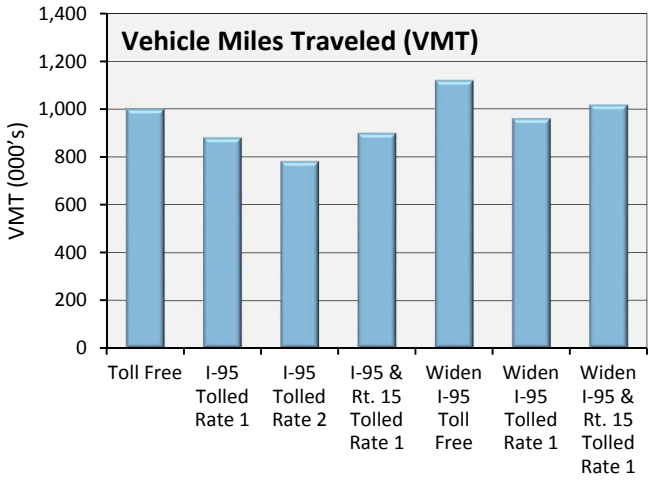
Southbound I-95
New Haven to New York

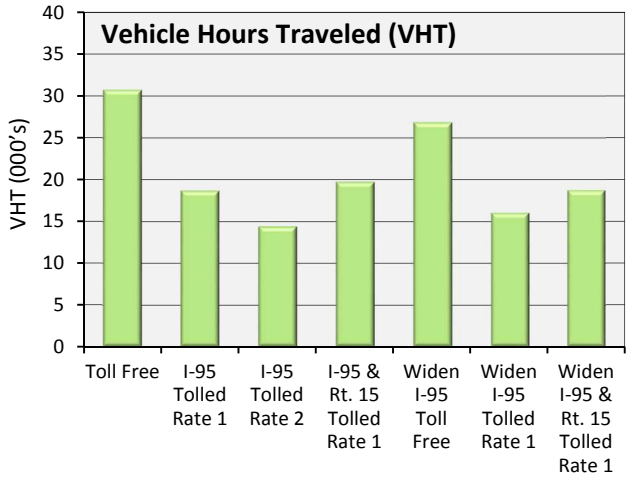


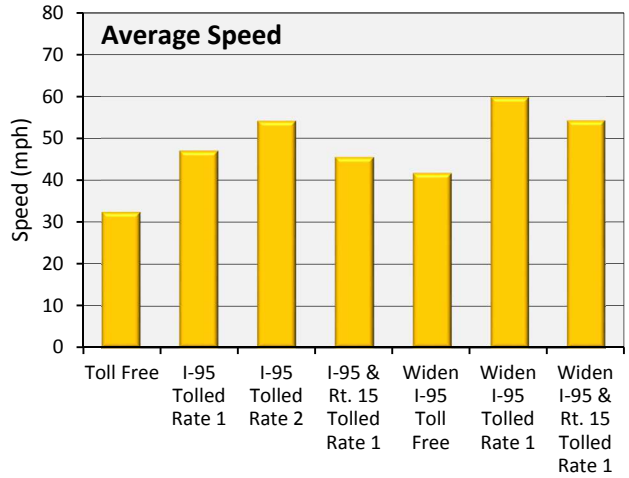




Northbound I-95
New Haven to New York





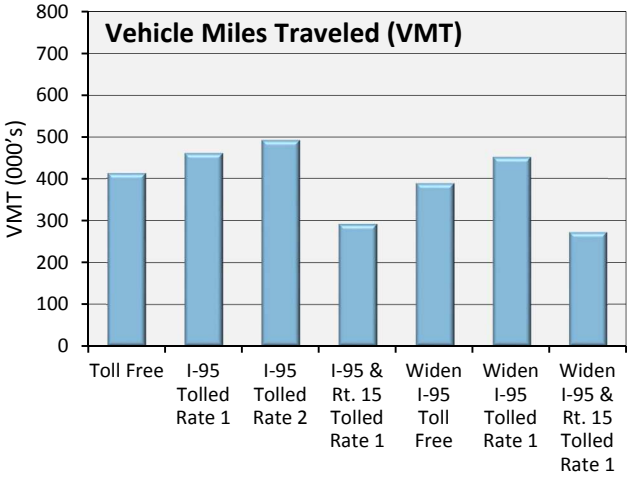


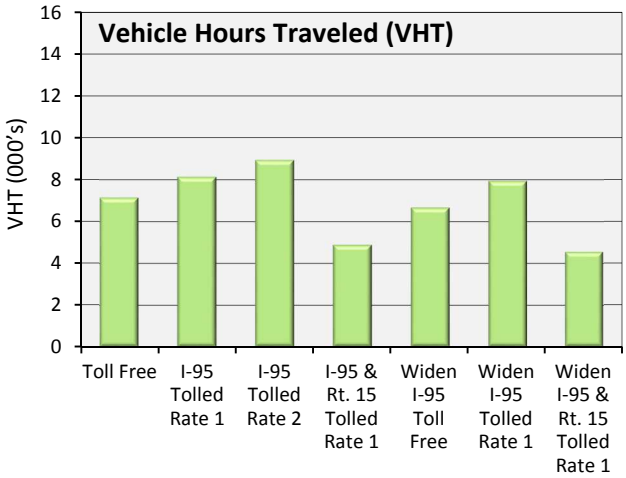
2020 I-95 ESTIMATED VMT, VHT AND AVERAGE SPEED PM PEAK PERIOD (3:00 PM - 7:00 PM)

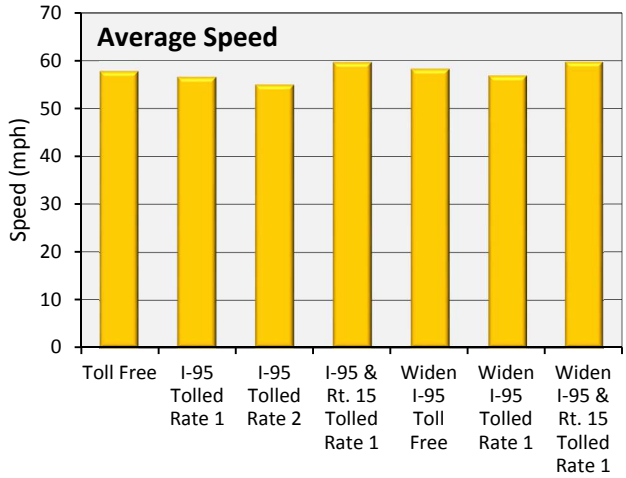
CDM Smith

FIGURE 6-19

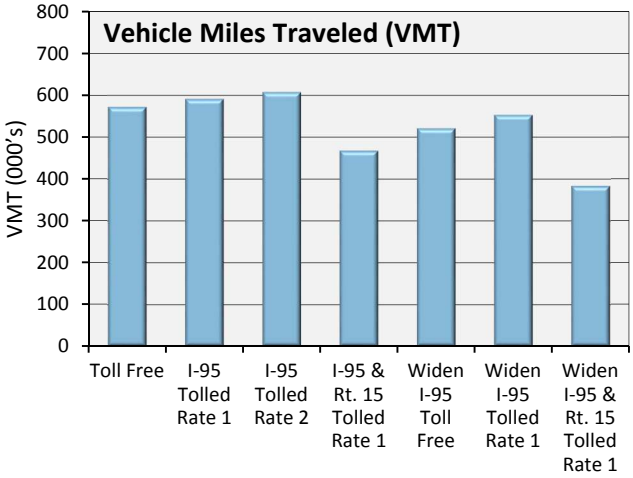
Southbound Route 15
New Haven to New York

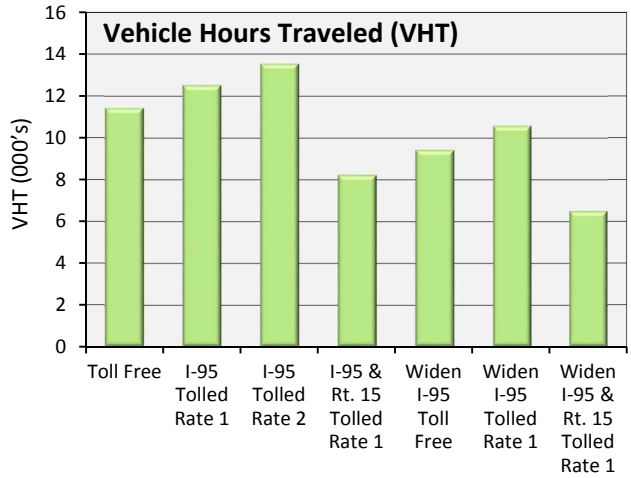


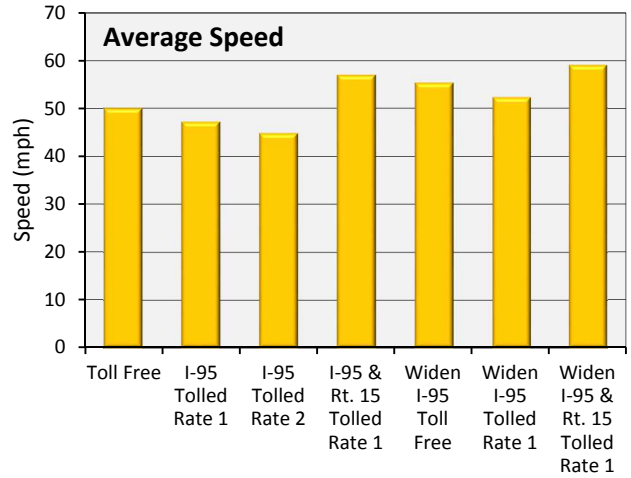




Northbound Route 15
New Haven to New York





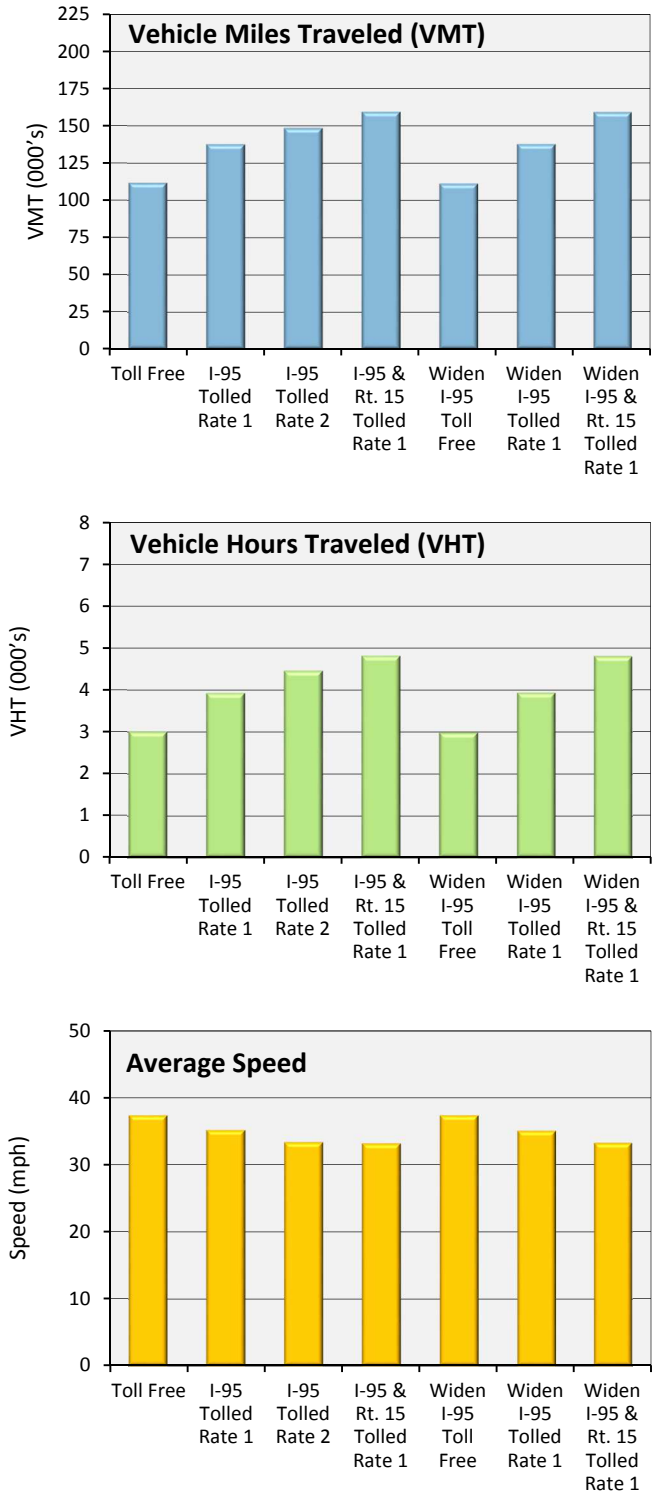


ROUTE 15 ESTIMATED VMT, VHT AND AVERAGE SPEED PM PEAK PERIOD (3:00 PM - 7:00 PM)

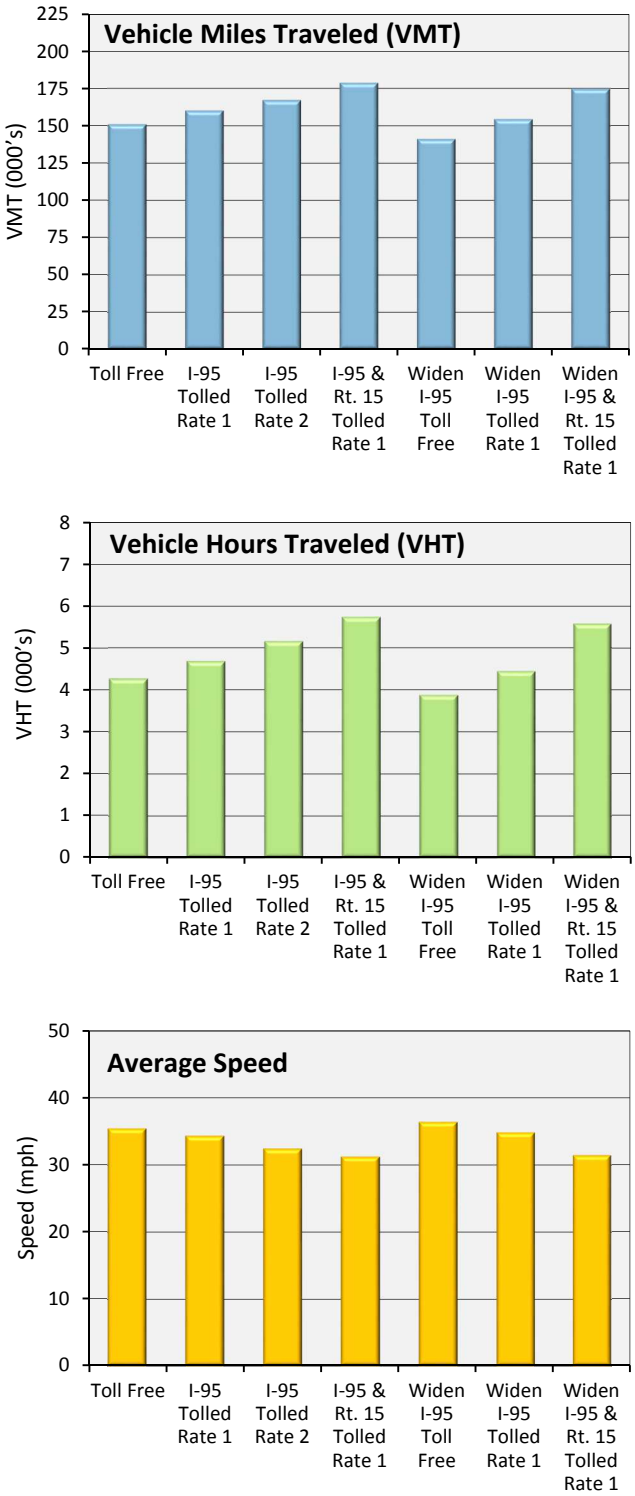
CDM Smith

FIGURE 6-20

Southbound Route 1
New Haven to New York



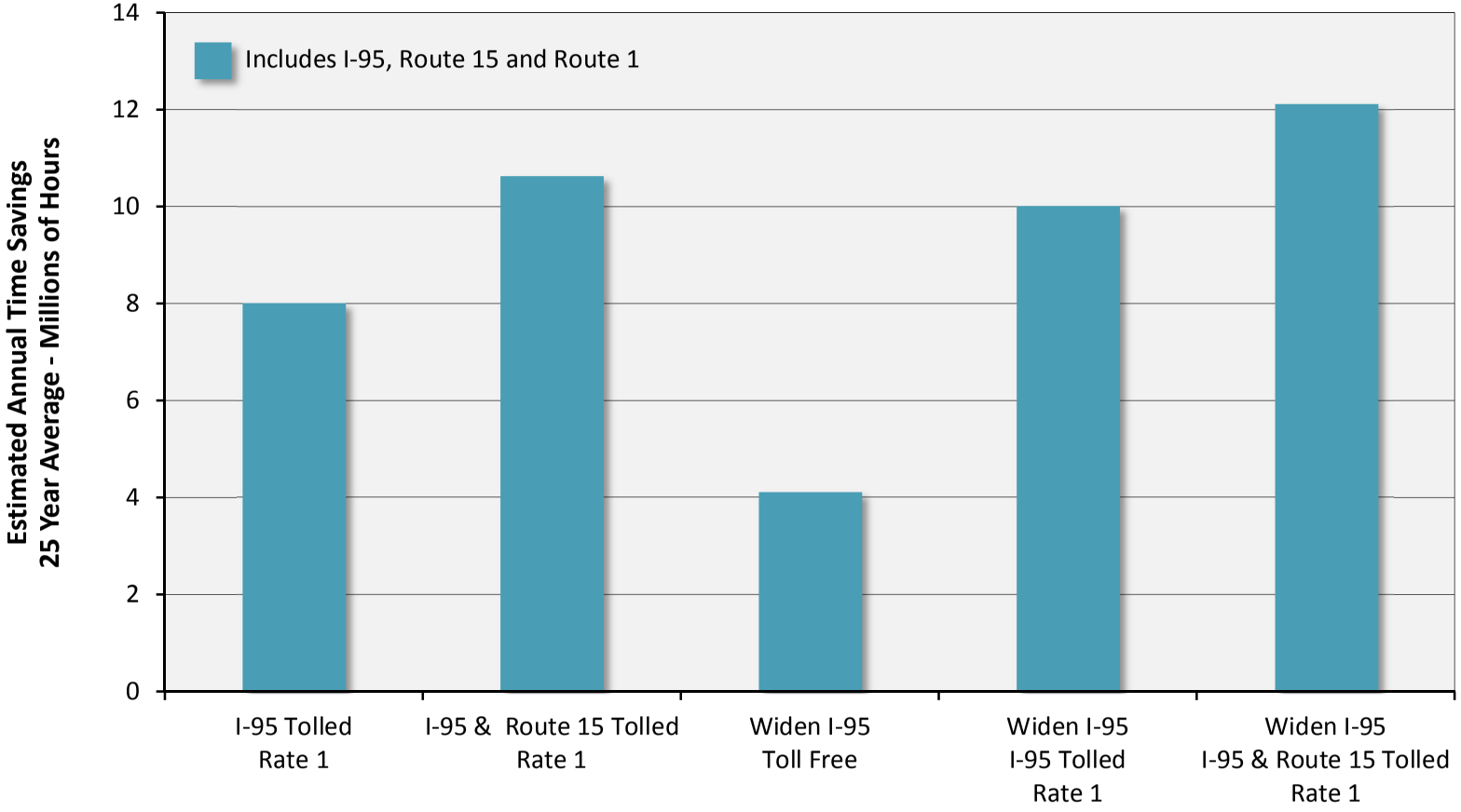
Northbound Route 1
New Haven to New York



ROUTE 1 ESTIMATED VMT, VHT AND AVERAGE SPEED PM PEAK PERIOD (3:00 PM - 7:00 PM)

CDM Smith

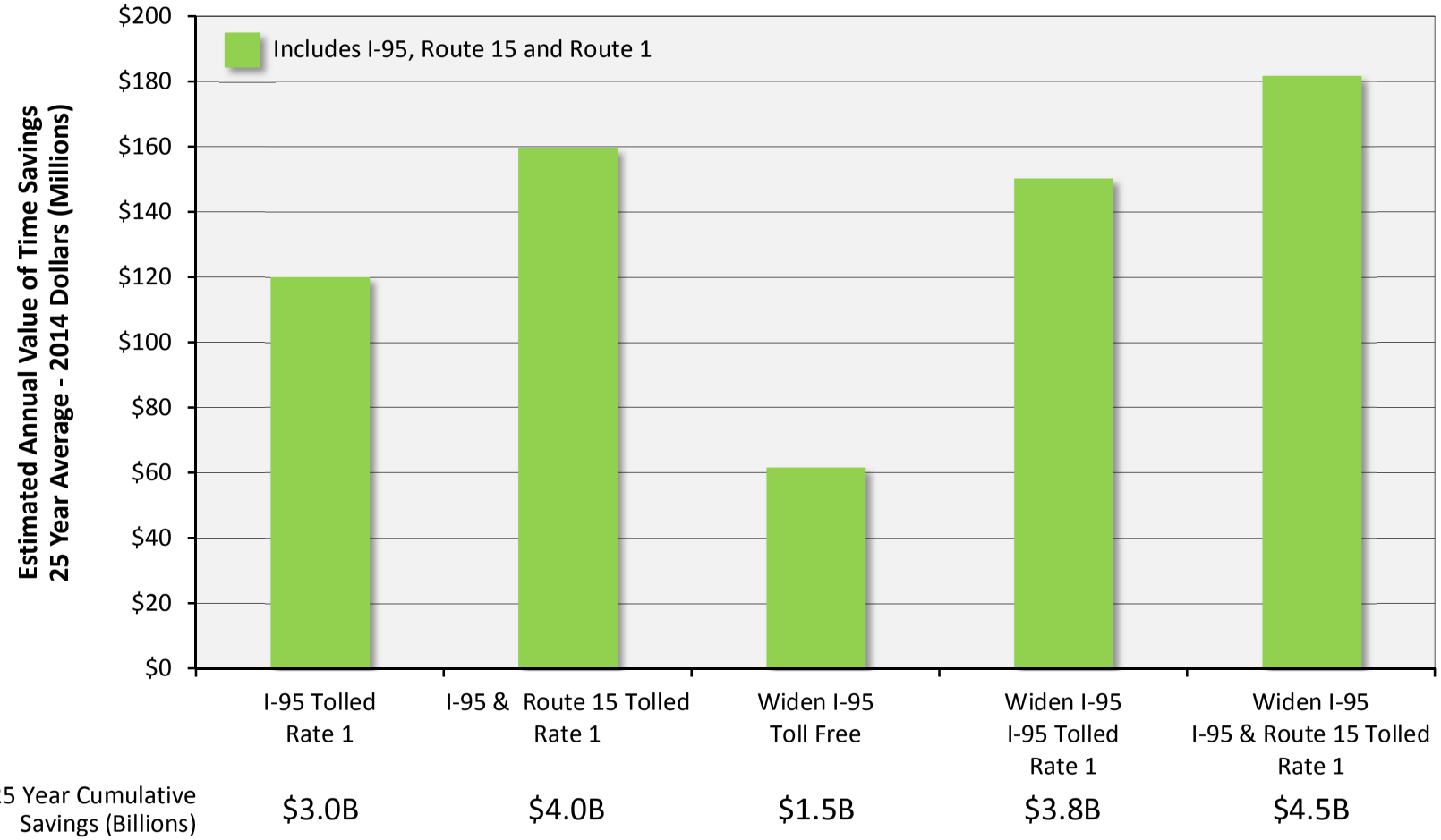
FIGURE 6-21



I-95 CORRIDOR ESTIMATED ANNUAL TIME SAVINGS 25 YEAR AVERAGE (2020 - 2044)

CDM Smith

FIGURE 6-22



I-95 CORRIDOR ESTIMATED VALUE OF TIME SAVINGS 25 YEAR AVERAGE (2020 - 2044)

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FIGURE 6-23

Chapter 7

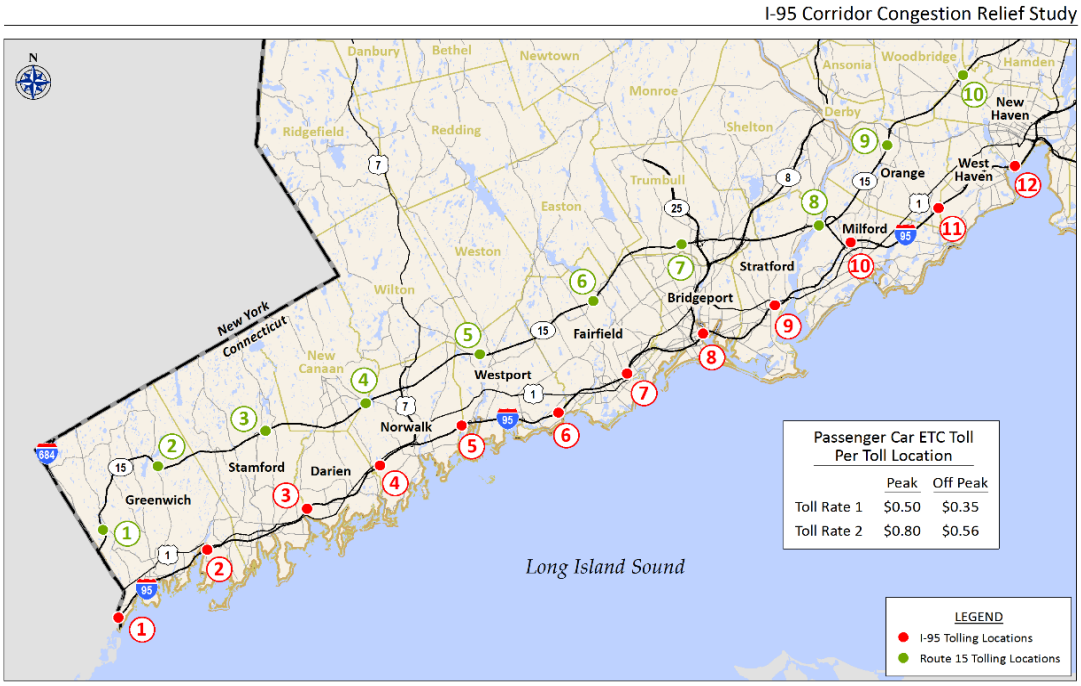
Tolling Capital Costs, Tolling Operations and Maintenance Costs, and Net Toll Revenue

This chapter provides a conceptual look at the various technical, functional and operational aspects of the toll collection system to be implemented for the Connecticut Department of Transportation (ConnDOT) I-95/Route 15 All Electronic Toll System (AETS) Project. In addition, preliminary tolling capital costs and tolling operations and maintenance costs are provided for the five tolling Alternatives discussed in Chapter 6. A summary table is presented at the end of this chapter which shows the estimated gross and net toll revenue for each of the five tolling Alternatives.

Project Description

The segments of the I-95/Route 15 corridors that are proposed to be tolled are between New Haven, CT and the New York State line. **Figure 7-1** shows both travel corridors with proposed tolling zone locations. I-95 has 12 tolling zone locations in each direction for a total of 24 tolling zones and Route 15 has 10 tolling zone locations in each direction for a total of 20 tolling zones. Each of the I-95 tolling zones will span 3 travel lanes plus a shoulder and the Route 15 tolling zones will span 2 travel lanes with one shoulder. Under some of the alternatives, the I-95 toll facility was assumed to be widened to 4 lanes in each direction from Bridgeport to Stamford.

Figure 7-1 – Corridor Map



CDM Smith

I-95 AND ROUTE 15 ASSUMED TOLLING LOCATIONS

Overview

Tolling systems throughout the U.S. and abroad have been implemented under a variety of scenarios and configurations. Until the early 1990's most toll collection systems were comprised of cash collection that required physical interaction with a toll collector or an automatic coin machine (ACM). Since then, the toll industry has seen a significant shift towards the use of Electronic Toll Collection (ETC) allowing roadway users to pay tolls without the need to stop and tender cash, tokens or paper coupons as a form of payment to the toll collectors, who worked from toll booths at toll plazas. The toll collectors would visually determine what type of vehicle was approaching, classify the vehicle by pressing a vehicle classification button on a terminal and collect the required toll from that user.

In the last 10 or so years, the trend has shifted to what is commonly referred to as Open Road Tolling (ORT). ORT is the predecessor to All Electronic Tolling (AET) where the ORT, or non-stop ETC lanes, were implemented by modifying the toll plazas and allowing ETC-equipped vehicles to drive past the toll plaza in exclusive ORT lanes at highway speeds. Since transponder equipped ETC vehicles are then allowed to drive past the toll plaza, this collection method involved deployment of an automated Violation Enforcement System (VES) to capture the license plate number and jurisdiction of all vehicles that were not recorded as a valid ETC transaction as that vehicle traverses the tolling zone. The ORT configuration includes an overhead toll gantry system comprised of ETC and VES equipment. The ORT environment also utilizes transponders, which are on-board units installed on vehicles, to communicate via Radio Frequency Identification (RFID) or Dedicated Short Range Communication (DSRC) technology with an ETC overhead antenna that is connected to a reader unit. In this environment customers are required to be registered in the ETC program which involves opening an account, acquiring a transponder, establishing an account opening balance, and providing the toll agency with personal information like name, e-mail address, home address, vehicle type, license plate information, etc.

The current development in the toll industry is a move towards deploying an All Electronic Tolling System (AETS). Technology advancements have allowed more tolling agencies across the U.S. and abroad to consider the potential benefits of AETS collection (i.e. all ETC, no cash option). This technology is a more sophisticated version of the ORT which utilizes video tolling without a need for a customer to have an ETC account prior to using the toll facility. The AETS solution is a cashless system whereby customers are encouraged to join the ETC program, or some form of video tolling program, to use the tolling facility to avoid having to send an invoice to a registered vehicle owner using information obtained from the CT Department of Motor Vehicles (DMV) or third party service provider.

Based on recent toll industry trends and technology advancements, the most suitable alternative for the Project is an AETS solution encompassing ETC only with a video tolling option used to handle unregistered vehicles in addition to violating vehicles. This preferred alternative is referred to in this document as AETS. This concept includes non-stop ETC with no option for cash payment, complimented with an automated VES to collect license plate video image data for video tolling and violation processing purposes. The customers will have an option to sign up for the ETC program (establish an account, register their license plate information and provide personal data) and obtain a transponder.

Unregistered users (non ETC program participants) will be given a small time window of time to pay the toll (grace period) to avoid being classified as a violating vehicle. Violation accounts will incur a violation charge, including the evaded toll amount, and an administrative fee to discourage the customers from paying the tolls in this manner and to encourage customers to sign up for an ETC account. The unregistered video toll transactions are an option created to accommodate infrequent users for whom a violation account will be initially established and they will have to pay the toll within the grace period before it becomes a violation. There will be no pre-paid video tolling account options when signing up for the program in order to pay tolls to use the facilities. Automated VES is part of this implementation providing non-stop front and rear license plate image capture and processing for all vehicles not recording a successful ETC transaction. Tolls are paid either via the ETC program account or from unregistered video tolling transactions. It should be noted that any tolling project implemented under the VPPP in Connecticut would be required to be an AETS.

All Electronic Tolling Overview

As mentioned in the section above, an AETS solution is proposed for this project that encompasses the ETC only option supplemented by video tolling transactions and an automated VES. Under this, program users are encouraged to join the ETC program as a condition of using the facilities because no cash option exists.

A user is required to establish an account and obtain an ETC transponder which needs to be installed on their vehicle in a specific location and subsequently those vehicle operators that do not have a transponder are considered to be video tolling until the grace period expires and they then become possible violators.

Although the transactions may be processed as a violation, a filter is applied that extracts transaction records with license plate data that matches the plate number entered for already existing ETC accounts and video transactions which if remain unpaid become violation transactions. The toll charged for a video toll transaction user could be set higher than the toll for users enrolled in the ETC program to encourage all users to obtain a transponder. This will be established in the CTDOT business rules. For this study, the video toll rate was set at 50 percent higher than the ETC toll rate during the traffic assignment process. This 50 percent surcharge amount is approximately the same as the average surcharge being assessed across other AET facilities in the U.S.

Within a tolling zone either a transponder ID number is read electronically via RFID or dedicated short range communication (DSRC) or a video image of the vehicle's license plate(s) is captured. In both cases, the data and video are automatically collected as the user traverses through the tolling zone at highway speeds. As briefly described above, the AETS alternative does not provide for the option of cash payment nor for the standalone pre-paid video tolling accounts. The tolling zone is comprised of an overhead gantry, sign structures, cantilever structures for mounting the necessary tolling equipment such as antennas, ETC readers, VES cameras, supplemental lighting, power supplies, etc. **Figure 7-2** below represents what a typical dual gantry AETS zone would look like.

However, several system integrators are now deploying single gantry AET systems. **Figure 7-3** below shows the side view of a typical single toll gantry design. **Figure 7-4** shows a top view of the same single toll gantry approach.

Figure 7-2 – Dual AET Gantry Lane Level Layout

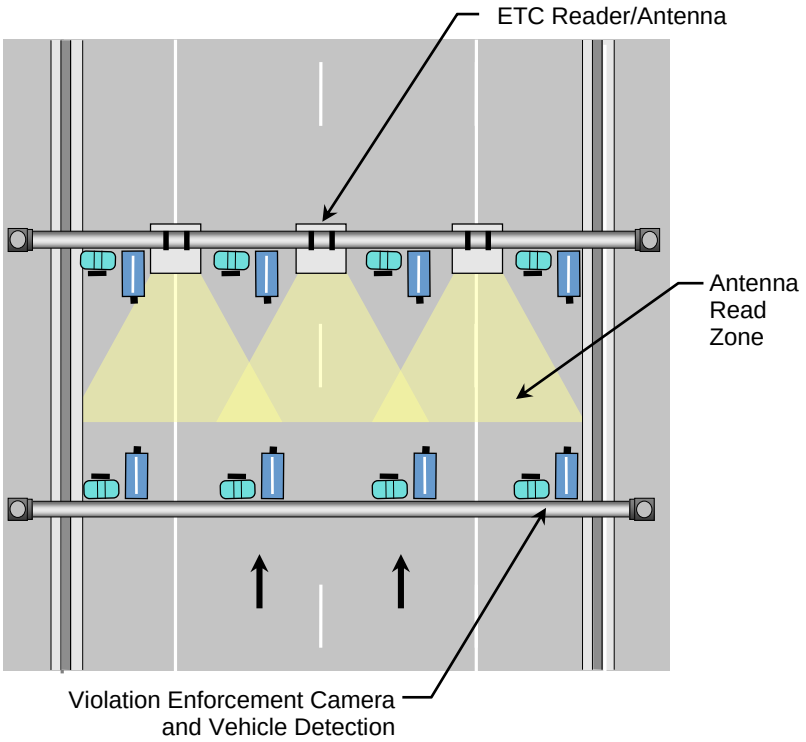


Figure 7-3 – AET Single Gantry Lane Level Layout

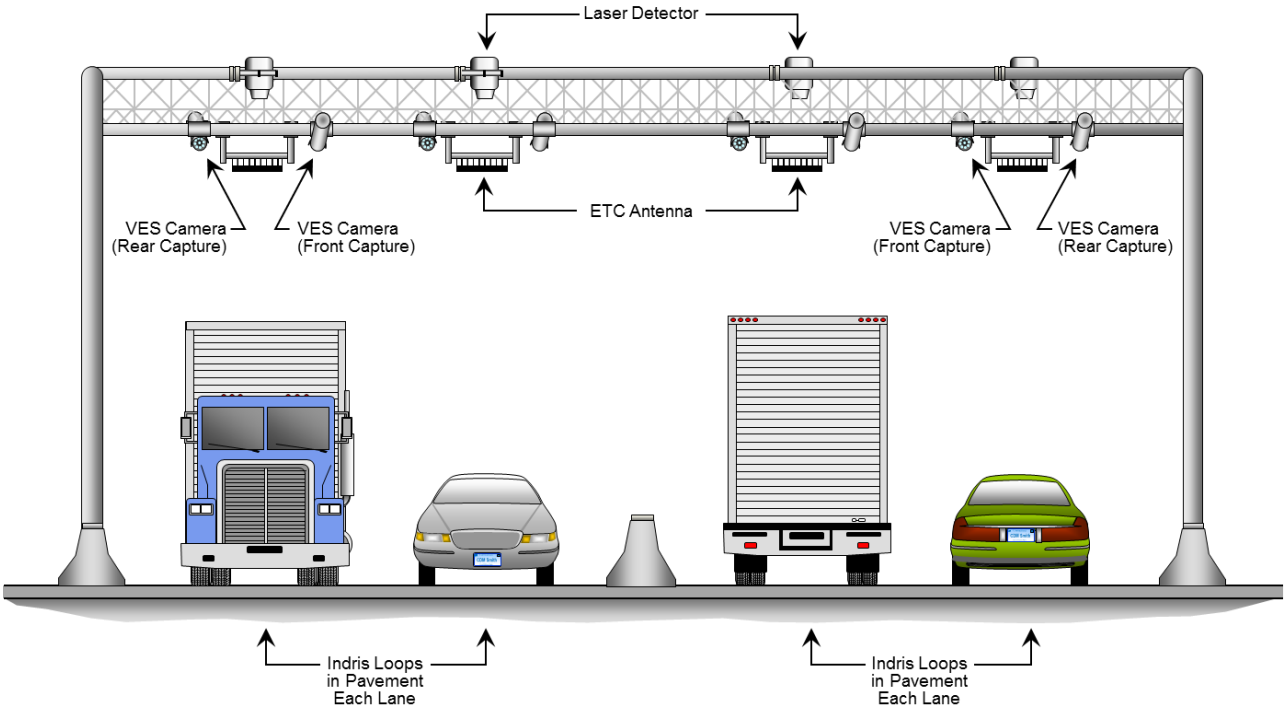
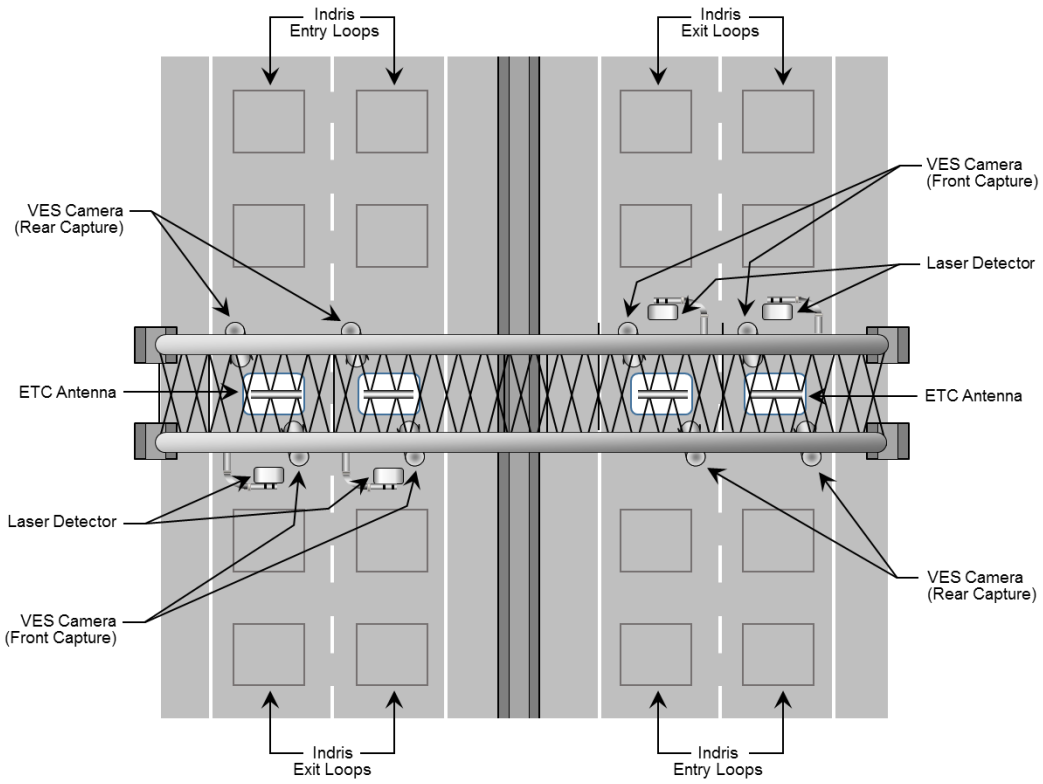


Figure 7-4 – AET Single Gantry Top View Equipment Layout



A Customer Service Center (CSC) and Violation Processing Center (VPC) for AETS requires an organization to establish central processing and back office functionality which is required to validate lane-level transactions, audit and reconcile the disposition of all transactions, and generate reports. In a general sense, the back office is the area where the CTDOT tolling program would be managed.

All users who do not record a successful ETC transaction are identified via video image capture of their vehicle license plates using cameras and then cross referencing the license plate of users enrolled in the ETC program. For users not enrolled in the ETC program, and for those whose unregistered video accounts have not been created in the recent past, an interface with the DMV is needed to identify the registered owner of the vehicle. For the users that the license plate images were captured, the TCS automatically requests registered vehicle owner information from the DMV (or third party) and opens an account to accumulate, store and invoice transactions in accordance with the CTDOT business rules.

All users are expected to pay tolls through either the debiting of a prepaid or post-paid commercial ETC Program account or through an unregistered video tolling account. CTDOT business rules will address the various measures that are taken if the video tolling notice amount is not paid by the stated due date after two notification attempts. These measures would include collection agency referral, suspension of the vehicle registration, suspension of their driver's license, etc. The suspension of the vehicle registration or driver operating licenses might require a law to be passed by the Connecticut legislature.

The VES concept begins with the video capture of the vehicle's license plates, (i.e., both front and rear) while it passes through the tolling zone. After the image is captured at the lane level and that record stored in the lane controller unit it will be subjected to the Optical Character Recognition (OCR) software that will determine the state of jurisdiction and the numbers and letters on the license plate. This data will then be appended to the transaction record and it will be transmitted to the TCS Host for future processing. The back office server then confirms that the plate information does not belong to an existing ETC account holder with sufficient balance or a non-revenue account exists. If it is, then the record will be processed as a pay-by-plate and the ETC account will be debited the amount of the toll. If the transaction is not affiliated to any ETC accounts, it will be processed as a video tolling transaction. The specific vehicle information will then be requested from the DMV via the established interface.

All Electronic Tolling Technical Review

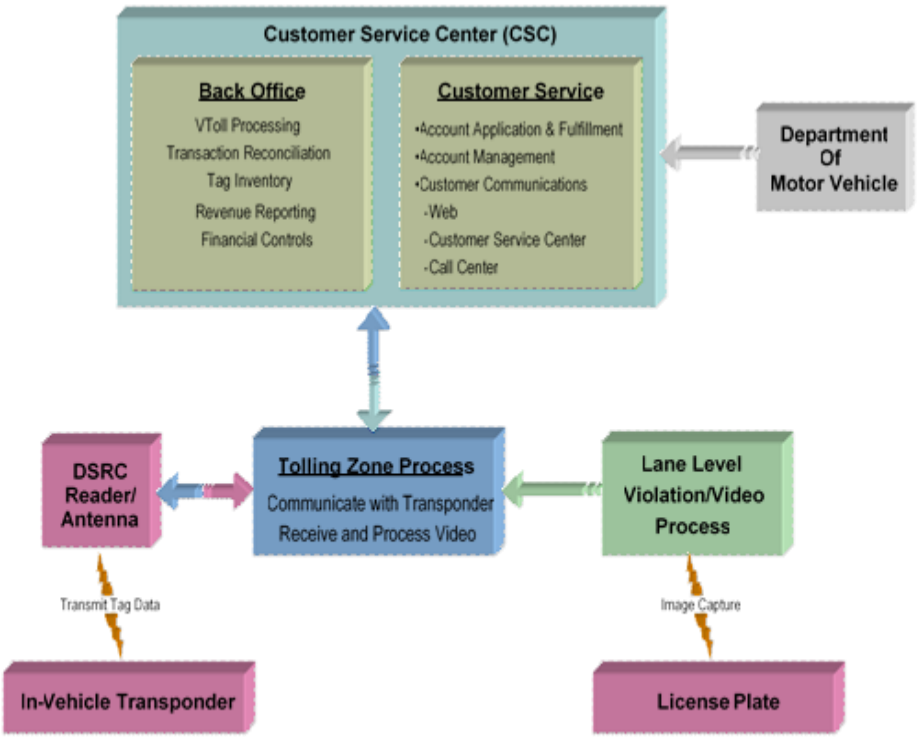
The purpose of this section is to identify more specific technical and operational aspects of the AETS as it relates to its operation on the I-95 and Route 15 corridors. This section provides the groundwork for future development of more detailed functional requirements that will be utilized as the basis for the development of the TCS technical requirements.

Technical Understanding

In a general sense, the concept of AETS encompasses ETC only implementations with an automated VES for violations operating concurrently. Tolling of vehicles will occur at free-flow prevailing highway speeds without the need to stop and provide a toll payment to a toll collector. Use of RFID/DSRC equipment such as transponders, readers, and antennas is necessary for the electronic tolling portion of the system. Tolls are charged for vehicles that are equipped with transponders as they traverse a tolling zone. For vehicles without transponders a license plate image will be taken and those patrons will be first filtered as video transactions (vehicle without a transponder traverses through the toll zone, but has an existing ETC account and license plate information already on file) which are matched at the back office before assigning it as an existing violation account or creating a new unregistered video account (which may become a violation account after the grace period elapses). An interface with the CT DMV will be required to perform a license plate lookup.

Figures 7-5 and 7-6 below depict the proposed overall data flow of the AETS. **Figure 7-5** is intended to present the system from a functional perspective as described above and **Figure 7-6** provides a physical layout of the lane level equipment through to the CSC and back office, which also includes the various interfaces to the CT DMV, rental car companies and ETC account registration. There are essentially two major components to the AETS; the lane level tolling zone and the back office system. Most of the user interaction with the system occurs at the tolling zone while processing accounts for all transactions and reconciliation with all account changes and related adjustments to identify both realized and unrealized revenue occurs at the back office.

Figure 7-5 – AET System Functional Diagram



Tolling Zone

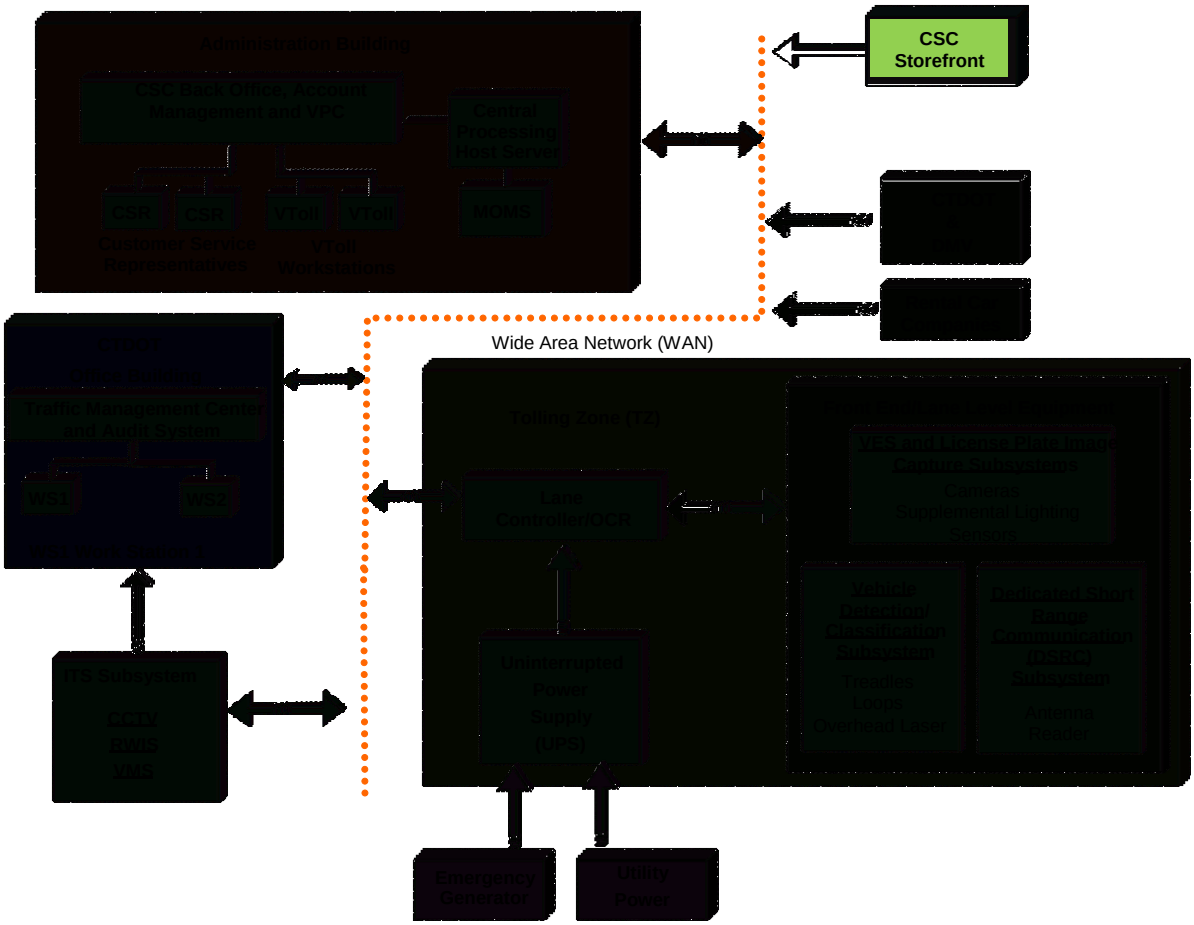
The tolling zone would be comprised of a lane controller unit(s), ETC antenna and transponder reader, VES and video image capture equipment, vehicle detection and classification equipment, uninterrupted power supply (UPS), various communications equipment and a portable back-up generator. Cameras and supplemental lighting are typically mounted to the toll gantry that is installed at the tolling zones.

ETC Antenna and Reader Subsystem

The ETC antenna and transponder reader work based on the DSRC or RFID technology. The ETC antenna and reader are mounted on the top of the tolling gantry facing down to capture the transponder unit that will be mounted on the vehicle's windshield as it travels under the tolling gantry. When a vehicle that is equipped with a transponder passes under the tolling gantry the ETC antenna sends an RF signal to the reader which communicates directly with the transponder in a read only manner. If the transponder is valid and linked to an ETC account in good standing a transaction is created and sent to the lane controller. Transaction files are stored at the lane controller and

periodically sent to the Host for processing. Transaction framing occurs at the lane level and includes various bits of data, including a time stamp, lane number, tolling gantry number and transponder ID. The transaction records will be held in files at the Host and will be periodically transferred to the back office for account processing.

Figure 7-6 – AETS Structural Diagram

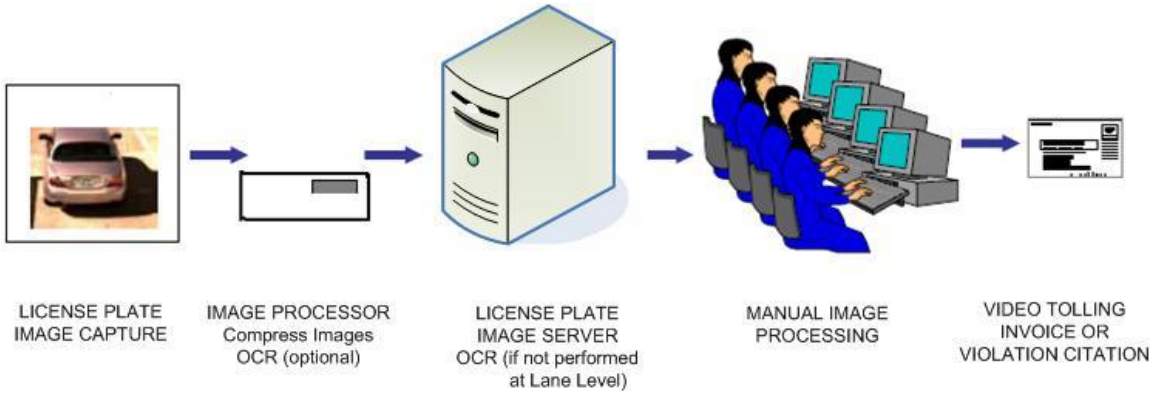


VES and Video Image Capture Subsystem

Automated camera based VES will be installed to capture and record a readable license plate image (primarily through OCR and confirmed via manual review if front and rear images do not match with a high level of confidence) of all vehicle violator license plates. This system is comprised of digital cameras mounted overhead to capture images of the front and rear license plates of passing vehicles. The cameras will be mounted in a specific location to ensure that each roadway area through the tolling zone is effectively "covered". Front and rear license plate capture is required since the trailer of a combination truck may not be registered to the truck owner, to improve VES performance, and to

reduce the need for manual review and confirmation of OCR identification. The video image capture subsystem will be equipped with supplemental lighting to ensure that high quality license plate images are captured under all ambient light conditions at each tolling zone. **Figure 7-7** below provides a graphical overview of the image capture and processing flow from the roadside subsystem to the back office.

Figure 7-7 – Vehicle License Plate Image Capture Process



Vehicle Detection/Classification Subsystem

The tolling zone will also be equipped with a vehicle detection and classification system. This typically involves the use of the following:

- In-pavement smart loops capable of determining the vehicle's classification and number of axles, and
- Overhead laser scanning devices that are capable of detecting vehicle presence and profiling vehicles to determine vehicle classification based on length, width and or height.

The preferred solution will depend on the vehicle classification structure that is to be adopted by CTDOT and the expected accuracy and reliability of the AETS to be deployed. However, an axle-based and height vehicle classification system is recommended for the I-95 toll facility since a variety of recreational vehicles and commercial trucks with different lengths and heights is expected to use this facility. Also, axle-based and height detection devices work best in the typical adverse weather conditions found in Connecticut. Even though commercial vehicles are not allowed to drive on Route 15, the same vehicle classification system can also be deployed on this facility.

Lane Controller

A Lane Controller is the primary roadside computer that collects and stores transaction data and manages the communications between the tolling zone equipment, the various roadside subsystems and the back office processing system. The lane controller is typically two independent computers; a primary unit that handles normal operations and a secondary unit that monitors the primary unit's status and is able to automatically assume full control of the roadside level activities in the event of a malfunction in the primary unit. This redundant design ensures that tolling operations can continue despite a failure of the primary lane controller unit. The lane controller commonly includes a hard drive and removable storage device for use in the event of extended loss of communications between the roadside subsystem and the Host.

Image Processor/Optical Character Recognition

An Image Processor is a computer containing a frame grabber and a digital input/output (I/O) interface with the image capture trigger. The cameras send video signals to the image processor that grabs multiple frames when triggered and subsequently processes and routes the images to the OCR software module to attempt to identify the license plate characters and jurisdiction. The image processor interfaces with the lane controller to receive an image capture trigger and data associated with the transaction for indexing it to the images for back office processing. The OCR process has widespread use on tolling systems and can be executed at the roadside level or at the Host, depending on the system integrator's preference. OCR software is a unique and a propriety part of the video image capture subsystem.

Uninterrupted Power Supply and Generator

A UPS unit provides conditioned and filtered utility electrical power to the tolling zone equipment. The UPS is commonly co-located in an environmentally controlled roadside cabinet with the lane controller and image processor. The UPS also provides battery backup in the event there is a utility power loss. A 30-minute runtime is typically specified to provide sufficient time to either shut down the lane controller software in a safe and orderly fashion or convert the power source to generator power via an automatic transfer switch.

A portable or permanent emergency generator could also be provided, if required by CTDOT. If a permanent generator is installed, it would typically be housed separately from the roadside cabinet. The generator would be sized according to the power load requirements of the lane equipment. In the event of a loss of utility line power, the generator would automatically start and after the proper phase and voltage is established, the line service into the UPS would be automatically switched over. All power, including line and generator, must pass through the UPS to effectively protect the tolling zone equipment from power surges.

Account Management System – CSC Host Server

The Account Management System (AMS), which is comprised of the CSC server (also referred to as the CSC Host), processes all transactions that are received from the lane controllers. The Host posts transactions to the ETC accounts database and reports account balances, changes in status, refunds, replenishments/payments, declines/chargeback's, credit card expirations, customer profile information and updates, account transponder ID numbers and class, revenue summaries, accounts payable and receivables. A Storage Area Network (SAN) is commonly used to provide data storage

fault tolerance. CSR workstations provide the user interface to retrieve data from the AMS database. A browser interface is commonly used to avoid loading client applications on to the client workstations.

Extracted license plate data sent from the Host is used by the VPC subsystem to either charge an existing ETC account the toll amount contained in the corresponding transaction record, or develop an existing violation account or placed in a queue to build a new video/violation account that is automatically sent a grace period notice. Unregistered video/violation transactions without an existing account must be processed through a DMV interface to obtain vehicle owner registration information. A proxy server provides a secure interface with the DMV to obtain registered vehicle owner information. This server ensures security, administrative control, and caching service. A proxy server is associated with or is part of a gateway server that separates the enterprise network from the outside network and includes a firewall to protect the enterprise network from outside intrusion.

Central Processing System Host Server

The central Processing System (CPS) Host is the server that centrally manages and stores all of the toll system data generated and received from the roadside lane controllers. Utilizing a database structure such as Oracle or MS SQL in conjunction with vendor specific applications, the Host receives, processes and stores all transaction data and maintenance messages received from the lane controllers and forwards valid ETC, video tolling and violation transactions to the CSC Host. Vehicle and license plate images captured by the roadside image processors are stored in a database and accessed from image processor workstations in conjunction with the corresponding transaction data.

A cluster or "redundant" configuration and use of virtual hosts is commonly used for the CPS Host to achieve high system availability and reliability. A SAN using fiber channel networking is also typically used to provide high data storage availability and to protect against loss of data. In addition, the CPS Host data will also be backed up on a periodic, typically daily, via tape, disk or off-site storage.

Maintenance On-Line Management System

The Maintenance On-line Management System (MOMS) application is an important component of the TCS. The MOMS can execute from either the CPS Host or a separate server co-located with the Host subsystem. The MOMS provides operations and maintenance staff with the ability to monitor, maintain and track repairs of the toll equipment hardware, software and subsystems. The MOMS will also have the flexibility to accommodate adjustments and refinements after the TCS has been made operational. This is typically encountered when fault alarms may need to be re-prioritized in an effort to reduce unnecessary service notices during off hours.

Customer Service Representative Workstations

In order to accommodate the maintenance of user accounts, Customer Service Representative (CSR) workstations will be located at the back office for their use. The CSR workstations will be comprised of a Commercial-off-the-Shelf (COTS) Personal Computer (PC) with monitor, keyboard and mouse. Via access to the CPS and AMS Host databases, the workstations will allow the CSRs to perform various user account activities such as:

Opening/closing ETC, video tolling and violation accounts;
Querying all available accounts;
Update user information;
Account replenishment;

Payment processing;
Credit card, EFT account updating;
Complaint handling;
Process video and violation transaction payments;
Conduct account inquiries; and
Process dispute resolutions.

It is envisioned that the CSR workstations will be utilized to serve walk-in customers at the CSC storefronts and also be used for back office call center activities. A more comprehensive description of CSR operations is provided later in this document.

Video/Violation Processing Workstation

In the event that a transaction image is not sufficiently legible for OCR processing or that the minimum confidence level of the OCR identification process has not been met, the image and corresponding transaction data must be manually processed. This manual process involves the retrieval of the video image(s) indexed to transaction data that is stored in the database and visual inspection of the vehicle images to determine the license plate characters and then entering them into the database via the video/violation processing workstation screen.

Depending on the adopted CTDOT business rules, the image review process typically requires two reviews by CSC staff (this is referred to as double blind review). This ensures that there is a high level of accuracy in determining the correct license plate information. However, if front and rear license plates are captured and one plate is successfully processed by OCR, only one review would be required if the manually extracted characters match the license plate information from the other VES camera. If both plates are captured with a high level of OCR confidence, no manual review would be warranted.

The license plate information and jurisdiction entered by the quality control reviewer (or first reviewer if matched with the vehicle's other captured license plate information) updates the VPC database in real-time and is immediately posted to an existing account or placed in a queue for DMV lookup.

Toll System Communications

Implementing toll system communications between the roadside equipment and the CPS Host, as well as any remote CSC storefront locations, requires evaluation of alternative long haul communication methods and the careful selection of a preferred network solution. Alternative communication methods applicable to this Project would be the following:

- Fiber optic backbone;
- Local common carrier's infrastructure; and
- Wireless network.

Fiber Optic Backbone

A single mode fiber optic cable could be installed along the entire length of the two facilities to provide a secure and reliable means of transmitting data from the roadside level equipment to the local common carrier's on-site transmission equipment, providing at least T1 level service to a remote building where CPS and ETC account management is performed. The fiber optic network could also be

used to interconnect roadside traffic management equipment for data and video transmission to a Traffic Management Center (TMC) server.

Each roadside cabinet or communications building containing lane and image processors would also contain fiber optic transmission equipment and a fiber distribution panel. Collapsed ring architecture is commonly used to provide redundant transmission paths to all of the connected TCS equipment. The fiber optic network would typically be installed in a 1¼" diameter duct that would be trenched along the outer limits of the toll facilities and within CTDOT ROW. To provide easy system maintenance and operational access, manholes would typically be installed at intervals of about every 2,000 feet. The local fiber optic transmission equipment would include network management system software that allows the status of the network to be monitored remotely by CTDOT.

Local Common Carrier's Infrastructure

An alternative to installing a fiber optic cable along the entire length of both toll facilities is to lease communication lines from a local common carrier. The common carrier would deliver T1 service to the tolling zone communications building, or roadside cabinet, the CPS, the AMS facility, the CSC sites, and any other subsystems used in the TCS design. Easements and/or permits would be required for the laterals and manholes installed by the local carrier to maintain communications service. These laterals and any backbone extension would extend from the local carrier's closest interconnection point to their existing communications network infrastructure. A public network interconnection at the CPS facility would be required to establish a communications link with the lane controller units and all CSC locations. This public network interconnection may need to upgrade the bandwidth to be able to carry all of the TCS video that would be transmitted for these projects (i.e. T3 lines).

Wireless Network

Concerns with reliability, terrain (i.e., line-of-sight), and security have limited the use of wireless communications for toll facilities. Alternative wireless communication methods providing adequate bandwidth capacity are the following:

- Digital microwave;
- Spread spectrum; or
- Mesh network.

Digital Microwave

This approach involves installation of a transmitter/receiver at each communications network node, such as a roadside cabinet or communications room/building that communicates with a hub. Multiple hubs (i.e., transmitter/receivers) and repeaters then form a communications path to the nearest interconnection to the local common carrier's communication infrastructure. The public network would then be used to complete the communications link to CTDOT's administration building or the building of a contracted operating agency or service provider. Digital microwave requires the installation of towers to install transmitters, receivers and repeaters. An application for a Federal Communications Commission (FCC) permit must be submitted and approved before activating the digital microwave network.

Spread Spectrum

This communication approach involves the use of radio units and antennas for point-to-point and multi-point communications. Since the radios are capable of supporting T1 communication links, this communications approach is a viable alternative for the initial implementation of toll facilities. Point-

to-point communications would be used from the toll zone roadside cabinet or communications building to the nearest interconnection to the local common carrier's communication infrastructure. This involves mounting radio/antennas and repeaters to poles installed along the line-of-sight communication path to a local carrier's existing communication facility. Installation of repeaters may require the purchase of ROW. An FCC license is not required to operate spread spectrum radios. Communication lines would be leased from the local common carrier to establish a communications link between the tolling zone controllers and CPS Host, any remote kiosks, the CSC storefronts, and the AMS Host.

Mesh Network

A mesh network involves the installation of multiple towers with transmitters/receivers to form a mesh network communications configuration. This approach is best suited for central business districts and campus settings, and less suitable for long and narrow facilities such as these two toll projects. Consequently, this approach would not be deemed appropriate for the CTDOT toll facilities.

The preferred communications network for the CTDOT toll projects would be a single mode fiber optic approach. The security, reliability and bandwidth capability provided by fiber optic communications network supports this selection.

Electrical Service

Electrical service needs to be arranged with the local service utility company. An electrical service supply of 120/240 VAC, single phase, would be sufficient for handling the roadside equipment load. A load center, disconnect, UPS, surge suppressors and grounding would be required for each lane controller and image processor installed at the tolling zone.

Intelligent Transportation System

An Intelligent Transportation System (ITS) would need to be deployed for the CTDOT tolling projects. The ITS is comprised of roadway components such as Closed Circuit TV (CCTV) to provide continuous corridor surveillance, Variable Message Signs (VMS) to display weather and roadway conditions, construction activities, and other traveler information. CTDOT should also consider the deployment of a Road Weather Information System (RWIS) to provide detailed weather related information. RWIS information is conveyed to travelers and those planning trips via the CTDOT website, and is also used by roadway maintenance crews for planning operations such as snow and ice removal. Information provided by all ITS devices and systems could be transmitted to a designated location which will effectively function as a mini-TMC.

Closed Circuit Television Systems

CCTV cameras will be located at each tolling zone site, and at any other locations deemed appropriate by CTDOT staff, to provide video coverage along both roadway corridors. The CCTVs allow the CTDOT staff to closely monitor both toll facilities. CCTV subsystems will also support independent system audits conducted by CTDOT. As a minimum, CCTV cameras would be installed in order to see what messages are being displayed on the VMSs and situated to allow CTDOT operations and security staff to see what is happening at each of the tolling zone sites.

Variable Message Signs

VMSs are optional and can be located upstream of each of the toll zones or and location deemed appropriate by CTDOT staff. VMSs will be full matrix signs capable of displaying three or more lines of text. Each line will be capable of displaying at least 15 alpha numeric characters with variable font and a height up to 18 inches. These signs will be NTCIP compliant and use IP for remote communications. These message signs could display tolling information, weather messages, amber alerts, traffic and construction related information that is important for the motorists traveling on these two facilities. Each VMS will include a controller installed in an environmentally controlled roadside cabinet that provides a user interface for local or remote control. The VMSs will be capable of storing a minimum of 50 messages.

Road Weather Information System

RWIS stations include in-pavement sensors and meteorological devices that would be located along the two corridors at various pre-defined locations. The contractor will coordinate with CTDOT and Public Facilities to ensure that the RWIS data is appropriately shared and is part of the existing CTDOT RWIS network. The contractor will furnish and install the RWIS workstations and will make arrangements with CTDOT to have all of the required data available to CTDOT staff.

CTDOT Traffic Management Center

The CTDOT TMC can be located at CTDOT's administration building, or any other location determined by staff, and would consist of multiple workstations and one or more large (52 inches or more) LCD monitors. The workstations, as well as the wall-mounted monitors, will display images from the CCTV cameras and include full Pan Tilt Zoom (PTZ) functionality. In addition to the CCTV images of the toll facility corridors, VMS messages and RWIS information will also be available on TMC workstations and monitors. CTDOT staff will have full control over the VMS library and will be able to post any traffic and weather related information on the signs.

All ITS related information as well as selected TCS reports will be available to CTDOT staff via a Real Time Monitor (RTM) interface. RTM functionality will be accessible from each workstation located at CTDOT's office and by anyone that has on-line access to this information. CTDOT staff could use the toll and traffic information to conduct any independent audit reviews of the TCS. One of the workstations will support system administration functionality for the archive server and storage network, which will be restricted to pre-determined employees. All of the TMC workstations will also be able to access the TCS MOMS.

Back Office & Customer Service Center Operations

This section outlines and describes the basic functionality of the AETS back office and CSC operations.

Customer Service Center

Although sometimes these terms are used interchangeably, the CSC storefront and CSC back office do have distinct differences. To help clarify, the CSC storefront center is a walk-in facility that is typically located close to the toll facilities and is highly visible to the public and allows existing and prospective new customers to visit the center and speak with a CSR regarding the ETC and video tolling programs that are offered. The CSC back office is the facility where ETC and video tolling account management

activities and the data processing occurs. A website and Interactive Voice Response (IVR) system are considered elements of the back office operation and primarily involve servers that have a protected interface to the CSC and AMS servers that process transactions, build the transponder status files and maintain a transponder inventory management system.

Conversely, the CPS back office is the facility that houses the TCS Host hardware and software, the MOMS, the video image processing, VPC, DMV interface, and other components of the TCS. Some toll agencies divide these subsystems in a variety of ways specific to their particular needs. In CTDOT's case it is envisioned that both the central processing and AMS functions would be outsourced and operated by a third party service provider.

CSC Storefronts

The AETS concept allows for the location of the central processing back office and CSC/AMS subsystem to reside virtually anywhere. There are, however, several key factors that should be considered while trying to determine the location of the CSC storefronts, including:

- User convenience for walk-in storefront centers;
- Accessibility, including parking, walking distance, elevators, etc.;
- Access to the communications network; and
- Leasing costs, utilities, etc.

The CSC is often located in a storefront type environment which provides for high visibility to the public and ease of access. Provisions will be made to evaluate the performance of the program after the first few years of operation to ensure that the back office processing and CSC locations are meeting the CTDOT system and operational requirements.

CSC Hours of Operation

The CTDOT CSC storefront operations will maintain regular business hours, typically 8 a.m. to 5 p.m. Monday through Friday. As of this writing, it is presumed that the video tolling image review operations will also be performed during normal business hours. The account management and information website and IVR system will always be available on a 24-7 basis.

CSC Front Desk

The CSC storefront desk allows customers to ask program related questions and conduct a full complement of account transactions. Customers will be able to make payments, open an ETC account (and register one or more vehicles), close accounts, update other account information, etc. A drop-box will also be available for walk-in customers to make payments and drop off applications with initial deposits if they choose to not wait for personal assistance. The CSC front desk will be staffed during regular business hours.

The Call Center Service

The CTDOT CSC call center service is expected to be operated by a selected third party service provider. The telephone system will process incoming customer calls. It includes an automated IVR system that routes calls via pre-determined menu selections in several languages. The system enables customers to review their ETC account balances, payments and toll usage at any time, 24 hours a day, 7 days a week. The system also provides messages containing general information. During hours of operation, callers have the option to transfer to a CSR if they wish to talk to someone.

The CSRs will be trained in efficient account management, problem solving and customer relationship management. All customer calls pertaining to the program will be fielded by service provider CSC staff. All program questions and any operations related questions will be answered by the CSRs and all discussions will be recorded so CTDOT is able to determine whether or not customers are receiving the best possible customer assistance.

Interactive Voice Response System

The CSC telephone system will have an IVR module that will be connected to the Host database for users account information access. Access via IVR will be restricted to read only access to ensure data integrity. The IVR module will provide the customer with different options on a 24/7 basis, even when the CSC is closed, including:

- Receive information on the CSC location and opening hours;
- Obtain customer account status and balance information;
- Input or modify vehicle information, including license plate data; and
- Enter credit/debit card and ACH payment information.

Account Replenishment

Accounts may be established to be replenished either automatically via credit card, debit card or manually by cash, check, or one-time credit or debit card. Cash and check options will only be available at the store front CSCs. The replenishment amount will depend on the business rules that are approved by CTDOT.

Automatic replenishment is performed as soon as the account balance drops below the specified pre-determined threshold. The software will continually monitor usage of the accounts and notify the customer of a change in the replenishment amount. Within the first 6-8 weeks of operation the replenishment amount will adjust automatically depending on that customer's usage level. In case of any subsequent change in the replenishment amount, the patron will need to acknowledge the new replenishment amount and agree to the new charges that will be imposed on the credit card associated with their account.

Account Monitoring

The CSC will provide the ability to monitor and identify unusual and undesirable activity (i.e. negative balance or frequent replenishments). System processes will include the ability to generate notices, assess penalty fees, offer incentive programs and other remedial actions. The most frequent situations are expected to be:

- Investigate negative and inactive accounts with the intent to collect and close;
- Investigate unpaid video violations and escalation rules;
- Establish a process for converting a negative customer account into an accounts receivable for collection purposes and write-off, as needed; and
- Proposing customized account types or plans to the customer.

Account Modifications/Updates

The customer will have real-time access to their account for updates and modifications either through the CTDOT website, the IVR or the call center with a CSR. The following information, at a minimum, will be available:

- Profile information (including personal and billing addresses, phone numbers, e-mail, preferred contact method and time, etc.);
- Account type and plan (limited to CSR);
- Payment method modifications (switch to automatic replenishment, credit card update, etc.);
- Replenishment amount and threshold within set business rules;
- Vehicle information (including make, model, color, year, license plate);
- Customer password modification or reminder; and
- Any other comment about the account (complaint, etc.).

All changes to account attributes are logged to the CSC database. The history of changes is available for viewing via online screens.

Access to Customer Data and History

CSC staff will have on-line access to all relevant customer information, including account number, address, payment details and most recent transactions. Additionally, they can access the customer history and perform searches either in the transactions or the notes history, using different criteria including date period or type of event, or they can perform a text search on selected customer account attributes or information types.

Customer Statements

The CSC will generate standard customer statements on a monthly or quarterly basis for mailing to Program customers who request a mailed or emailed statement. These statements are produced as electronic files that can be submitted to an external statement printing and distribution facility or printed and mailed locally. Statements can also be generated electronically in Hypertext Markup Language (HTML), Portable Document Format (PDF) or Word format by a CTDOT CSR who can then e-mail the statement to the customer upon request.

Upon request, CSC staff can view the actual statement that was sent to the customer. This is an important feature in cases where the customer is seeking an explanation regarding certain fees or disputing specific transactions.

Customer Notices

The CSC will have the capability to automatically manage customer notices. The customer notices will depend on the business rules but the usual customer notices would include at least the following:

- Change in replenishment method;
- Change in replenishment amount and threshold;
- Denial of replenishment due to non-sufficient funds for a check or expired credit card;
- Credit card declined (a card on account no longer valid);
- Replenishment required (for initial operations when replenishment threshold may change);
- Negative account balance warning;
- Account suspension or revocation;
- Account closure; and
- Toll violations for unpaid due tolls.

Unregistered video toll grace period and violation notices rules are as follows:

- Unregistered Video Tolling Notice - not yet a violation and is sent 48 hours after traversing through the tolling gantry. Gives ten days to pay due toll plus administrative fees, and gives an option to sign up for ETC program which would then then waive the administrative fees;

- First Violation Notice - payment needs to me made within 30 days after Unregistered Video Tolling Notice date plus processing fee; and

- Second Violation Notice - payment needs to be made within 30 days subsequent to receipt of the 1st notice (76 days since the date of the Unregistered Video Tolling Notice including two days between each notice) plus processing fees.

Website Access

A CTDOT hosted website will provide general information about the project for general public access, including:

- Description of the project and how it operates;
- Contact information;
- Maps, location and operating hours of the CSC;
- Current toll rates and vehicle classifications;
- Links to traffic condition and live web cams;
- Frequently Asked Questions (FAQs);
- General announcements; and
- A web link to the CTDOT home page
- Link to other relevant organization websites.

The CTDOT CSC website will provide potential and existing customers with online capabilities for the following:

- Application for new account;
- On-line account application;
- Opening balance payment;
- Inquiry and complaint entries;
- Account closing requests;
- Review of current and previous statements;
- Account balance, recent activity, and transaction history;
- Unregistered Video Toll and Violation Transactions payment;
- Transponder purchases;
- Account replenishment via credit or debit card (used without PIN);
- Customer information modification (address, telephone number, change of payment method, change account type, etc.);
- Credit card information modification (change of credit card details, etc.); and
- Vehicle information modifications (add or remove vehicle and associated license plate from the account, etc.).

Access to all account management functions will require a secure log in, using the user's account number and confidential password (or PIN). Access to this section of the website will require a secure connection to protect and encrypt data transmissions to and from the user's browser.

Payment Processing

The CTDOT CSC payment processing will include:

- Account opening pre-paid tolls;
- Account pre-paid toll replenishments;
  - Automatic payment replenishment with credit/debit card.
  - One-time cash, check (CSC only), credit card or debit card.
    - Monthly account maintenance fee (optional);
    - Account payments including notices;
    - Unregistered Video Toll and Violations payments;
    - Other specific fees (as detailed in the business rules); and
    - Account credits/debits.
  - Adjustments;
  - Refunds;
  - Non-Sufficient Funds (NSF); and
  - Write-off.

Credit Card Payments

The CSC will manage the processing of credit card payments for account openings and replenishment (one-time or automatic) on a near real-time basis using a credit card clearinghouse. Reports are available for reconciliation of credit card activity from the CSC as well as from the credit card clearinghouse. These reports are then reconciled with reports from the receiving bank. The reports are monitored for unusual activity such as excessive charges, credits or credit card discrepancies. Customers with pending expiration of credit cards are notified in the month prior to the expiration month.

Account Management System Reporting

Reports will be created based on priority and importance. A suite of system use reports will be made available to CTDOT staff by setting up administrative level access to the accounts database. Each report will be based on the retrieval of information from the Host database (or backup database). The following major grouping of reports will be available:

- Account Management;
- System Audit;
- Revenue Management and Finance/Reconciliation;
- System Traffic;
- System Revenue;
- System Administration; and
- System Maintenance.

Accounting Controls and Processes

The CSC will have audit capability and will generate an audit trail for every transaction either created by or received into the system. The software provides monitoring and diagnostics capability. Every back office and CSC process will produce progress statistics that are logged to the database, log files

and/or the system event log. Alarms are triggered when processes do not complete as expected. These alarms can be configured as e-mail or pager notifications to responsible operations staff.

Revenue is tracked by payment method, including cash, check, credit card and debit card in accordance with the business rules. The payment methods apply to the following types (and sub-categories within these types):

- Web site payments;
- IVR payments;
- Drop box payments (optional);
- Storefront payments received by mail, phone-in or at the walk-in remote CSC; and
- Payments from a collection agency (depending on the CTDOT business rules).

CSC System Access

Access to the CSC system is controlled via integrated access control mechanisms implemented through the application software using security groups. (All users belonging to a security group will inherit the access privilege of that group). Each log-in ID is associated with a security group that has pre-specified and limited access to application components (read/write, access to certain data, etc.).

Additionally, user passwords are encrypted using a real-time encryption scheme. If a user forgets their password, the System Administrator can only reset the password to some new value. The system requires passwords to be changed periodically. Access to certain critical system functions may require more than one password and user ID or more complex security measures. All CTDOT workstations will have access to CSR reports via the RTM for audit purposes.

Costing Approach

The purpose of this section is to describe the estimated tolling system related capital, toll system maintenance and toll system operations costs for the proposed CTDOT I-95 and Route 15 all electronic toll system (AETS) facilities. AETS requires all facility users to join the electronic toll collection (ETC) program (E-ZPass), receive an on-board device (referred to as a transponder) and pay their tolls electronically. There will be no cash paying option at the roadside. However, for those that chose not to join the program, their tolls will be collected through a video tolling system, that will include roadside cameras that will capture the license plate data from vehicles that traverse the tolling zones. The estimated costs are based on toll industry knowledge of AET systems that have been deployed by toll agencies elsewhere in the U.S. and abroad. All estimated costs are in U.S. dollars and are assumed to be in 2014 dollars.

The following sections describe the cost estimates for the capital and maintenance and operations (M&O) costs under the following tolling Alternatives:

- Alternative 1 – No Build Tolling I-95 ($0.50 Peak/$0.35 Off Peak);
- Alternative 2 – No Build Tolling I-95 ($0.80 Peak/$0.56 Off Peak);
- Alternative 3 – No Build Tolling I-95 and Route 15 ($0.50 Peak/$$0.35 Off Peak);
- Alternative 4 – Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak); and
- Alternative 5 – Widen I-95 and toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak).

The M&O cost estimates have been developed for two possible operational approaches:

- Outsourcing the back office operations, which would include the ETC account management, Customer Service Center (CSC) and Violations Processing Center (VPC) where a vendor operates the back office operation on behalf of CTDOT; and
- Self-operating the full back office operation where CTDOT sets up an organization whose personnel will operate the system.

Under both approaches the back office platform, including all required hardware and software, would be provided in conjunction with the provided services. The self-operating back office approach typically requires reduced costs especially when the annual traffic is very high. The outsourced back office operation typically allows for quicker ramp-up, but often includes a higher profit margin thus driving up the cost when compared to the self-operating model. The increased operations costs are often seen as acceptable to the toll agency since they would not then need to incur other operations related costs associated with hiring staff, overseeing that staff, paying for overhead costs such as paid sick leave, vacations, employee taxes, etc. Many toll agencies choose to implement the outsourced option in the beginning and switch over to a self-operating approach once they fully understand all of the back office operating requirements.

The following assumptions have been made during the cost estimation process:

- Cost estimates are at 2014 dollars;
- AETS costs include all equipment, hardware and software related to the collection and reporting of toll revenue;
- Civil costs for toll gantries and CCTV poles are also included;
- A single gantry approach was assumed at each tolling zone site;
- Tolling zone gantries will cover both directions of travel;
- Vehicle front and rear image capture would be deployed at each tolling zone site;
- Roadway shoulders at each tolling zone site will be covered with toll equipment;
- Spare equipment costs are assumed to be 15% for each total number of equipment/devices;
- ETC transponders have not been included in the cost estimate;
- Communications network costs have not been included in the cost estimate;
- A traffic management center (TMC) is not included in the cost estimate;
- Annual traffic numbers were used to estimate the M&O costs and these numbers were developed by CDM Smith during the traffic and revenue study;
- CTDOT management and oversight staff will be required to support the outsourced back office operations approach;
- Operating related fees associated with violation processing will be assessed and are assumed to be revenue neutral;
- Fees associated with mailings related to video tolling invoicing are not included; and
- Fees associated with credit card and automated clearing house (ACH) transactions are not included.

Toll Capital Costs

The estimated toll capital costs presented herein includes the actual hardware and software as well as all of the costs associated with a state-of-the-art AETS design, development, integration, testing and implementation for CTDOT that will allow the collection of toll revenue from motorists at highway speeds. The vehicles will not need to slow down or stop to pay a toll. This is accomplished through the use of a combination of windshield mounted transponders, high-speed vehicle license plate capture via cameras that will be deployed at each tolling zone and the use of a robust automatic vehicle classification (AVC) system.

Toll Zone Equipment

The toll zone equipment is used to detect vehicles and capture vehicle information at the roadside level and create transactions that are used to charge patrons a toll for the use of the AETS facility. The toll zone costs estimated for each option assumes 2 to 4 travel lanes in each direction at multiple tolling points with fully equipped shoulders in each direction of travel. Some costs savings might be realized by not installing toll equipment to cover the shoulders, but this will depend on which toll systems integrator (TSI) is awarded the project. The tolling zone, which will include tolling gantries from which the roadside toll equipment will be mounted, assumes front and rear license plate image capture cameras that will be mounted on the toll gantries in each direction of travel. Toll equipment that is installed at the roadside will capture the transponder ID (via ETC antennas and readers), the vehicle class, by AVC equipment, and the vehicle license plate image capture. The tolling zone equipment that is required to ensure a fully operational AETS includes the tolling zone controllers, AVC equipment in each toll lane, uninterruptable power supply (UPS) and generators to ensure uninterrupted power to the roadside equipment, and other associated components like illumination devices and vehicle separation overhead scanners. Toll zone and Host equipment costs are estimated below for each of the five Alternatives.

Back Office Toll Equipment

The back office equipment presented herein is used to process the transaction data that is generated by the tolling zone controllers and sent to the Host and then to the back office computer system via the communications network. The transaction records will be used to identify the patron's ETC account number and the Host system will deduct from their account the amount of the toll rate that was being assessed when they traversed the tolling zone(s). The back office equipment will include computer servers, workstations and other support equipment. The closed circuit TV (CCTV) subsystem will be comprised of video cameras that will be installed at a location that will allow CTDOT staff to monitor the tolling zone sites for incident management and security purposes. Back office capital costs also include the CCTV monitoring workstations, communications system interface equipment, printers, a UPS, furniture, etc. Back office equipment related costs are estimated below for each of the five options.

Toll System Software

The toll system software licenses that are required for the AETS include the back office and roadside locations. The required software includes for the tolling zone controllers, the local area network (LAN) system, the video surveillance system (CCTV subsystem), the VPC, toll system reports, and the ETC account management and CSC system. The license costs include the design and development of each of these subsystems that will be provided by the TSI and the back office platform provider(s). The total estimated cost of all required AETS software is estimated below for each tolling Alternative.

Alternative 1 – No Build Toll I-95 ($0.50 Peak/$0.35 Off Peak)

Table 7-1 below shows the summary for the estimated capital cost for Alternative 1. The estimated actual toll equipment and infrastructure cost is $19,072,500, the system development cost is $10,576,400 and the total electronic toll system (ETS) estimated capital cost is $29,648,900. With a 20% contingency the total estimated cost would be $35,578,700.

Table 7-1 – Alternative 1 – No Build Toll I-95 ($0.50 Peak/$0.35 Off Peak) Estimated Capital Costs

Electronic Toll System Capital Costs (2014$)	
Toll Equipment/Infrastructure	**Estimated Cost (2014$)**
Roadside Equipment	$6,657,000
ETC Equipment	4,550,000
VES Equipment	1,560,000
Host Equipment	490,000
CCTV Equipment	204,000
Back Office Equipment	480,000
Spare Equipment	991,500
Toll Gantries (includes installation)	3,540,000
CCTV Poles (includes installation)	600,000
Subtotal:	**$19,072,500**
Toll System Development/Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty Period	381,400
Training	500,000
TSI Project Management	1,500,000
Toll Equipment Installation	2,310,000
Subtotal:	**$10,576,400**
Total Capital Cost	**$29,648,900**
20% Contingency	$5,929,800
Total Capital Cost with Contingency	**$35,578,700**

Alternative 2 – No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak)

Presented below as **Table 7-2** is the summary for the estimated capital cost for Alternative 2. The estimated actual toll equipment and infrastructure cost is $19,072,500, the system development cost is $10,576,400 and the total electronic toll system (ETS) estimated capital cost is $29,648,900. With a 20% contingency the total estimated cost would be $35,578,700. Note that Alternative 1 and 2 show the same tolling capital costs since the only difference between these options is the toll rate which does not impact the toll equipment, system development or deployment costs.

Table 7-2 – Alternative 2 – No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak) Estimated Capital Costs

Electronic Toll System Capital Costs (2014$)	
Toll Equipment/Infrastructure	**Estimated Cost (2014$)**
Roadside Equipment	$6,657,000
ETC Equipment	4,550,000
VES Equipment	1,560,000
Host Equipment	490,000
CCTV Equipment	204,000
Back Office Equipment	480,000
Spare Equipment	991,500
Toll Gantries (includes installation)	3,540,000
CCTV Poles (includes installation)	600,000
Subtotal:	**$19,072,500**
Toll System Development/Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty Period	381,400
Training	500,000
TSI Project Management	1,500,000
Toll Equipment Installation	2,310,000
Subtotal:	**$10,576,400**
Total Capital Cost	**$29,648,900**
20% Contingency	$5,929,800
Total Capital Cost with Contingency	**$35,578,700**

Alternative 3 – No Build Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak)

Table 7-3 shows the summary for the estimated capital cost for Alternative 3. The estimated actual toll equipment and roadside infrastructure cost is $29,410,500, the system development and deployment cost is $12,032,300 and the total electronic toll system (ETS) estimated capital cost is $41,442,800. With a 20% contingency the total estimated cost would be $49,731,400.

Table 7-3 – Alternative 3 – No Build Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak) Estimated Capital Costs

Electronic Toll System Capital Costs (2014$)	
Toll Equipment/Infrastructure	**Estimated Cost (2014$)**
Roadside Equipment	$10,991,500
ETC Equipment	6,825,000
VES Equipment	2,340,000
Host Equipment	490,000
CCTV Equipment	374,000
Back Office Equipment	480,000
Spare Equipment	1,540,000
Toll Gantries (includes installation)	5,270,000
CCTV Poles (includes installation)	1,100,000
Subtotal:	**$29,410,500**
Toll System Development/Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty Period	562,300
Training	500,000
TSI Project Management	1,500,000
Toll Equipment Installation	3,585,000
Subtotal:	**$12,032,300**
Total Capital Cost	**$41,442,800**
20% Contingency	$8,288,600
Total Capital Cost with Contingency	**$49,731,400**

Alternative 4 – Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak)

Table 7-4 shows the summary for the estimated capital cost for Alternative 4. The estimated actual toll equipment and infrastructure cost is $20,110,000, the system development cost is $10,576,400 and the total electronic toll system (ETS) estimated capital cost is $30,686,400. With a 20% contingency the total estimated cost would be $36,823,700.

Table 7-4 – Alternative 4 – Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak) Estimated Capital Costs

Electronic Toll System Capital Costs (2014$)	
Toll Equipment/Infrastructure	**Estimated Cost (2014$)**
Roadside Equipment	$7,189,500
ETC Equipment	4,725,000
VES Equipment	1,620,000
Host Equipment	490,000
CCTV Equipment	204,000
Back Office Equipment	480,000
Spare Equipment	991,500
Toll Gantries (includes installation)	3,810,000
CCTV Poles (includes installation)	600,000
Subtotal:	**$20,110,000**
Toll System Development/Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty Period	381,400
Training	500,000
TSI Project Management	1,500,000
Toll Equipment Installation	2,310,000
Subtotal:	**$10,576,400**
Total Capital Cost	**$30,686,400**
20% Contingency	$6,137,300
Total Capital Cost with Contingency	**$36,823,700**

Alternative 5 – Widen I-95 and Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak)

Table 7-5 shows the summary for the estimated capital cost for Alternative 5. The estimated actual toll equipment and infrastructure cost is $30,124,000, the system development cost is $12,118,000 and the total electronic toll system (ETS) estimated capital cost is $42,242,000. With a 20% contingency the total estimated cost would be $50,690,400.

Table 7-5 – Alternative 5 – Widen I-95 and Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak) Estimated Capital Costs

Electronic Toll System Capital Costs (2014$)	
Toll Equipment/Infrastructure	**Estimated Cost (2014$)**
Roadside Equipment	$11,200,000
ETC Equipment	7,000,000
VES Equipment	2,400,000
Host Equipment	490,000
CCTV Equipment	374,000
Back Office Equipment	480,000
Spare Equipment	1,540,000
Toll Gantries (includes installation)	5,540,000
CCTV Poles (includes installation)	1,100,000
Subtotal:	**$30,124,000**
Toll System Development/Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty Period	573,000
Training	500,000
TSI Project Management	1,500,000
Toll Equipment Installation	3,660,000
Subtotal:	**$12,118,000**
Total Capital Cost	**$42,242,000**
20% Contingency	$8,448,400
Total Capital Cost with Contingency	**$50,690,400**

Toll Maintenance & Operations Costs

The estimated toll maintenance and operations costs are presented herein for both a self-operated and outsourced back office, including the ETC account management, customer service center, and violation processing system. Under each scenario the maintenance of the AETS toll equipment, software and all subsystems is assumed to be conducted by the TSI, under a contract with CTDOT.

Back Office Self-Operated Approach

The self-operated back office operation presented herein includes a full CTDOT operations staff to support the AETS back office system. The cost per transaction is computed under the self-operated model and is a function of the cost of operations and total annual traffic forecasted for the CTDOT toll facilities. A 20% contingency is also included. All estimated labor costs are in 2015 dollars and costs associated with fees for credit cards, ACH, etc. are not included.

Back Office Outsourced Approach

The outsourced back office operation estimated costs are presented in sections below for each of the 5 tolling Alternatives. The outsourced approach includes a reduced number of CTDOT staff to support the AETS as the outsourcing contractor will provide their own employees under the outsourcing contract. The cost per transaction is broken down into the 3 transaction categories; transponder based (ETC), video based and violation based. The cost per transaction is based on an estimate of current toll system outsourcing operators. The actual costs may vary depending on the specific CTDOT outsourcing requirements and which operator is selected. A 20% contingency is included and all labor costs are in 2015 dollars. All costs associated with fees for credit cards, ACH, etc. are not included in the bellow cost estimates and may (or may not) be included in the outsourcing operators per transaction cost, which is subject to negotiations.

Future Operational Cost Estimates

Operational cost estimates from 2020 thru 2044 are presented in sections below for each of the 5 tolling Alternatives. The initial, opening year cost per transaction for the self-operated back office option is slightly higher due to the smaller number of annual transactions for the first few years of operation. During subsequent years the cost per transaction is reduced as the annual transactions (i.e. traffic) increases. The outsourced back office approach is just the opposite, whereby as the annual traffic increases the cost to CTDOT for outsourcing these services also increases. The annual mail house cost assumes 0.75 pieces of mail per video toll transaction. It is also assumed that the cost of the mail house is $0.75 per piece of mail. The mail house cost estimates from 2020 thru 2044 is presented below for each of the 5 tolling Alternatives.

Alternative 1 – No Build Tolling I-95 ($0.50 Peak/$0.35 Off Peak)

Table 7-6 below shows the estimated M&O costs for Alternative 1. The total estimated M&O outsourced back office cost is $19,407,900. Applying a 20% contingency increases the outsourced costs to $23,289,500. The self-operated estimated M&O costs is $8,916,700 and increases to $10,700,000 when adding a 20% contingency. The cost differential is primarily due to the increased transaction processing cost under the outsourced operational scenario.

Table 7-6 – Alternative 1 – No Build Tolling I-95 ($0.50 Peak/$0.35 Off Peak) Estimated M&O Costs

Outsourced Back Office	
	Estimated Cost (2014$)
Back Office Staff	$787,200
Toll Maintenance and Miscellaneous	2,342,000
Transaction Record Processing	16,278,700
Total Maintenance & Operating Costs:	**$19,407,900**
Total Cost with 20% Contingency	**$23,289,500**
Self Operated Back Office	
	Estimated Cost (2014$)
Back Office Staff	$2,859,200
Toll Maintenance and Miscellaneous	2,647,500
Transaction Record Processing	3,410,000
Total Maintenance & Operating Costs:	**$8,916,700**
Total Cost with 20% Contingency	**$10,700,000**

Alternative 2 – No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak)

Table 7-7 below shows a summary of the estimated M&O costs for Alternative 2. The total estimated M&O outsourced back office operational cost is $16,636,100. Adding a 20% contingency increases the costs to $19,963,300. The estimated M&O costs for a self-operated approach is $8,196,600 and increases to $9,835,900 when adding a 20% contingency. The cost difference is primarily due to the increased transaction processing cost which would include the contractor's profit margin to cover all of their staff resources under the outsourced approach.

Table 7-7 – Alternative 2 – No Build Toll I-95 ($0.80 Peak/$0.56 Off Peak) Estimated M&O Costs

Outsourced Back Office	
	Estimated Cost (2014$)
Back Office Staff	$787,200
Toll Maintenance and Miscellaneous	2,165,600
Transaction Record Processing	13,683,300
Total Maintenance & Operating Costs:	**$16,636,100**
Total Cost with 20% Contingency	**$19,963,300**
Self Operated Back Office	
	Estimated Cost (2014$)
Back Office Staff	$2,859,200
Toll Maintenance and Miscellaneous	2,471,100
Transaction Record Processing	2,866,300
Total Maintenance & Operating Costs:	**$8,196,600**
Total Cost with 20% Contingency	**$9,835,900**

Alternative 3 – No Build Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak)

Table 7-8 shows the summary of estimated M&O costs for Alternative 3. The total estimated M&O outsourced back office operational cost is $30,252,300. Applying a 20% contingency increases the costs to $36,302,800. The estimated M&O costs for a self-operated operational approach is $13,447,000 and increases to $16,136,400 when adding a 20% contingency. The cost difference is primarily due to the increased transaction processing cost which would include the vendor's profit margin to cover all of their staff resources under the outsourced operational scenario.

Table 7-8 – Alternative 3 – No Build Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak)
Estimated M&O Costs

Outsourced Back Office	
	Estimated Cost (2014$)
Back Office Staff	$1,113,600
Toll Maintenance and Miscellaneous	3,866,600
Transaction Record Processing	25,272,100
Total Maintenance & Operating Costs:	**$30,252,300**
Total Cost with 20% Contingency	**$36,302,800**
Self Operated Back Office	
	Estimated Cost (2014$)
Back Office Staff	$3,717,600
Toll Maintenance and Miscellaneous	4,435,600
Transaction Record Processing	5,293,800
Total Maintenance & Operating Cost:	**$13,447,000**
Total Cost with 20% Contingency	**$16,136,400**

Alternative 4 – Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak)

Table 7-9 below shows a summary of the estimated M&O costs for Alternative 4. The total estimated outsourced M&O back office operational cost is $19,824,000. Adding a 20% contingency increases the M&O costs to $23,788,800. The estimated M&O costs for a self-operated approach is $9,024,800 and increases to $10,829,800 when adding a 20% contingency. The cost difference is primarily due to the increased transaction processing cost under the outsourced approach.

Table 7-9 – Alternative 4 – Widen and Toll I-95 ($0.50 Peak/$0.35 Off Peak) Estimated M&O Cost

Outsourced Back Office	
	Estimated Costs (2014$)
Back Office Staff	$787,200
Toll Maintenance and Miscellaneous	2,368,500
Transaction Record Processing	16,668,300
Total Maintenance & Operating Costs:	**$19,824,000**
Total Cost with 20% Contingency	**$23,788,800**
Self Operated Back Office	
	Estimated Costs (2014$)
Back Office Staff	$2,859,200
Toll Maintenance and Miscellaneous	2,674,000
Transaction Record Processing	3,491,600
Total Maintenance & Operating Costs:	**$9,024,800**
Total Cost with 20% Contingency	**$10,829,800**

Alternative 5 – Widen I-95 and Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak)

Table 7-10 shows a summary of the estimated M&O costs for Alternative 5. The total estimated M&O outsourced back office operational cost is $30,448,100. Adding a 20% contingency increases the costs to $36,537,720. The estimated M&O costs for a self-operated approach is $13,497,900 and increases to $16,197,500 when adding a 20% contingency. The cost difference is primarily due to the increased transaction processing cost under the outsourced approach.

Table 7-10 – Alternative 5 – Widen I-95 and Toll I-95 and Route 15 ($0.50 Peak/$0.35 Off Peak) Estimated M&O Costs

Outsourced Back Office	
	Estimated Costs (2014$)
Back Office Staff	$1,113,600
Toll Maintenance and Miscellaneous	3,879,000
Transaction Record Processing	25,455,500
Total Maintenance & Operating Costs:	**$30,448,100**
Total Cost with 20% Contingency	**$36,537,700**
Self Operated Back Office	
	Estimated Costs (2014$)
Back Office Staff	$3,717,600
Toll Maintenance and Miscellaneous	4,448,000
Transaction Record Processing	5,332,300
Total Maintenance & Operating Costs:	**$13,497,900**
Total Cost with 20% Contingency	**$16,197,500**

Net Toll Revenue

Table 7-11 shows the average annual net toll revenue that could be expected for each tolling alternative. Tolling operations and maintenance costs, as well as tolling capital costs amortized over ten years are subtracted from the gross toll revenue estimates to produce the net annual toll revenue estimates. The last column shows the cumulative net toll revenue that could be produced over a 25-year period (2020 thru 2044). The net toll calculations were conducted for both the self and outsourced toll operations. Depending on the Alternative, cumulative net toll revenue over a 25-year period is estimated to range between $6.2 Billion to $9.2 Billon.

Table 7-11
Estimated Net Toll Revenue - 2014 Dollars

Self Operating Toll Operations and Maintenance

	25 Year Annual Average (2020 thru 2044)				25 Year Total
Alternative	**Gross Toll Revenue**	**O&M Cost**	**Cap Cost Amortized (1)**	**Net Toll Revenue (2)**	**Net Toll Revenue**
1	$274,760,000	$10,700,000	$3,557,870	$260,502,130	$6,512,553,000
2	$380,529,000	$9,835,900	$3,557,870	$367,135,230	$9,178,381,000
3	$382,426,000	$16,136,400	$4,973,140	$361,316,460	$9,032,912,000
4	$286,408,000	$10,829,800	$3,682,370	$271,895,830	$6,797,396,000
5	$387,764,000	$16,197,500	$5,069,040	$366,497,460	$9,162,437,000

Outsourced Toll Operations and Maintenance

	25 Year Annual Average (2020 thru 2044)				25 Year Total
Alternative	**Gross Toll Revenue**	**O&M Cost**	**Cap Cost Amortized (1)**	**Net Toll Revenue (2)**	**Net Toll Revenue**
1	$274,760,000	$23,289,500	$3,557,870	$247,912,630	$6,197,816,000
2	$380,529,000	$19,963,300	$3,557,870	$357,007,830	$8,925,196,000
3	$382,426,000	$36,302,800	$4,973,140	$341,150,060	$8,528,752,000
4	$286,408,000	$23,788,800	$3,682,370	$258,936,830	$6,473,421,000
5	$387,764,000	$36,537,700	$5,069,040	$346,157,260	$8,653,932,000

Notes:
(1) Tolling capital cost spread over a 10 year period.
(2) Net toll revenue = gross toll revenue minus O&M and capital cost amortized.

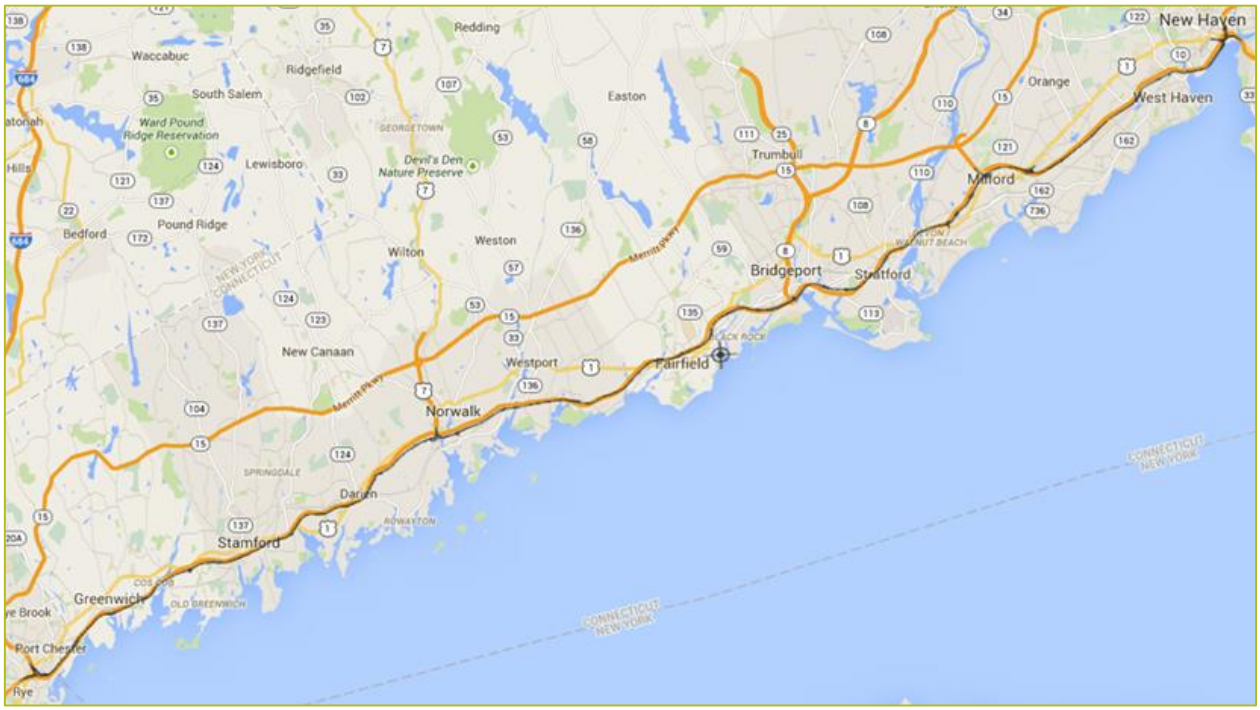
Chapter 8

I-95 Operations Analysis

CDM Smith appointed Cambridge Systematics to evaluate impacts of various potential geometric improvements and pricing strategies to relieve traffic congestion on the I-95 corridor. In order to assess the impacts of various alternatives, Cambridge Systematics developed a simulation model of I-95 at a microscopic level. This microscopic simulation model was developed using the Quadstone Paramics Microscopic Traffic Simulation Software (version 6.9.3).

The microsimulation model developed by Cambridge Systematics covered a 49-mile section of I-95 in Connecticut, from the I-91 & I-95 interchange in New Haven, Connecticut to the I-287 & I-95 interchange in Rye, New York. The microsimulation model includes the mainline roadway, all interchange ramps to and from I-95 along the corridor, and all connecting roadways where available data permitted them to be included in the model. **Figure 8-1** illustrates the extents of the microsimulation model, with simulated roadways shown in black.

Figure 8-1 Geographic Extents of the Microsimulation Model



Background Image Source: Google Maps

This chapter presents a summary of the work conducted by Cambridge Systematics in evaluating the various alternatives discussed with the study team, comprised of CDM Smith and the Connecticut Department of Transportation. Specifically, this chapter documents the development and calibration process utilized by Cambridge Systematics to represent existing/base year conditions model and the

validation of the base year model against the observed operational conditions. Further, the chapter provides a summary of simulation results of future year scenarios for the I-95 corridor under various physical improvements and/or pricing scenarios suggested by the study team. A copy of two separate reports, one for base year calibration and another for future year scenarios, have been attached as **Appendix C** with this report.

Base Year Model Development and Calibration

Subarea Demand Model Development

In order to provide a basis for developing the microsimulation model, a subarea demand model was developed as an intermediate step. This subarea demand model was developed to refine the demand estimates for travel along I-95 corridor as forecasted by the regional demand model to better align with the traffic counts and enhance those demands as needed for the microsimulation model analyses.

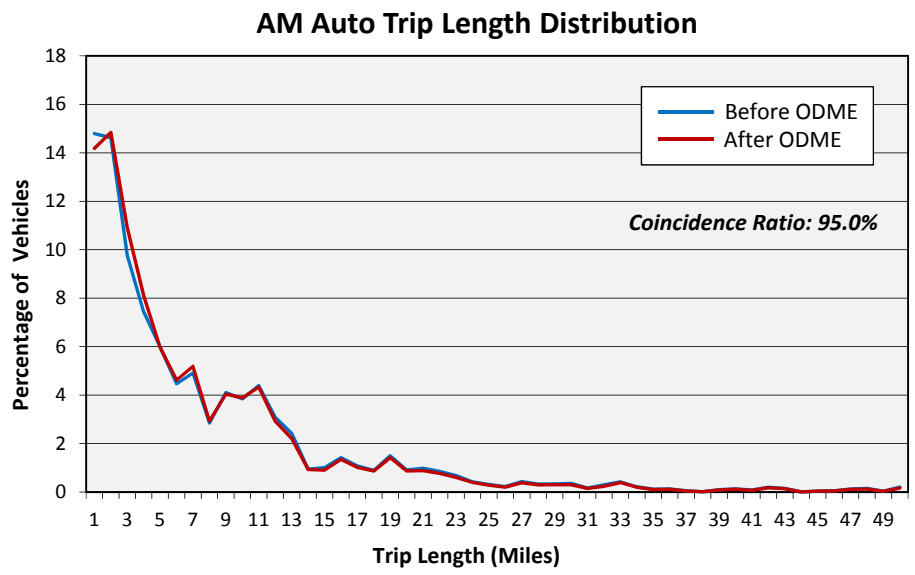
As a first step to create the subarea model, an extraction of the study area roadway network from the demand model covering the microsimulation study corridor was completed. Traffic zones within the subarea network were split to allow better distribution and representation of traffic flows on the ramps. Several link parameters, including free flow speeds and capacities, were adjusted as needed throughout the subarea model to better match the inferred and logical route choice patterns, the observed count data, and the observed congestion levels in existing conditions.

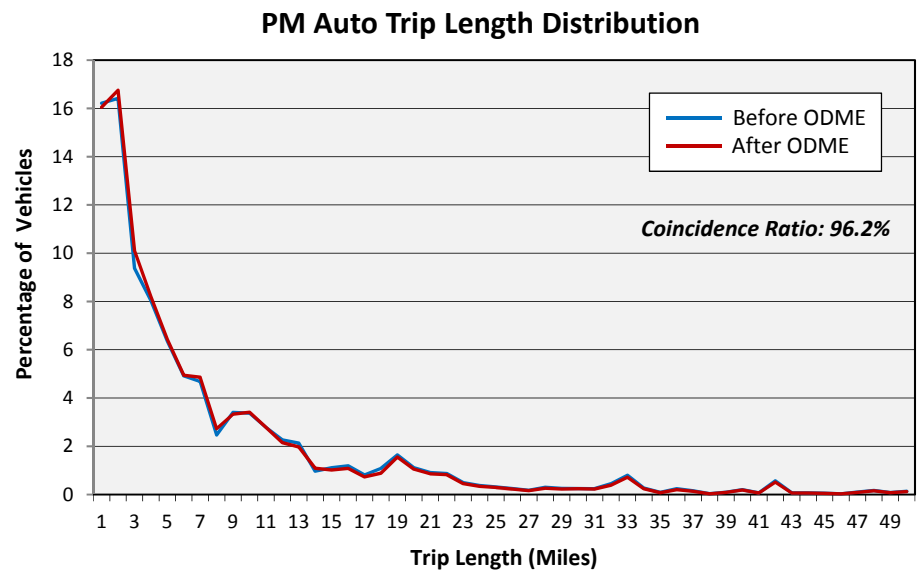
Following the completion of the subarea demand model network, the base year travel demands for each origin-destination pair, to be used in the microsimulation model, were developed. The key inputs to the development of these demands include the observed traffic count data and the overall travel patterns of traffic using the I-95 corridor. Using these inputs for the I-95 corridor, an iterative multi-class (autos & trucks) origin-destination matrix estimation procedure was undertaken to refine the existing year peak period demands and to better match the observed traffic counts.

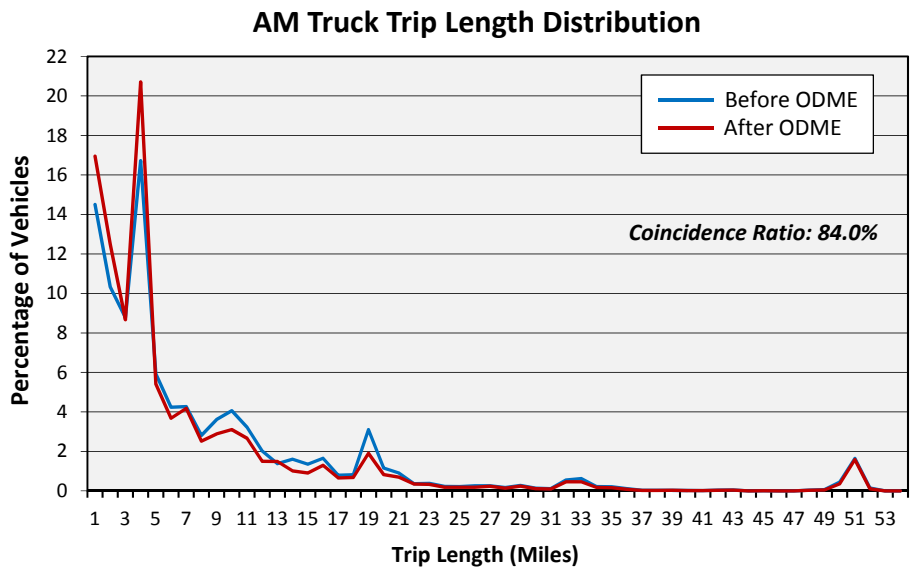
Table 8-1 represents the results of the calibration process conducted, by Cambridge Systematics, in terms of the GEH statistic[1] comparing the highway assignment link volumes against the total peak period volume balanced flow counts. As noted, the number of count locations satisfying the GEH statistic validation criteria greatly surpassed the threshold level during the origin-destination matrix estimation process (ODME).

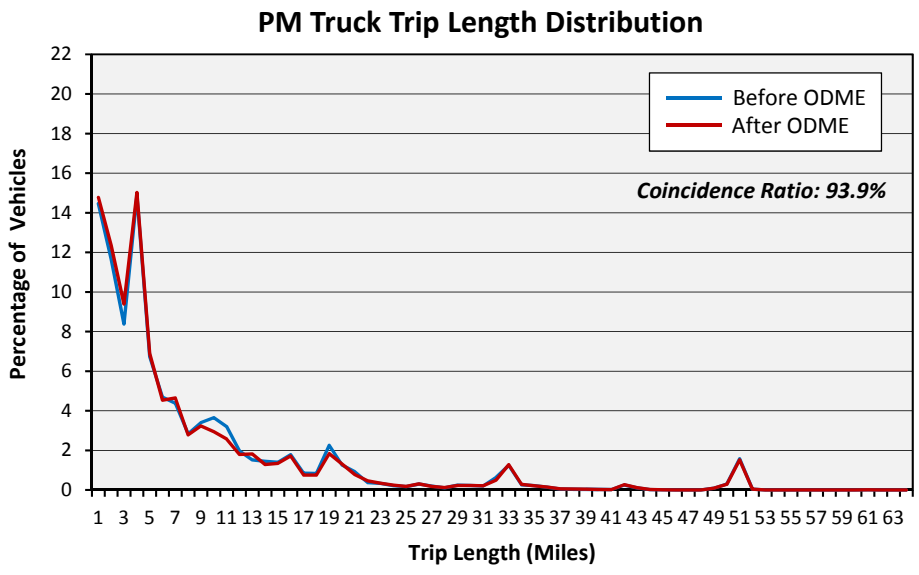
Another metric that was used for validating the calibration process was the change in the trip length distribution before-and-after the ODME procedure. **Figure 8-2** represents the before-and-after line graphs for the trip length distribution, by vehicle class and time of day. Results indicated a high level of coincidence and limited change in the overall travel patterns.

[1] The established criteria was to have a GEH value of 5.0 or less for at least 85% of the count links used in the ODME process. The GEH statistic, named such after the creator Geoffrey E. Havers, is a volume scaled error estimation statistic commonly used in traffic simulation.









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TRIP LENGTH DISTRIBUTION VALIDATION RESULTS

FIGURE 8-2

Table 8-1 Traffic Volume Validation Results

Time Period	Number of Counts	Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	Validation Criteria Threshold and Result
AM Peak	279	GEH <= 1	265	95.0%	N/A
	279	GEH <= 3	276	98.9%	N/A
	279	GEH <= 5	279	100.0%	> 85% (met)
	279	GEH <= 7	279	100.0%	N/A
PM Peak	279	GEH <= 1	265	95.0%	N/A
	279	GEH <= 3	275	98.6%	N/A
	279	GEH <= 5	279	100.0%	> 85% (met)
	279	GEH <= 7	279	100.0%	N/A

Base Year Microsimulation Model Development

A microscopic traffic simulation tool requires the transportation network to be more detailed than the regional or subarea demand models. As a result, Cambridge Systematics prepared a network from scratch in the Paramics Microscopic Traffic Simulation Software. The simulation network was developed to match the existing conditions (2012) in terms of the number of lanes and geometric details, signal infrastructure, and stop and yield control signage. The Paramics microsimulation network was coded based on 2012 ortho-images obtained from various sources. Further details were added to the network, such as adding the traffic control plans at signalized intersections to match the timing and phasing control plans for morning and evening peak hours. In order to represent vehicle population mix and their typical performance characteristics, passenger cars/autos and trucks were further disaggregated into multiple vehicle classes. Autos were split into passenger cars, SUVs, pickup trucks, and buses. Trucks were further split into single unit trucks, single-trailer trucks, and multi-trailer trucks. The final adjusted AM and PM peak period demand trip tables, obtained from the origin-destination matrix estimation procedure, were split into 15-minute intervals for assignment in the simulation model. As part of the calibration and validation process performed for the microsimulation model, the initial subarea network and demand tables, produced using the process explained above, underwent an iterative set of alterations and refinements to better match observed real world conditions.

The calibration results were validated for three performance measures: volumes, average congested speeds, and queues. Each of these measures were calibrated against the observed parameters to various degrees in the microsimulation model. Simulated volumes were validated against observed counts to ensure the model adequately matched both the demand for travel in the corridor and the throughput from bottleneck locations. Again, the GEH statistic was used to measure the differences between simulated flows and observed counts and is calculated for every individual link count in the study area. Simulated congested speeds were validated against available INRIX traffic data from 2012 for the I-95 mainline roadway segments. INRIX provides historical and real-time travel speed information collected through GPS-based devices such as mobile phones and other GPS equipped vehicles. Data collected from aerial photographs were used to qualitatively assess if the simulated and observed slow speeds and queuing in the congested locations matched well against each other.

Figure 8-3 presents the percent of locations satisfying the GEH statistics criteria (at least 85 percent of links having a GEH value lesser than or equal to five) for morning and evening average hourly flows.

The validation metric has been presented for a total of 201 balanced flow ramp counts and mainline observed count locations. As presented, the validation target was met for the all but two hours (8-9 AM and 6-7 PM). For these two hours, the 85 percent criteria was met for a value of six or less which indicated that the simulated volumes still validate well against the observed volumes.

Figure 8-3 Microsimulation Volume Validation Results

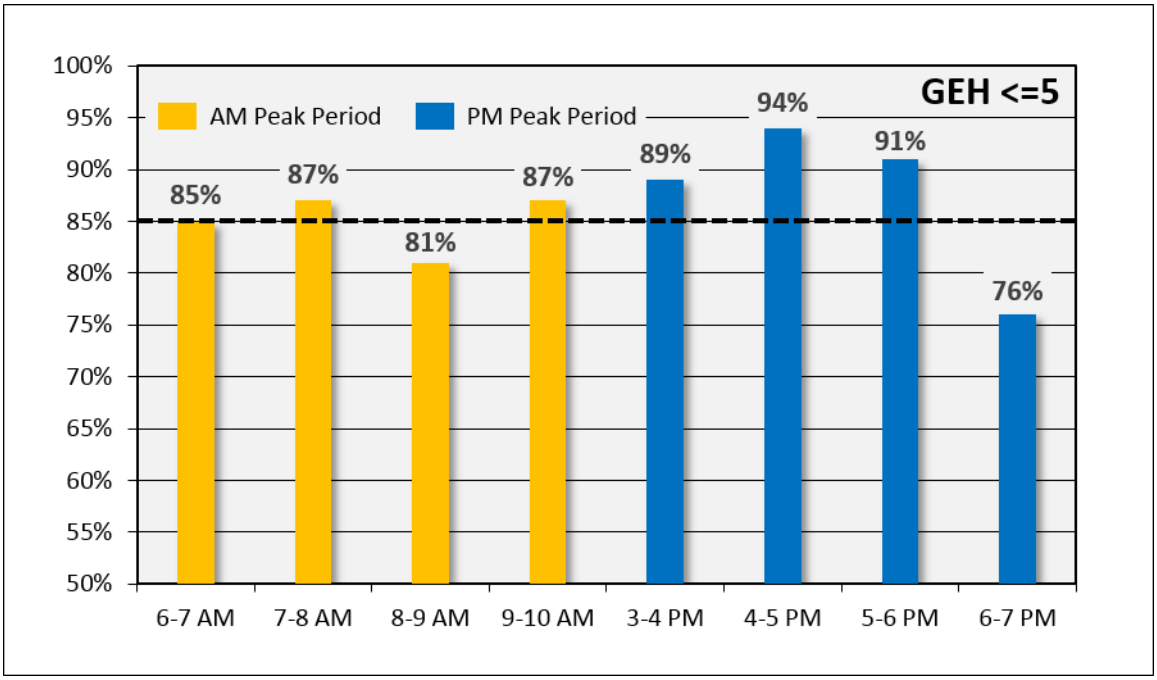


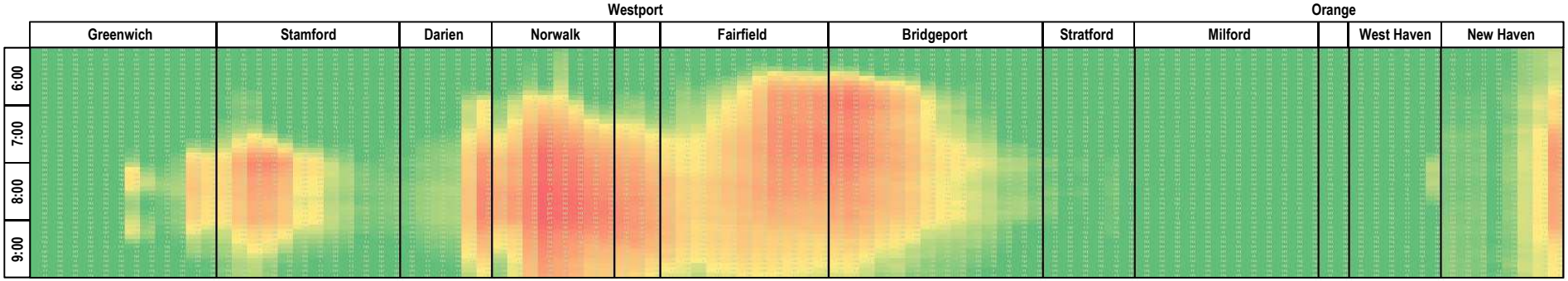
Figure 8-4 and Figure 8-5 present the results of the speeds from the microsimulation model that were qualitatively validated against the 2012 speed data, collected by INRIX. Each of the figures present two time-space congested speed heat maps, for AM and PM peak directions respectively, with INRIX congested speeds on the top and simulated condition speed heat map at the bottom.

Figure 8-4 presents the results of speed comparison for the AM peak period that occurs in the southbound direction of travel. Overall, the congestion patterns and spots where the slow speeds occur are pretty similar in the two heat maps shown. More specifically, the bottlenecks occur near downtown Stamford (Exits 6-9), Norwalk, and Fairfield and Bridgeport due to closely spaced interchanges coupled with high demand.

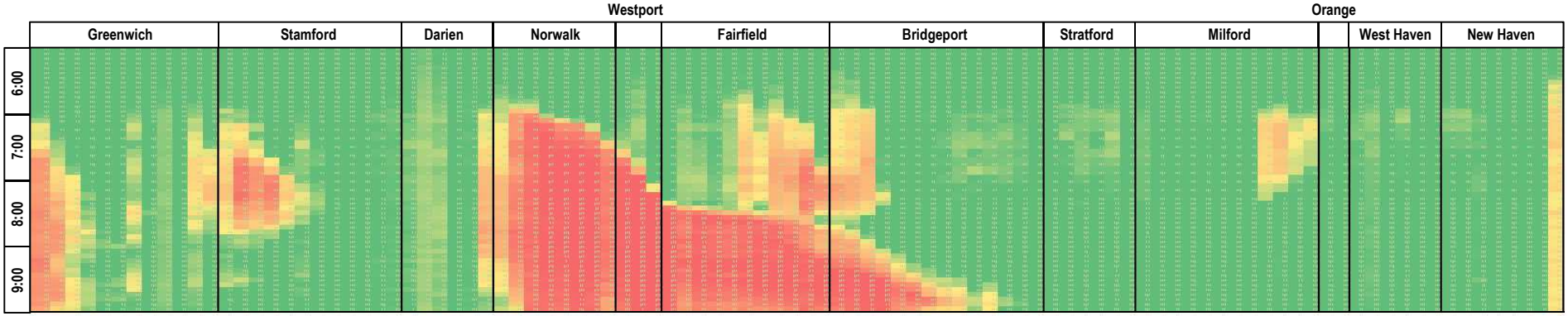
Figure 8-5 presents the results of PM peak period where the northbound direction is the peak direction of demand and sees extensive congestion and numerous bottlenecks. The congestion is a result of many bottlenecks which overlap to create miles of severe congestion with bumper to bumper traffic for long stretches of I-95, particularly from Stamford to Bridgeport.

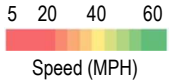
From the comparisons shown in the two figures mentioned above, the microsimulation model generally replicates the bottlenecks observed on I-95 in terms of location, duration and severity.

Observed INRIX - Base Year



Modeled - Base Year

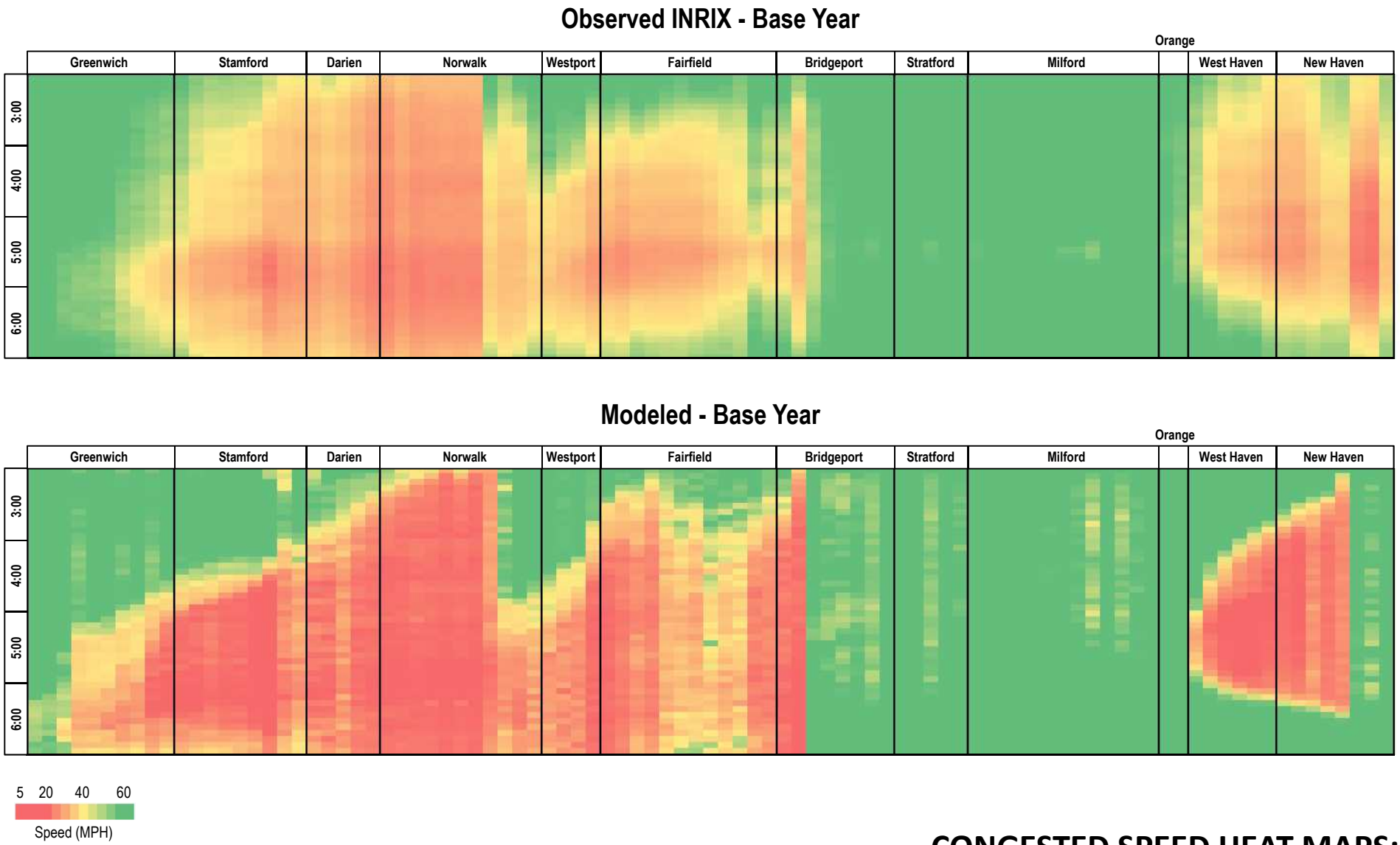




CONGESTED SPEED HEAT MAPS: I-95 SOUTHBOUND - AM PEAK PERIOD

CDM Smith

FIGURE 8-4



CONGESTED SPEED HEAT MAPS: I-95 NORTHBOUND - PM PEAK PERIOD

CDM Smith

FIGURE 8-5

Future Year Operations Analysis

After the development of 2012 base year calibrated microsimulation model for I-95, as described in the previous section of this chapter; several 2040 future year scenario models were created and simulated, upon discussion with the CDM Smith study team. The intent of developing these various scenarios was to analyze the operational impacts of the different combinations of conceptual design improvements for I-95 and for different tolling scenarios. This section presents the simulation of future year scenarios for the I-95 corridor under various physical improvements and/or tolling scenarios.

Scenarios Analyzed

The various physical improvements that were considered include addition of auxiliary lanes in key locations and/or the addition of full travel lanes throughout all or parts of the I-95 corridor. Tolling scenarios considered the introduction of tolls on I-95 alone, and the introduction of tolls on both I-95 and the Merritt Parkway (CT-15). The scenarios that were analyzed in microsimulation model for this study are presented in **Table 8-2**.

Table 8-2 Analyzed Future Year Scenarios

Number	Scenario Name	Physical Improvements	Tolling Strategy
1	2040 No Build	Existing committed improvements only	No Tolling
2	2040 Widened New York to New Haven – Toll Free	Add one travel lane per direction throughout corridor, additional hotspot improvements	No Tolling
3	2040 No Build with I-95 Toll	Existing committed improvements only	Toll I-95 only
4	2040 Widened Bridgeport to Stamford without Tolls	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	No Tolling
5	2040 Widened Bridgeport to Stamford with I-95 Toll	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	Toll I-95 only
6	2040 Widened Bridgeport to Stamford with I-95 & CT-15 Tolls	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	Toll I-95 & CT-15

Modeling Inputs

The travel demand model refined specifically for this study served as a key input for providing a cumulative assessment of impacts of the growth in traffic to 2040 conditions, the capacity increases of physical improvements made, the driver decisions regarding the time of travel and in route choices in response to the tolling strategies. As for reporting the operational performance of each scenario analyzed in the 2040 microsimulation model, several performance metrics are presented which capture the simulated operational conditions of the I-95 corridor. These metrics presented both the details of the corridor (speed contour diagrams) and aggregate measures of operational performance of the I-95 corridor. The aggregate metrics include the total vehicle miles traveled, total vehicle hours traveled, and average speed for each hour by travel direction of I-95 for all reported scenarios.

In order to prepare the transportation networks for the microsimulation model, projects were first identified for the 2040 No Build network. Through a review of the state Transportation Improvement Plans and consultation with Connecticut Department of Transportation officials, the following committed projects were identified and included in the 2040 No Build simulation network:

- Addition of an auxiliary lane northbound between Exit 8 and Exit 10;
- Addition of an auxiliary lane northbound between Exit 14 and Exit 15;
- Addition of an auxiliary lane southbound between Exit 15 and Exit 14; and
- Redesigned I-91 and I-95 interchange in New Haven (currently under construction).

The networks for other scenarios were then developed based on the No Build network described above by adding transportation improvement projects/tolling to the No Build network. **Table 8-3** provides a summary of inclusions in each scenario. In addition, **Table 8-3** also presents the process followed by the study team to develop demand for each of these scenarios.

Operations Analysis Results

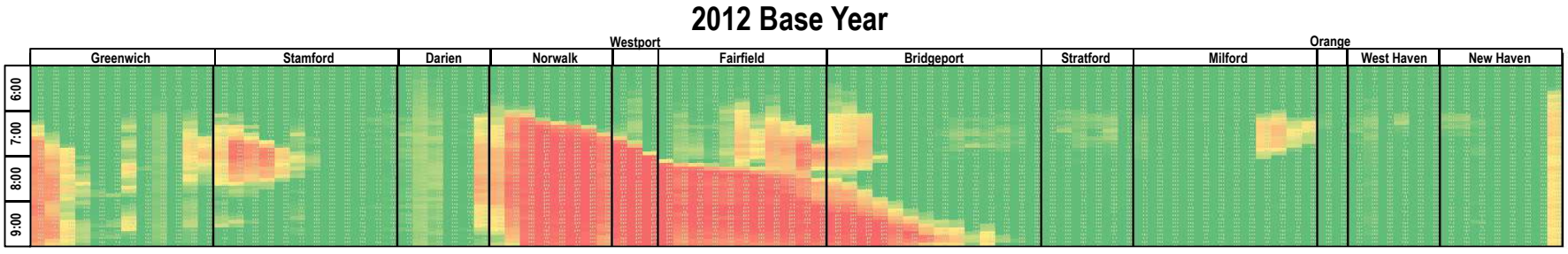
Figure 8-6 and Figure 8-7 present results of the operation analysis, conducted by Cambridge Systematics, for the southbound AM peak and the northbound PM peak directions, respectively. For the reader's reference, a 2012 base year heat map is included on the top, followed by the 2040 No Build to represent a baseline for 2040 results. The five graphics underneath present results of analysis of scenarios run by Cambridge Systematics in the simulation model.

Overall, the addition of an extra travel lane in each direction between the New York and New Haven without tolling to manage demand increases the volume attracted to I-95 as vehicles divert from other parallel congested roadways to I-95. While the added lane improves the throughput capacity of the roadway, the added demands at the interchanges create localized ramp and interchange failures, which in turn can create severe mainline congestion on I-95. Alternatively, an additional lane between the most congested portions of I-95 between Stamford and Bridgeport showed additional benefits when combined with localized selective interchange improvements. Simulation results showed there may be even more substantial benefits if the selective widening was continued further south to meet the I-287 interchange near the New York Stateline. The addition of an extra lane with tolling on I-95 showed potential for dramatic improvements in the future year operations of I-95 when compared to the No Build scenario.

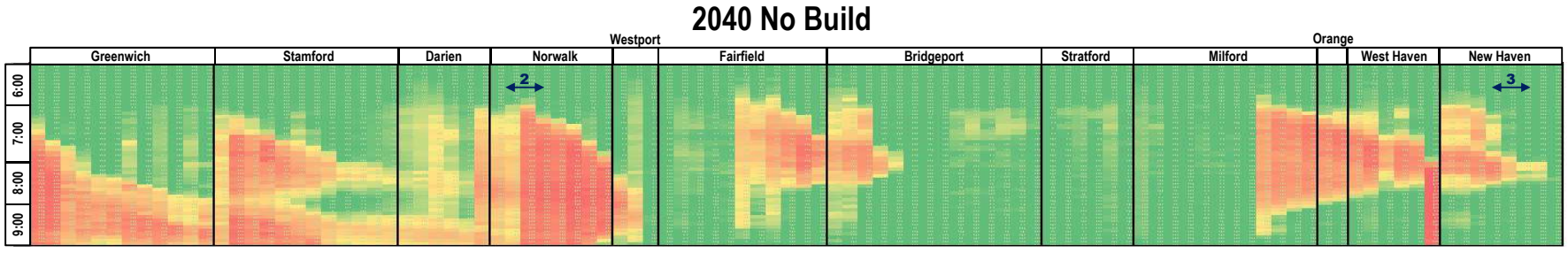
Table 8-3 Details of Future Year Scenarios

Number	Scenario Name	Physical Improvements	Mitigation Projects	Tolling Strategy	Demand Development
1	2040 No Build	Existing committed improvements only • Addition of an aux lane NB b/w Exit 8 and Exit 10 • Addition of an aux lane NB b/w Exit 14 and Exit 15 • Addition of an aux lane SB b/w Exit 15 and Exit 14 • Redesigned I-91 and I-95 interchange in New Haven (currently under construction)	-	No Tolling	• Developed by superimposing the difference (growth) in modeled demands between the 2012 Base Year and 2040 No Build travel demand modeled demands for the I-95 corridor onto the calibrated base year micro simulation demand trip tables. • Growth applied at OD pair level. • Total 2012-40 Growth: AM Peak 8.9%, PM Peak 11.7%
2	2040 Widened New York to New Haven – Toll Free	• Add one travel lane per direction throughout corridor, between I-287 and I-91. • Addition of an aux lane SB b/w Exit 15 and Exit 14 • Redesigned I-91 and I-95 interchange in New Haven (currently under construction)	• Two lane exit ramp and deceleration lane for the off ramp to I-287 from I-95 SB. • Auxiliary lane SB between Exits 7 and 6. • Two lane off ramp from I-95 NB at Exit 27A and auxiliary lane between Exits 26 and 27A. • Additional fifth lane SB between Exits 48 and 47. • Lane configuration improvements to NB I-95 approaching the I-91 Interchange.	No Tolling	Developed by superimposing the difference in demand from the demand trip tables in the travel demand models for 2040 No Build and 2040 Widened New York to New Haven without Toll scenario on top of the 2040 No Build microsimulation scenario demand
3	2040 No Build with I-95 Toll	Existing committed improvements only	-	Toll I-95 only	Developed by overlaying the difference in I-95 corridor demand as modeled in the regional demand model from the 2040 No Build with I-95 Toll and 2040 No Build scenario onto the simulation demands used in the 2040 No Build scenario.
4	2040 Widened Bridgeport to Stamford without Tolls	• Add one travel lane per direction between Exit 6 in Stamford to Exit 27A in Bridgeport. • Addition of an aux lane SB b/w Exit 15 and Exit 14 • Redesigned I-91 and I-95 interchange in New Haven (currently under construction)	• Two lane exit ramp and deceleration lanes for the off ramp to I-287 from I-95 SB. • Auxiliary lane SB between Exits 7 and 6 with a two lane exit at Exit 6. • Two lane off ramp from I-95 NB at Exit 27A and auxiliary lane between Exits 26 and 27A. • Additional fifth lane SB between Exits 48 and 47. • Lane configuration improvements to NB I-95 approaching the I-91 Interchange	No Tolling	Developed by calculating the difference in OD demands for the I-95 corridor as modeled in the regional demand model 2040 No Build and 2040 Widened Stamford to Bridgeport without Toll scenarios. Those differences in OD demands were then superimposed on the 2040 No Build scenario simulation demand trip tables.
5	2040 Widened Bridgeport to Stamford with I-95 Toll	• Add one travel lane per direction between Exit 6 in Stamford to Exit 27A in Bridgeport. • Addition of an aux lane SB b/w Exit 15 and Exit 14 • Redesigned I-91 and I-95 interchange in New Haven (currently under construction)	• Two lane exit ramp and deceleration lanes for the off ramp to I-287 from I-95 SB. • Auxiliary lane SB between Exits 7 and 6 with a two lane exit at Exit 6. • Two lane off ramp from I-95 NB at Exit 27A and auxiliary lane between Exits 26 and 27A. • Additional fifth lane SB between Exits 48 and 47. • Lane configuration improvements to NB I-95 approaching the I-91 Interchange	Toll I-95 only	Developed by calculating the difference in demand model forecasts of I-95 volumes between the 2040 No Build and the 2040 Widened Stamford to Bridgeport with Toll scenarios. This difference in demand was then superimposed onto the simulation model 2040 No Build scenario demand to arrive at the demand for this scenario.
6	2040 Widened Bridgeport to Stamford with I-95 & CT-15 Tolls	• Add one travel lane per direction between Exit 6 in Stamford to Exit 27A in Bridgeport. • Addition of an aux lane SB b/w Exit 15 and Exit 14 • Redesigned I-91 and I-95 interchange in New Haven (currently under construction)	• Two lane exit ramp and deceleration lanes for the off ramp to I-287 from I-95 SB. • Auxiliary lane SB between Exits 7 and 6 with a two lane exit at Exit 6. • Two lane off ramp from I-95 NB at Exit 27A and auxiliary lane between Exits 26 and 27A. • Additional fifth lane SB between Exits 48 and 47. • Lane configuration improvements to NB I-95 approaching the I-91 Interchange	Toll I-95 & CT-15	Developed by applying the difference in ramp to ramp OD trip tables of I-95 from the 2040 Widened Stamford to Bridgeport with I-95 and CT-15 tolled and 2040 No Build scenarios were calculated and then superimposed onto the 2040 No Build simulation trip tables.

2012 Base Year



2040 No Build

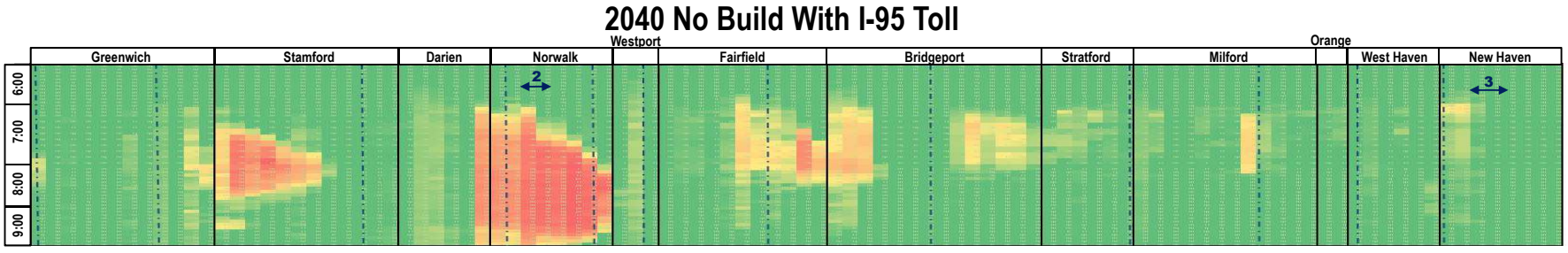


Committed No Build Projects: ←→

2) Auxiliary lane southbound between Exit 15 and Exit 14.

3) Redesigned I-91 and I-95 interchange at New Haven.

2040 No Build With I-95 Toll



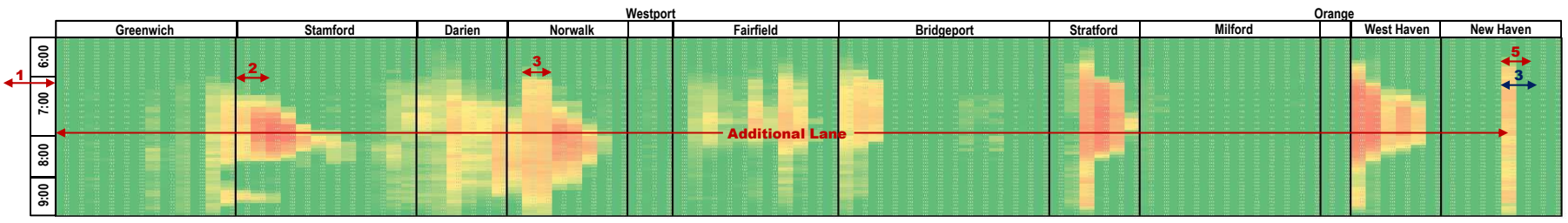
Committed No Build Projects: ←→

2) Auxiliary lane southbound between Exit 15 and Exit 14.

3) Redesigned I-91 and I-95 interchange at New Haven.

Approximate Toll Gantry Locations

2040 Widened New York to New Haven Without Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

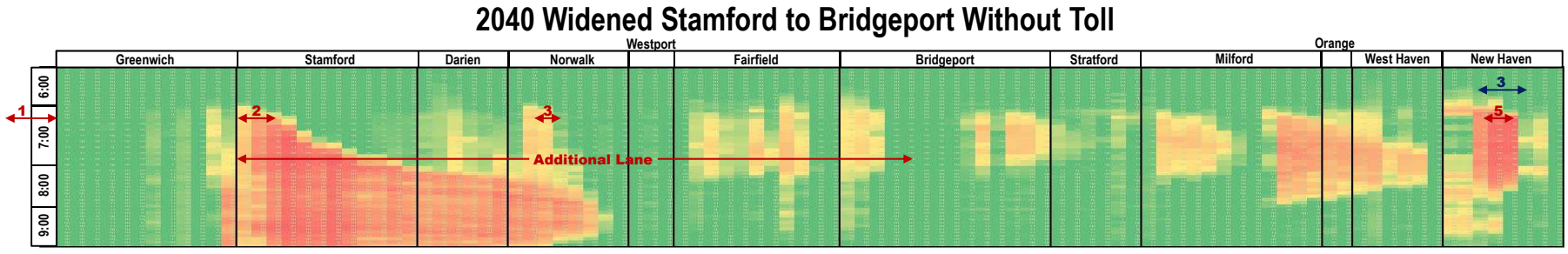
1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.

2) Auxiliary lane southbound between Exits 7 and 6.

3) Auxiliary lane southbound between Exits 15 and 14.

5) Additional 5th lane southbound between Exits 48 and 47.

2040 Widened Stamford to Bridgeport Without Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

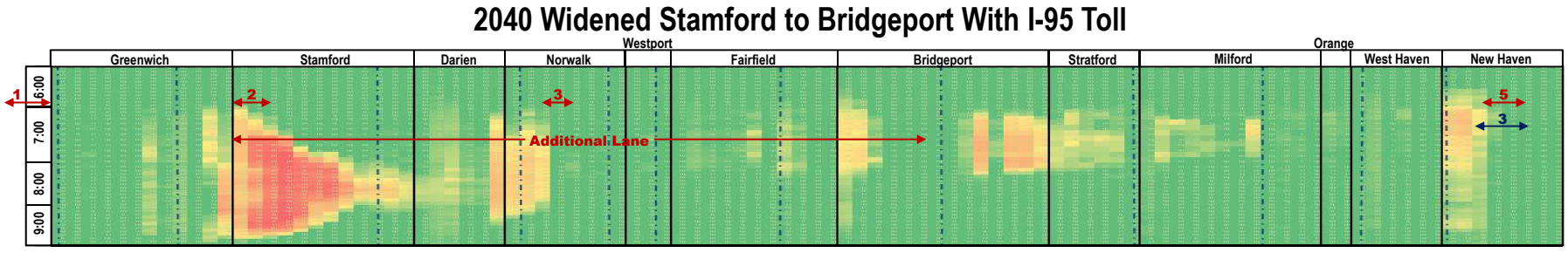
1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.

2) Auxiliary lane southbound between Exits 7 and 6.

3) Auxiliary lane southbound between Exits 15 and 14.

5) Additional 5th lane southbound between Exits 48 and 47.

2040 Widened Stamford to Bridgeport With I-95 Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.

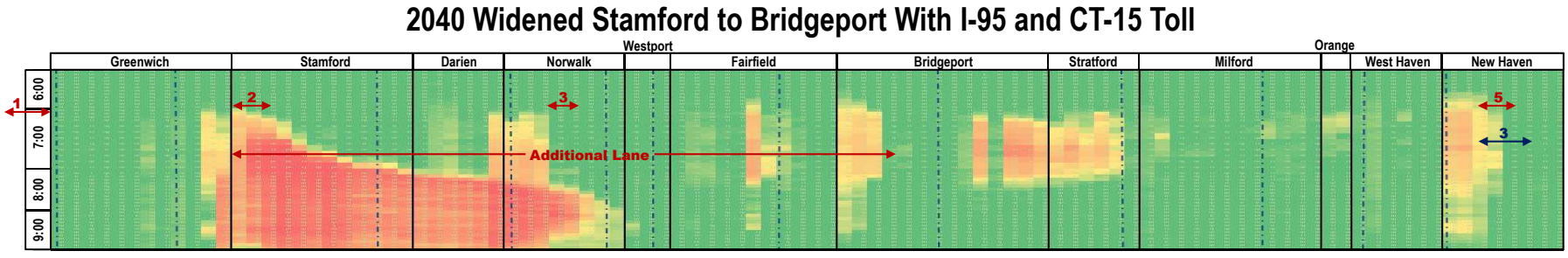
2) Auxiliary lane southbound between Exits 7 and 6.

3) Auxiliary lane southbound between Exits 15 and 14.

5) Additional 5th lane southbound between Exits 48 and 47.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport With I-95 and CT-15 Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound.

2) Auxiliary lane southbound between Exits 7 and 6.

3) Auxiliary lane southbound between Exits 15 and 14.

5) Additional 5th lane southbound between Exits 48 and 47.

Approximate Toll Gantry Locations

5 20 40 60

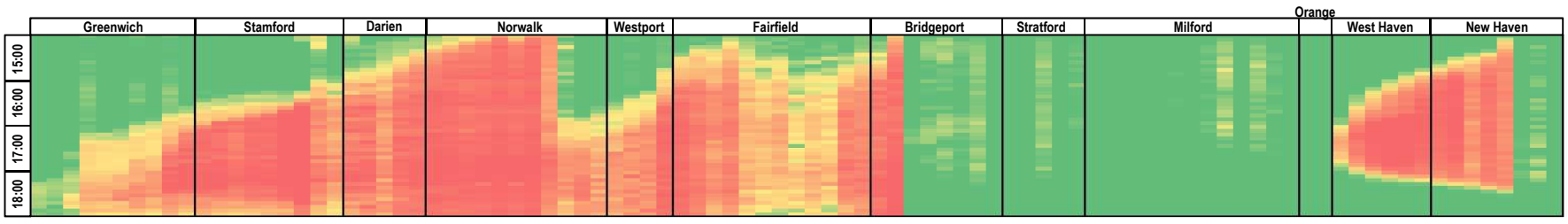
Speed (MPH)

CDM Smith

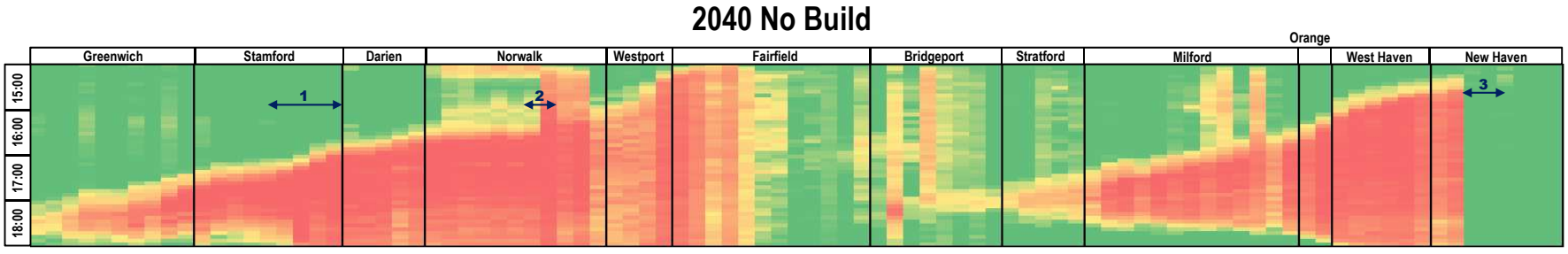
AM PEAK SOUTHBOUND SPEED CONTOURS

FIGURE 8-6

2012 Base Year



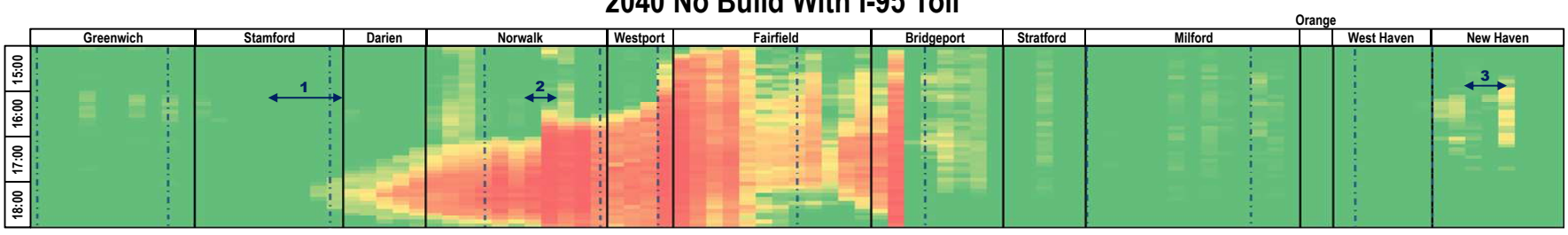
2040 No Build



Committed No Build Projects: ←→

1) Auxiliary lane northbound between Exit 8 and Exit 10.
2) Auxiliary lane northbound between Exit 14 and Exit 15.
3) Redesigned I-91 and I-95 interchange at New Haven.

2040 No Build With I-95 Toll

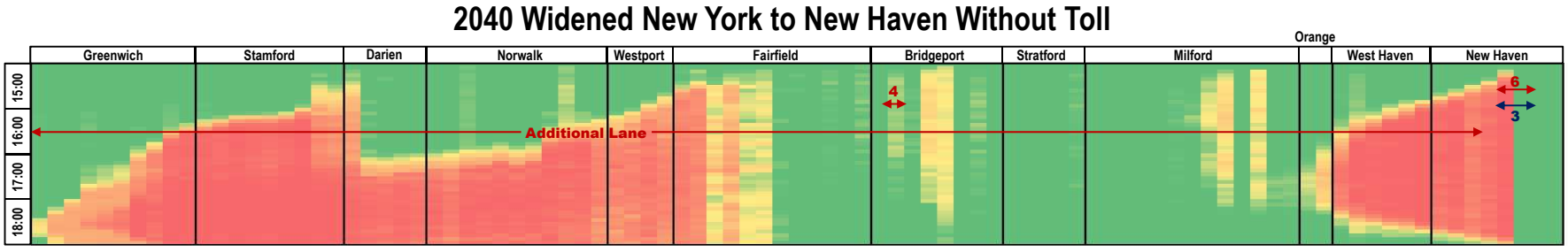


Committed No Build Projects: ←→

1) Auxiliary lane northbound between Exit 8 and Exit 10.
2) Auxiliary lane northbound between Exit 14 and Exit 15.
3) Redesigned I-91 and I-95 interchange at New Haven.

Approximate Toll Gantry Locations

2040 Widened New York to New Haven Without Toll



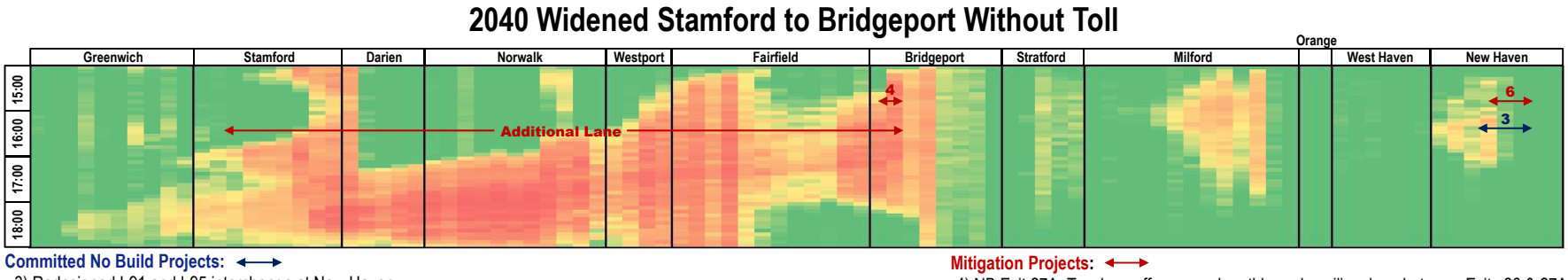
Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

2040 Widened Stamford to Bridgeport Without Toll



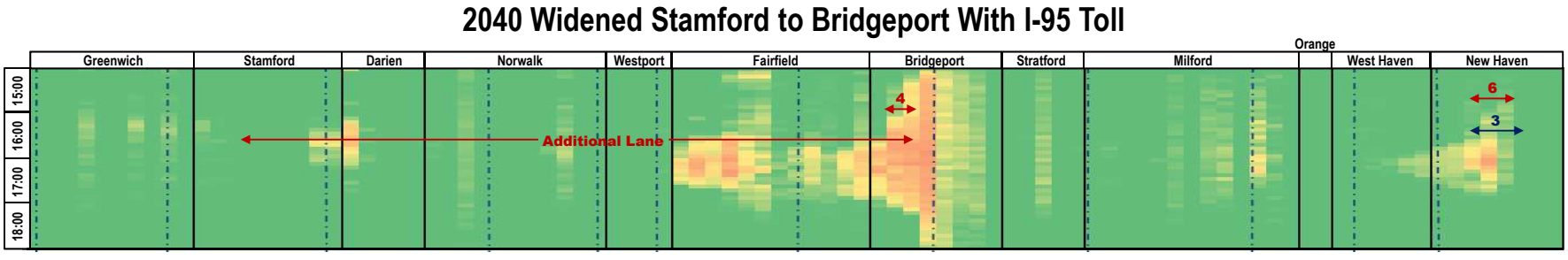
Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

2040 Widened Stamford to Bridgeport With I-95 Toll



Committed No Build Projects: ←→

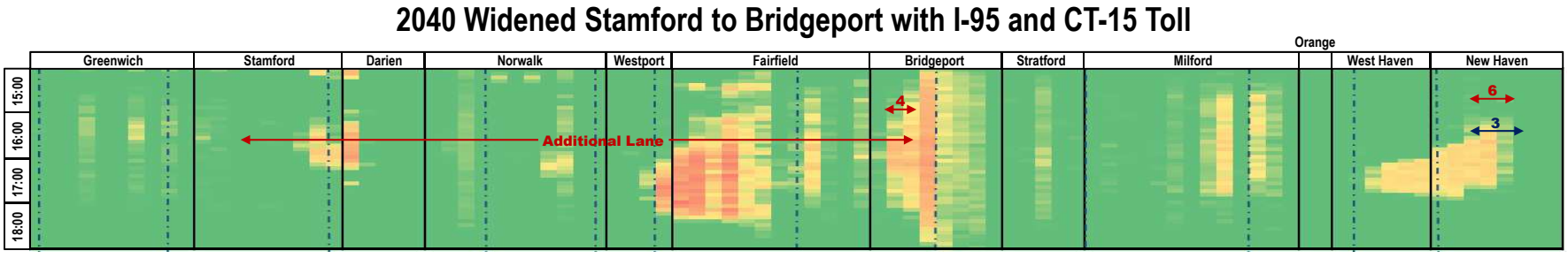
3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

Approximate Toll Gantry Locations

2040 Widened Stamford to Bridgeport with I-95 and CT-15 Toll



Committed No Build Projects: ←→

3) Redesigned I-91 and I-95 interchange at New Haven.

Mitigation Projects: ←→

4) NB Exit 27A: Two lane off ramp and northbound auxiliary lane between Exits 26 & 27A.
6) Lane configuration changes to northbound I-95 to I-91 Interchange ramps.

Approximate Toll Gantry Locations

5 20 40 60

Speed (MPH)

CDM Smith

PM PEAK NORTHBOUND SPEED CONTOURS

FIGURE 8-7

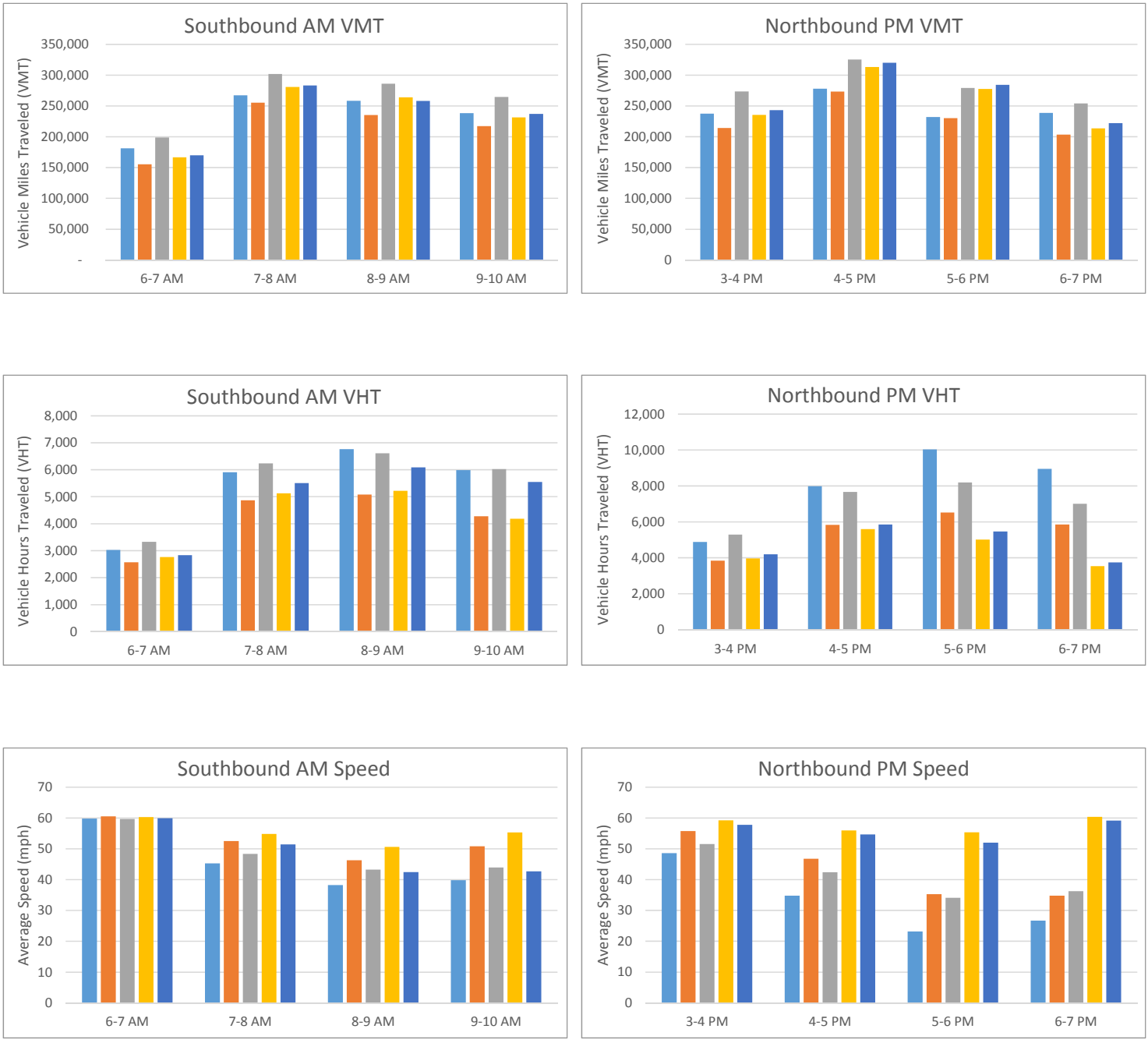
Results of Performance Measures

In addition to the speed contours, presented as heat maps in the previous section, two different sets of performance metrics were also computed from the simulation results of each scenario to conduct the comparative analysis. One of those is an aggregate performance measure of vehicle miles traveled (VMT), vehicle hours traveled (VHT), and average speed. These are good measures of effectiveness to gauge the relative performance of the corridor between the simulated scenarios. **Figure 8-8** presents the average hourly values of these measures for each of the future year 2040 scenarios.

In addition to VMT, VHT and speeds measures; average travel times for two different sections of I-95 were extracted from the simulation results and reported for each hour of the peak period for the peak directions of travel. The first section is between New York Stateline and New Haven (a 48-mile stretch of roadway between the I-287 and I-91 interchanges), and the second section is from Stamford to Bridgeport (a 22-mile stretch of I-95 between Exit 7 and Exit 27A). **Figure 8-9** presents average travel time and time savings by hour for the northbound PM peak period. More details, including travel time savings for the AM southbound peak period, have been included in the Cambridge Systematics report attached as **Appendix C** to this document.

During the PM peak period, which is typically more congested than the morning peak, average simulated travel times in the No Build without Toll scenario takes a maximum of 71 minutes to travel from Stamford and Bridgeport and 135 minutes from New York State Line and New Haven due to the severe congestion. These values represent approximately three times longer than a travel time under uncongested free flow conditions.

The most effective scenario, from the ones tested in the microsimulation modeling, turns out to be an additional lane on I-95 between Stamford and Bridgeport, combined with tolling on I-95. Under this scenario, significant reductions in travel times are estimated to occur in the PM peak period. Travel times between Stamford and Bridgeport are near uncongested travel times and drop to under an hour to travel from the New York State line to New Haven.

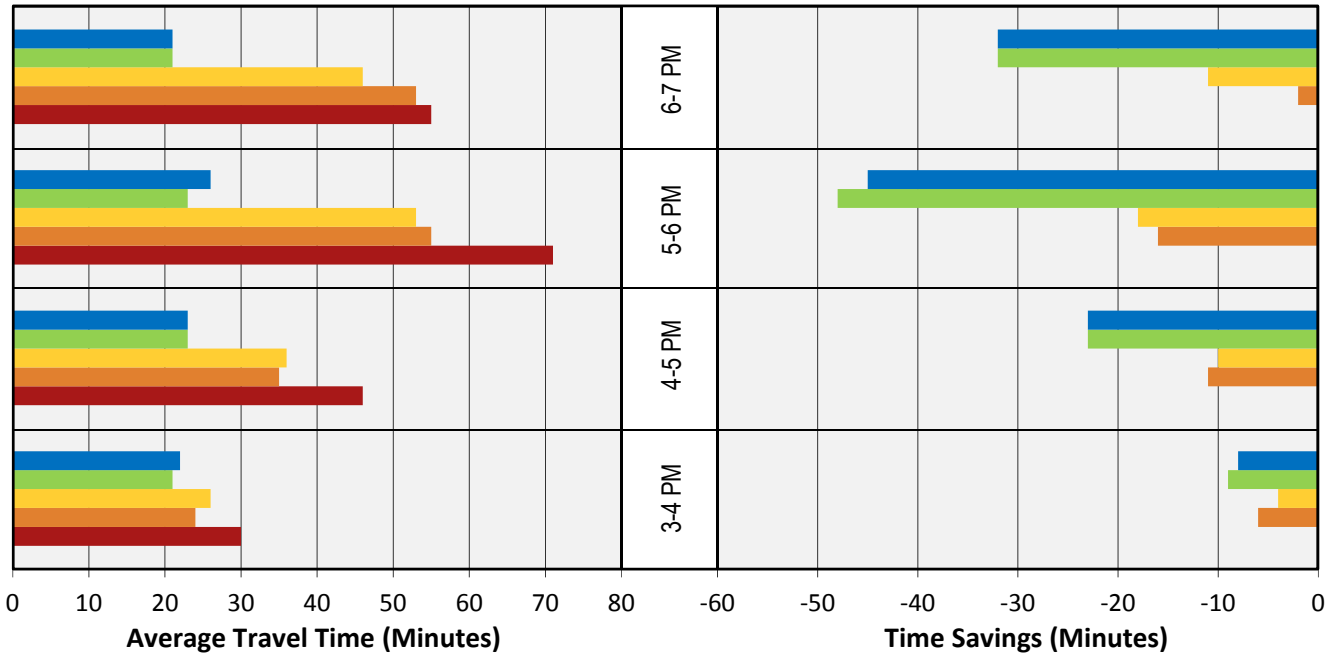


- No Build Without Toll
- No Build With I-95 Toll
- Widened Stamford to Bridgeport Without Toll
- Widened Stamford to Bridgeport With I-95 Toll
- Widened Stamford to Bridgeport With I-95 and CT 15 Tolls

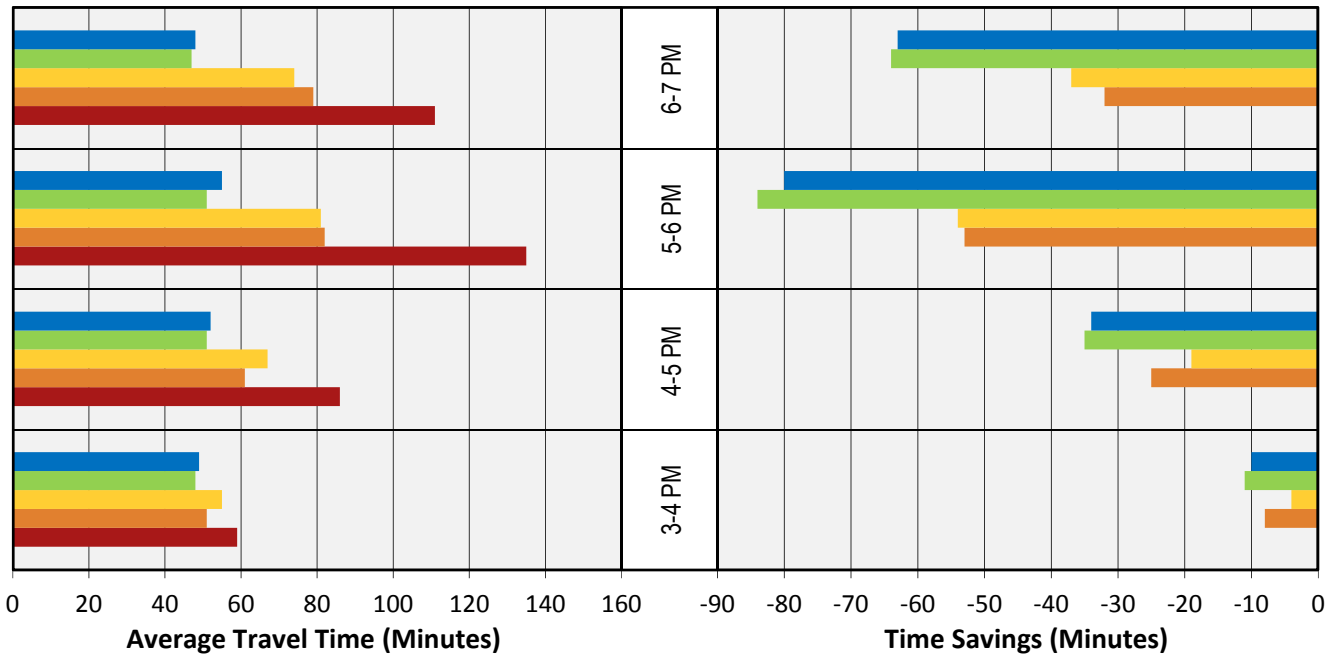
2040 AM AND PM PEAK AGGREGATE PERFORMANCE METRICS

FIGURE 8-8

Stamford to Bridgeport 2040 PM Peak Average Travel Time



New York to New Haven 2040 PM Peak Average Travel Time



LEGEND

- No Build Without I-95 Toll
- No Build With I-95 Toll
- Widen Stamford to Bridgeport Without I-95 Toll
- Widen Stamford to Bridgeport With I-95 Toll
- Widen Stamford to Bridgeport With I-95 and CT 15 Toll

NORTHBOUND PM PEAK AVERAGE TRAVEL TIME

CDM Smith

FIGURE 8-9