Connecticut I-84 Corridor Congestion Relief Study

Federal Highway Administration

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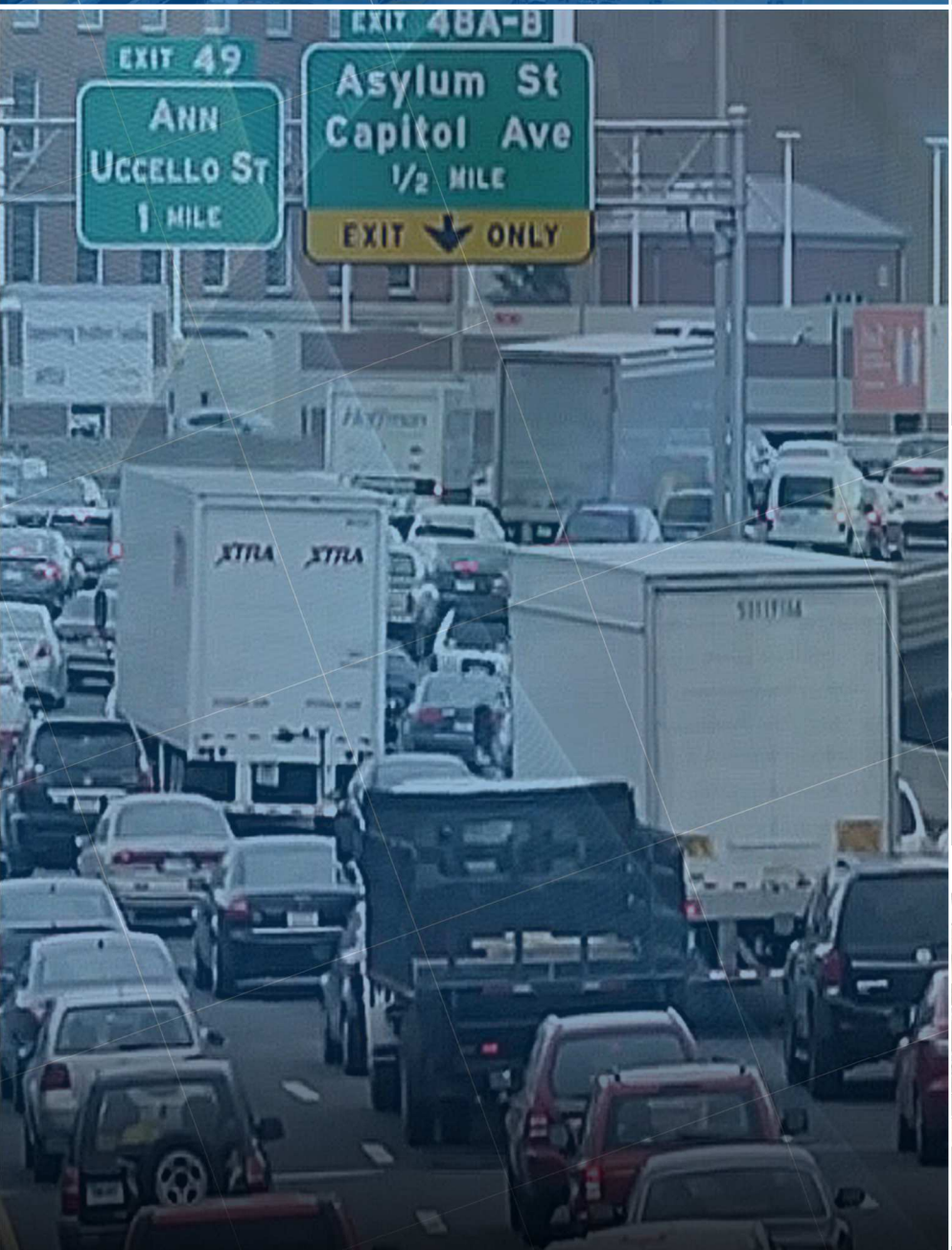

Coordinated and Funded Through the
Federal Highway Administration Value Pricing Pilot Program
and the Connecticut Department of Transportation

CDM Smith

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Appendices

Appendix A Stated Preference Survey Reports

Appendix B Simulation Model Development, Calibration, and Analysis Reports

List of Acronyms

AAPC	Average Annual Percent Change
ACH	Automated Clearing House
ADT	Average Daily Traffic
AET	All Electronic Tolling
AVC	Automatic Vehicle Classification
BIA	Bradley International Airport
CCTV	Closed Circuit TV
C-D	Collector-Distributor
ConnDOT	Connecticut Department of Transportation
CRCOG	Capitol Region Council of Governments
CS	Cambridge Systematics
CSC	Customer Service Center
EB	Eastbound
ETC	Electronic Toll Collection
FHWA	Federal Highway Administration
HBO	Home Based Other
HBW	Home Based Work
HOT	High Occupancy Toll
HOV	High Occupant Vehicle
LAN	Local Area Network
LOS	Level of Service
LPT	License Plate Tolling
M&O	Maintenance and Operations
MD	Midday
MNL	Multinomial Logit
NHB	Non-Home Based
NT	Nighttime
RSG	Resource System Group
RTP	Regional Transportation Plan
SOV	Single Occupant Vehicle
SP	Stated Preference
TCA	TravelCenters of America
TCS	Toll Collection System
TMC	Traffic Management Center
TSI	Toll Systems Integrator
UPS	Uninterrupted Power Supply
VES	Violation Enforcement System
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VOT	Value of Time
VPC	Violation Processing Center

VPPP	Value Pricing Pilot Program
WB	Westbound

Executive Summary

I-84 Corridor Congestion Relief Study

CDM Smith was selected by the Connecticut Department of Transportation (CTDOT) to perform a congestion pricing study of the Interstate 84 Viaduct in Hartford 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 motorists' value of time in the study corridor, and a detailed traffic modeling and toll revenue evaluation for pricing alternatives.

Study Objective and Scope

The grant application submitted by the CTDOT specifically outlined the I-84 Viaduct through Hartford as a pricing candidate due to its high travel demand, significant congestion, and imminent need of replacement. Congestion pricing may also provide a supplemental funding source, helping to offset the costs that surround such a critical, yet highly expensive replacement. The I-84 Viaduct, built in 1965 is the ¾ mile long section of elevated highway between the Sisson Avenue interchange and the Asylum and Capitol Avenue interchanges.

The use of value pricing in combination with physical and operational improvements to the I-84 corridor through Hartford was evaluated with the purpose of relieving congestion on one of the most heavily travelled and congested corridors in the State. Given the significant cost of replacing the I-84 Viaduct, toll revenue was also a key factor that was considered across alternatives.

To measure and compare potential congestion relief benefits and toll revenue potential across alternatives, performance measures such as traffic, diversion, and revenue were summarized. In addition, a simulation model of the I-84 study area was utilized to quantify and visualize the estimated I-84 congestion relief benefits of the various alternatives and the potential impacts on the local network.

The study also examined converting the existing high occupancy vehicle (HOV) lanes along I-91 and I-84 to high occupancy toll (HOT) lanes where single occupant vehicles would be allowed access to the existing HOV lanes in exchange for paying a toll.

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

- Development of a current traffic volume and speed profile for I-84 and I-91, including detailed analysis by time of day and travel direction;
- Conducting a Stated Preference (SP) Survey in the I-84 Hartford travel corridor to estimate motorists value of time;
- Enhancement of the Capitol Region Council of Governments (CRCOG) Travel Demand Model;
- Development of an I-84 micro-simulation traffic model in order to analyze the operational impacts on I-84 and surrounding local roadways under a toll application;

- Estimation of the traffic diversion that can be anticipated from tolling on I-84; 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 was defined as I-84 from Route 9 in West Hartford to the end of the I-84 HOV lanes in Vernon, and from the I-91 HOV lanes in Windsor to I-691 in Meriden. **Figure ES-1** depicts the regional study area, with major transportation facilities I-91, Route 15, Route 9, and Route 2 running north-south and I-84, I-691 (not shown in figure), I-384, and I-291 running east-west. **Figure ES-2** shows I-84 through the downtown area with the Viaduct section highlighted. Major arterials parallel to I-84 include Farmington and Capitol Avenues.

The rest of this executive summary provides a discussion of the alternatives evaluated, estimates of traffic and toll revenue, and roadway operational impacts that should be considered in any potential tolling of a new I-84 Viaduct replacement through Hartford.

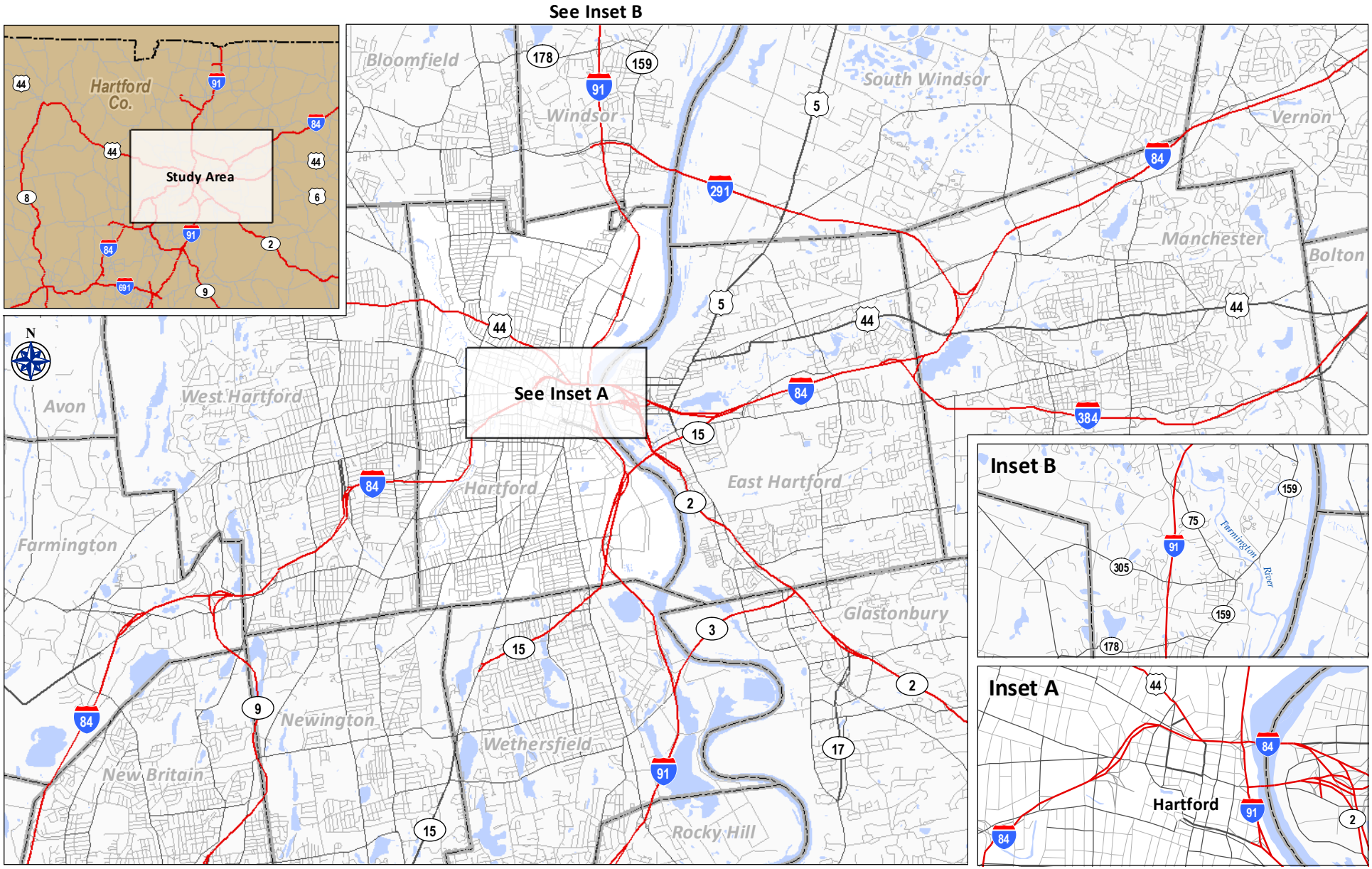
Alternatives Description

The alternatives considered in this study assumed all electronic tolling (AET) across all lanes on I-84 within the Hartford Area. As this study developed, an additional scenario beyond the physical limits of the I-84 Viaduct in Hartford was evaluated that considered expanded tolling along I-84 between Hartford and Danbury. In addition, a potential conversion of the existing High Occupancy Vehicle (HOV) lanes on I-84 and I-91 to High Occupancy Toll (HOT) lanes was studied to estimate the potential toll revenue and congestion relief benefits that could occur under such a conversion.

Parallel to this congestion pricing study, a major investment study of I-84 in Hartford was initiated by the CTDOT to develop a set of preliminary alternatives for replacing the existing I-84 viaduct. During this congestion relief study, two preliminary physical alternatives were developed by the I-84 Hartford Project team for use in the technical evaluation of tolling.

The alternatives evaluated in this study are discussed below.

- **Alternative 1-** Assumes the current configuration ("No Build") of I-84 with a single point toll gantry located east of the Sigourney ramps **(Figure ES-3)**. The toll for a passenger vehicle equipped with a transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively.
- **Alternative 2 -** Assumes the current configuration ("No Build") of I-84 with two tolling locations. The first gantry was assumed to be west of the Sisson Avenue Interchange and the second gantry east of the Asylum/Capitol Avenue interchange **(Figure ES-3)**. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively.
- **Alternative 3 –** Assumes a reconfigured I-84 through Hartford with major reconstruction and consolidation of the existing interchanges on the western and eastern edges of the Viaduct. The interchange with Sigourney Street is removed **(Figure ES-4)**. Alternative 3 assumes the same point toll location as used in Alternative 1. The toll for a passenger vehicle equipped with a



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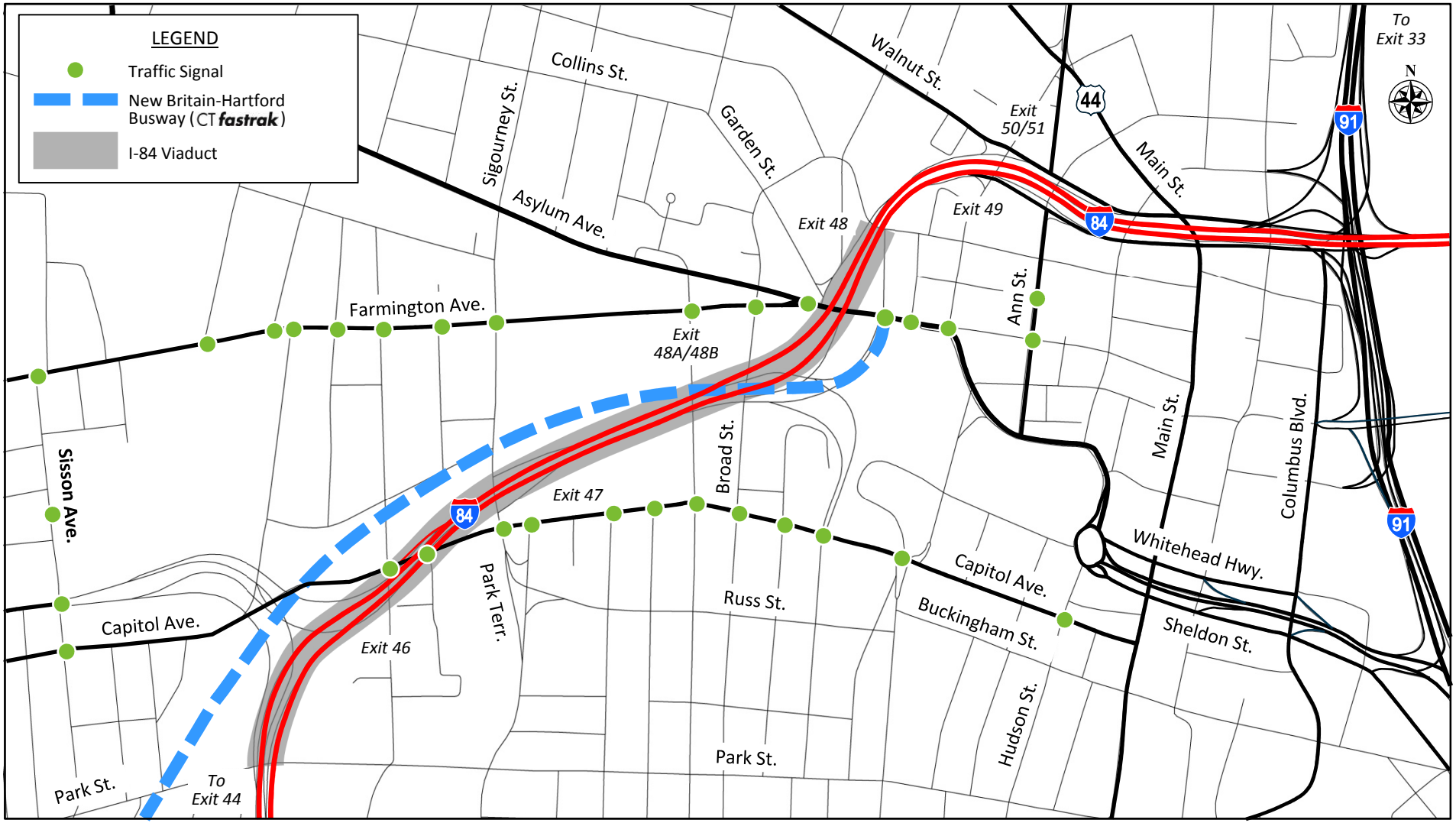
REGIONAL STUDY AREA

FIGURE ES-1



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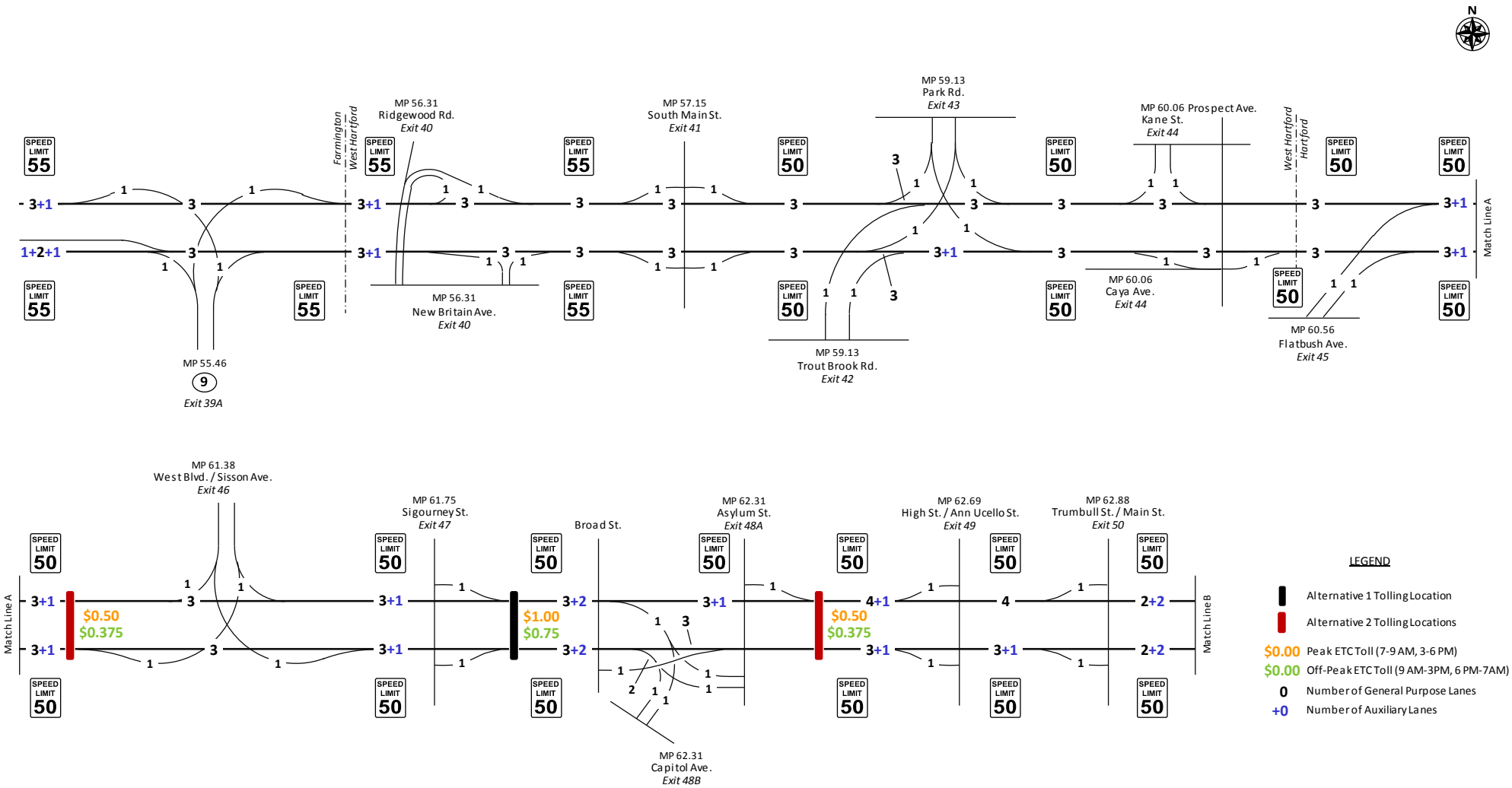
I-84 VIADUCT LOCATION MAP

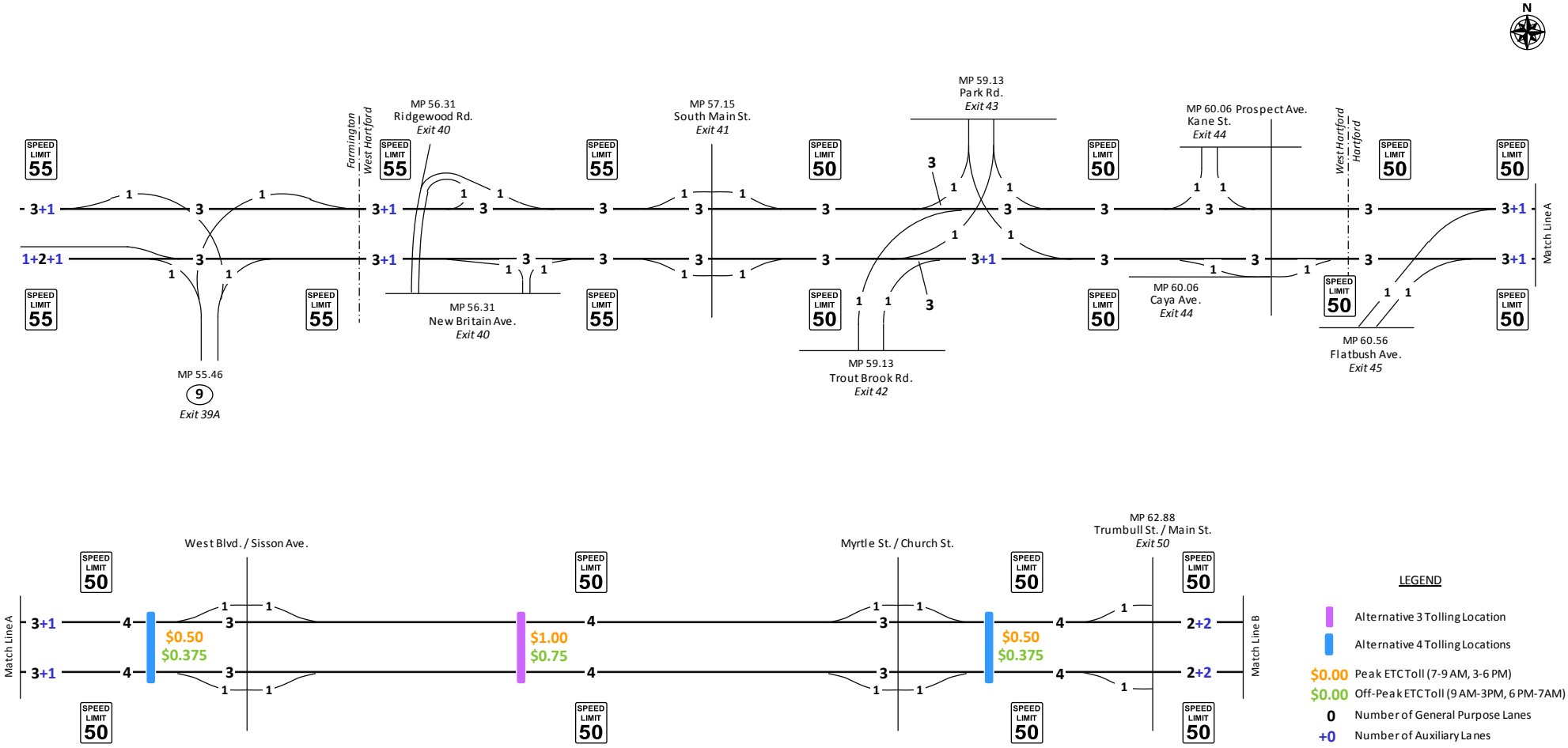
FIGURE ES-2



ALTERNATIVES 1 AND 2 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

CDM Smith

FIGURE ES-3



ALTERNATIVES 3 AND 4 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

CDM Smith

FIGURE ES-4

transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively.

- **Alternative 4** – Same as Alternative 3, but with two tolling locations. The first tolling gantry is assumed to be west of a new West Boulevard/Sisson Avenue Interchange and the second tolling location east of a new Church Street interchange. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively **(Figure ES-4)**.

- **Alternative 5 -** Assumes I-84 is reconfigured through Hartford with the addition of a collector-distributor (C-D) roadway **(Figure ES-5)**. This alternative assumes two tolling locations, strategically positioned just outside of the C-D and I-84 connections so as to prevent the C-D roadway from being used as a toll diversion alternative. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively.

- **Alternative 6 -** Assumes an expanded tolling configuration consisting of 11 AET locations spaced approximately 6 miles apart along I-84 from the New York border to Hartford **(Figure ES-6)**. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.35 for peak and off peak time periods, respectively.

- **Alternative 7 -** Assumes the conversion of the existing I-91 and I-84 HOV lanes to HOT lanes. Toll rates would vary dynamically in response to traffic conditions to ensure the HOT lanes operate near or at free flow at all times of the day. **Figures ES-7 through ES-10** show the current configuration of the HOV lanes and the access and egress locations between the general purpose lanes and the HOV lanes. The existing physical configuration of the HOV lanes is such that a single tolling location could be implemented on each of the corridors to manage single occupant demand through pricing.

These seven alternatives were run utilizing travel demand toll models specifically enhanced and refined for this study at 2012, 2020 and 2040 conditions. In addition, toll free runs were prepared to serve as the baseline to compare against the tolled alternatives

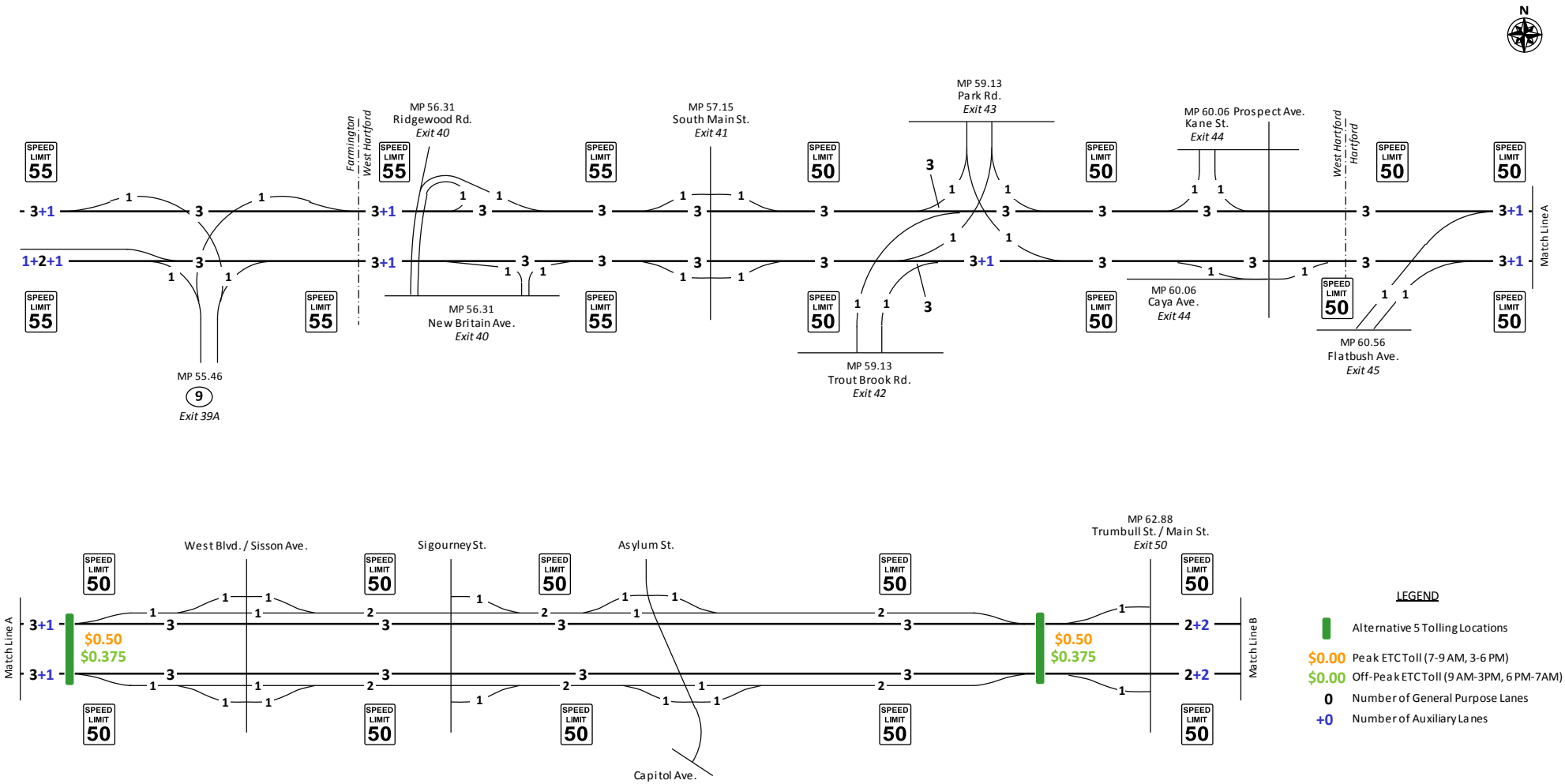
Summary of Traffic Estimates

Model runs were reviewed and summarized into volume line charts for ease of comparison and to demonstrate the estimated volume profile along I-84 between the Route 9 and I-384 interchanges for the different tolling scenarios.

Toll Free versus Alternative 1 and Alternative 2

Figures ES-11 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for the existing toll free configuration, Alternative 1 (single point toll), and Alternative 2 (two tolling locations). Since all three of these scenarios use the existing configuration, the differences displayed here are a direct result of the toll rate and tolling location(s).

Figure ES-12 shows the same information, but for the midday period and for the average weekday total. The total day chart on the lower half of the figure clearly demonstrates the impact of the single point toll (Alternative 1) and the impact of locating two tolling locations (Alternative 2) in the viaduct area of I-84. At the west end of the limits shown, we can conclude that about 5 percent of the reduction in traffic can likely be attributed to a regional diversion to avoid the toll. At the east end of



ALTERNATIVE 5 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

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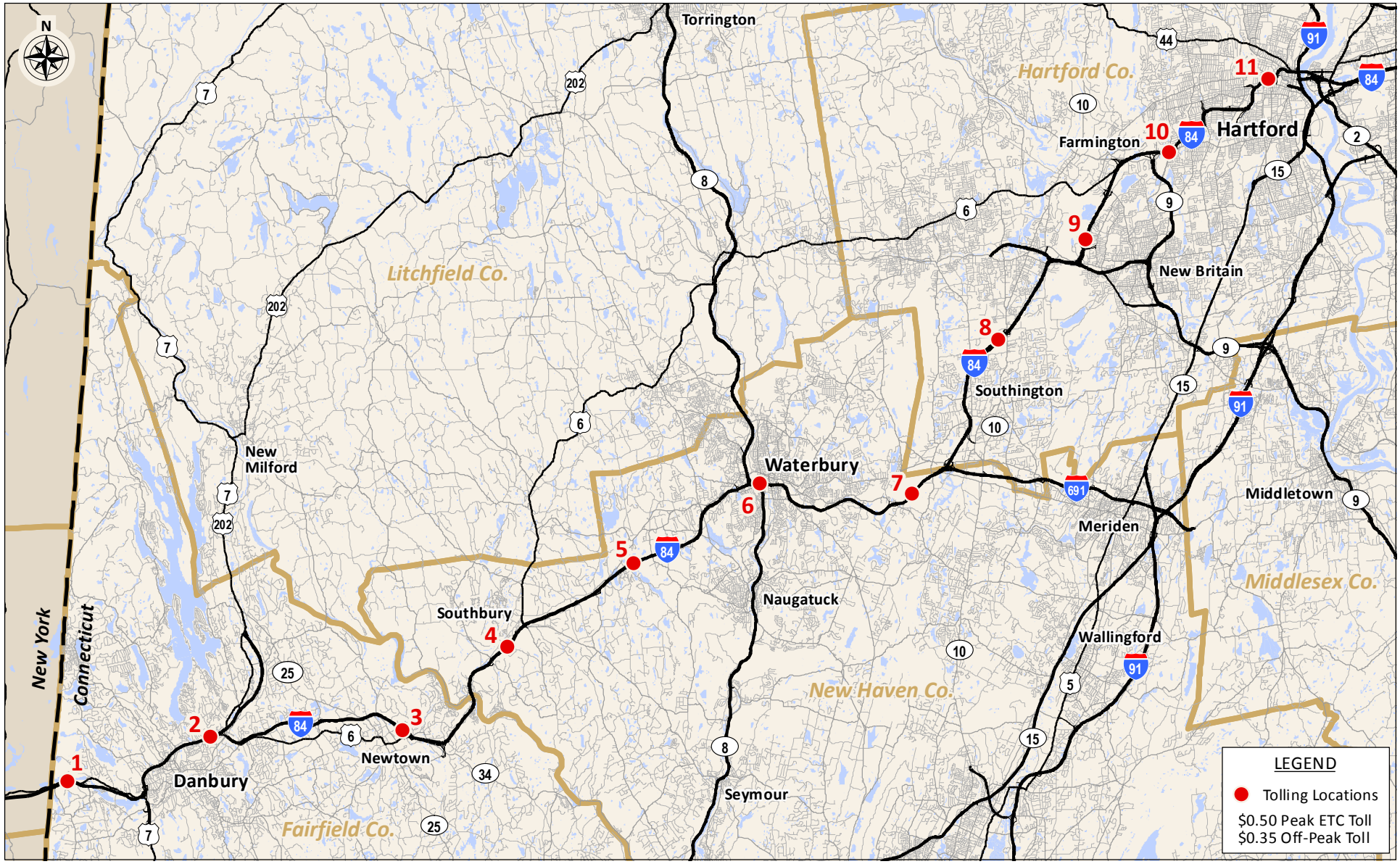
FIGURE ES-5



ALTERNATIVE 6 - EXPANDED I-84 TOLLING (NY-HARTFORD): GANTRY LOCATIONS

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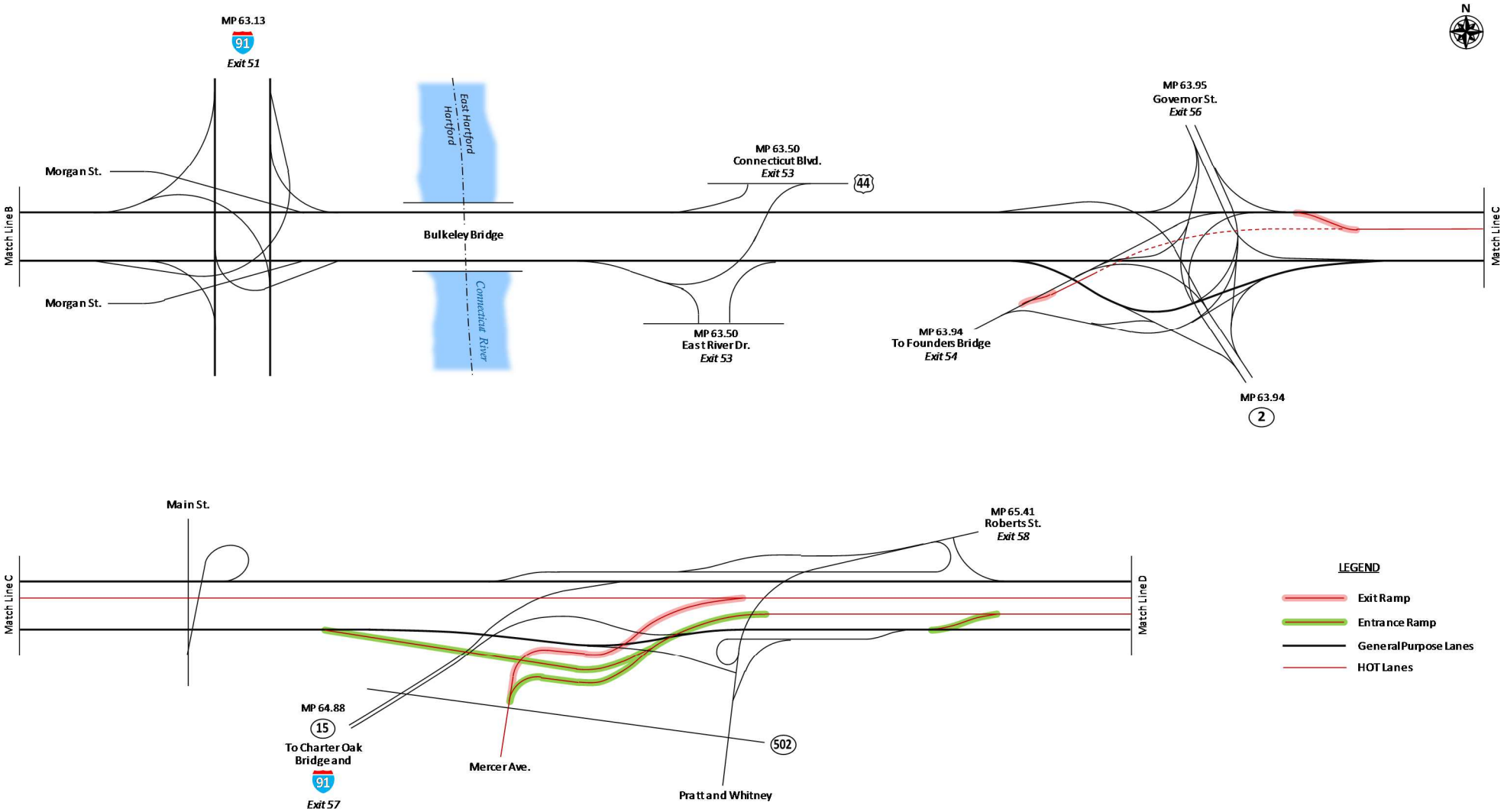
FIGURE ES-6



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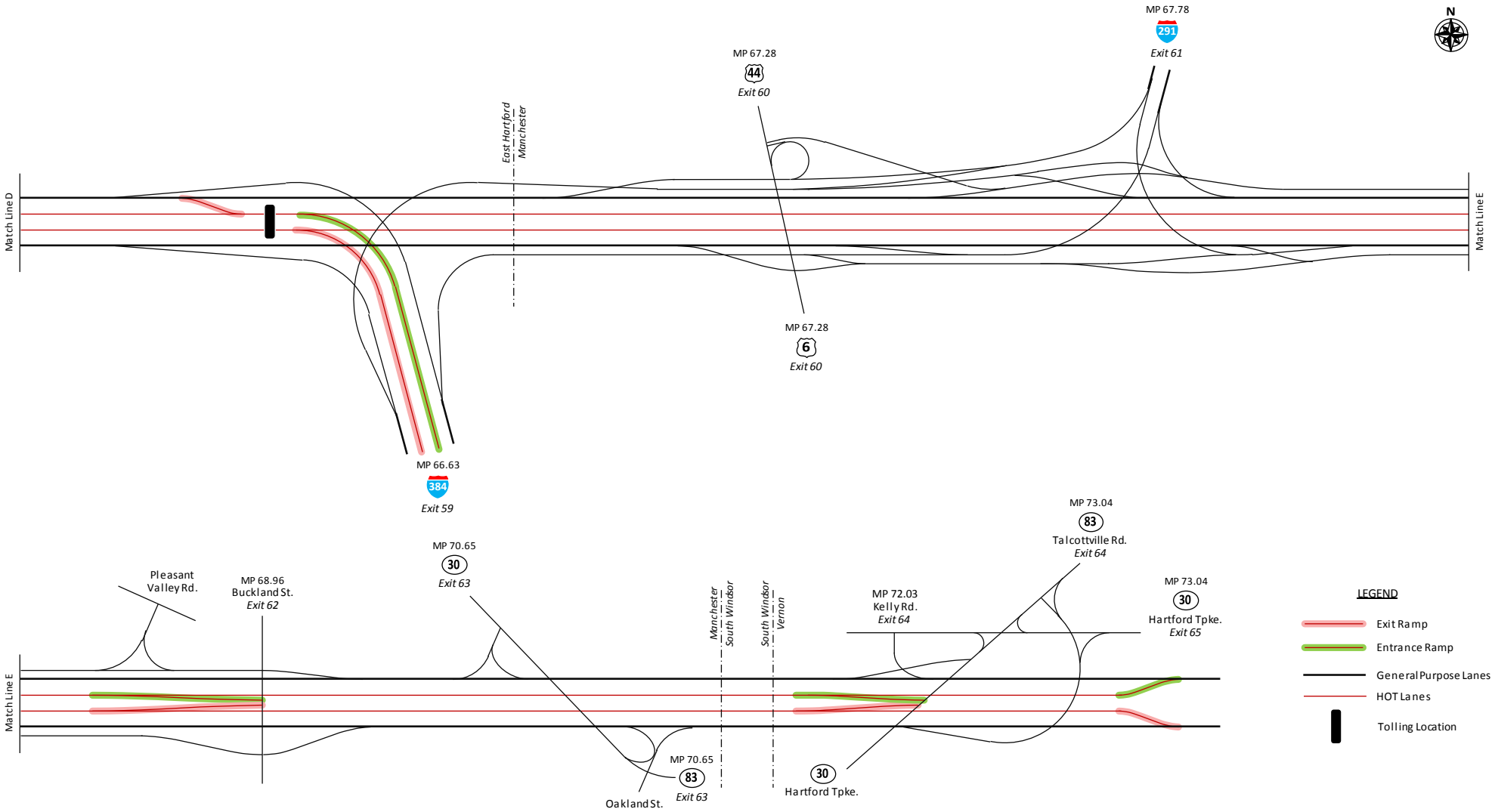
ALTERNATIVE 7 - I-84 HOV TO HOT CONVERSION

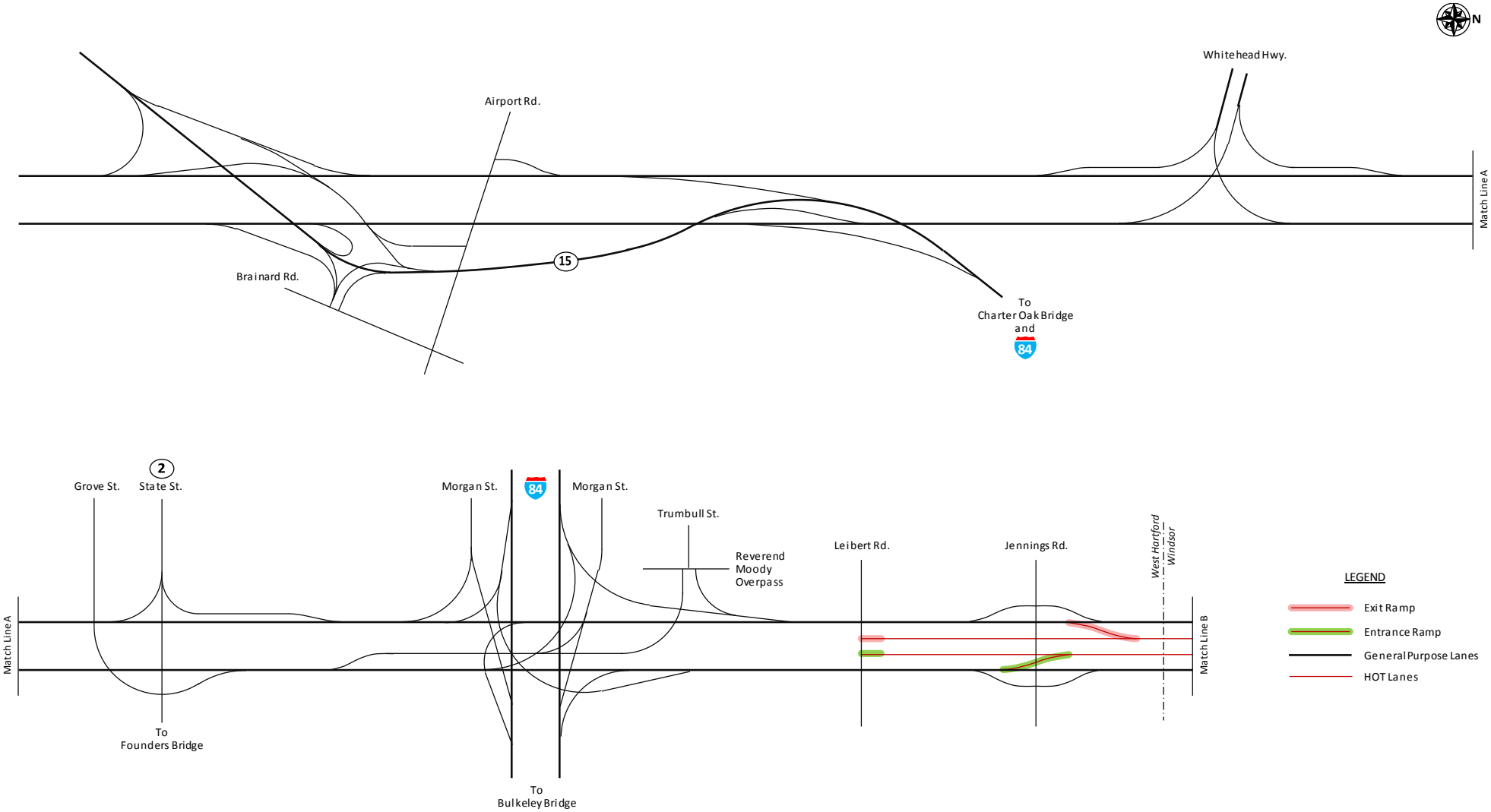
FIGURE ES-7



CDM Smith

ALTERNATIVE 7 - I-84 HOV TO HOT CONVERSION

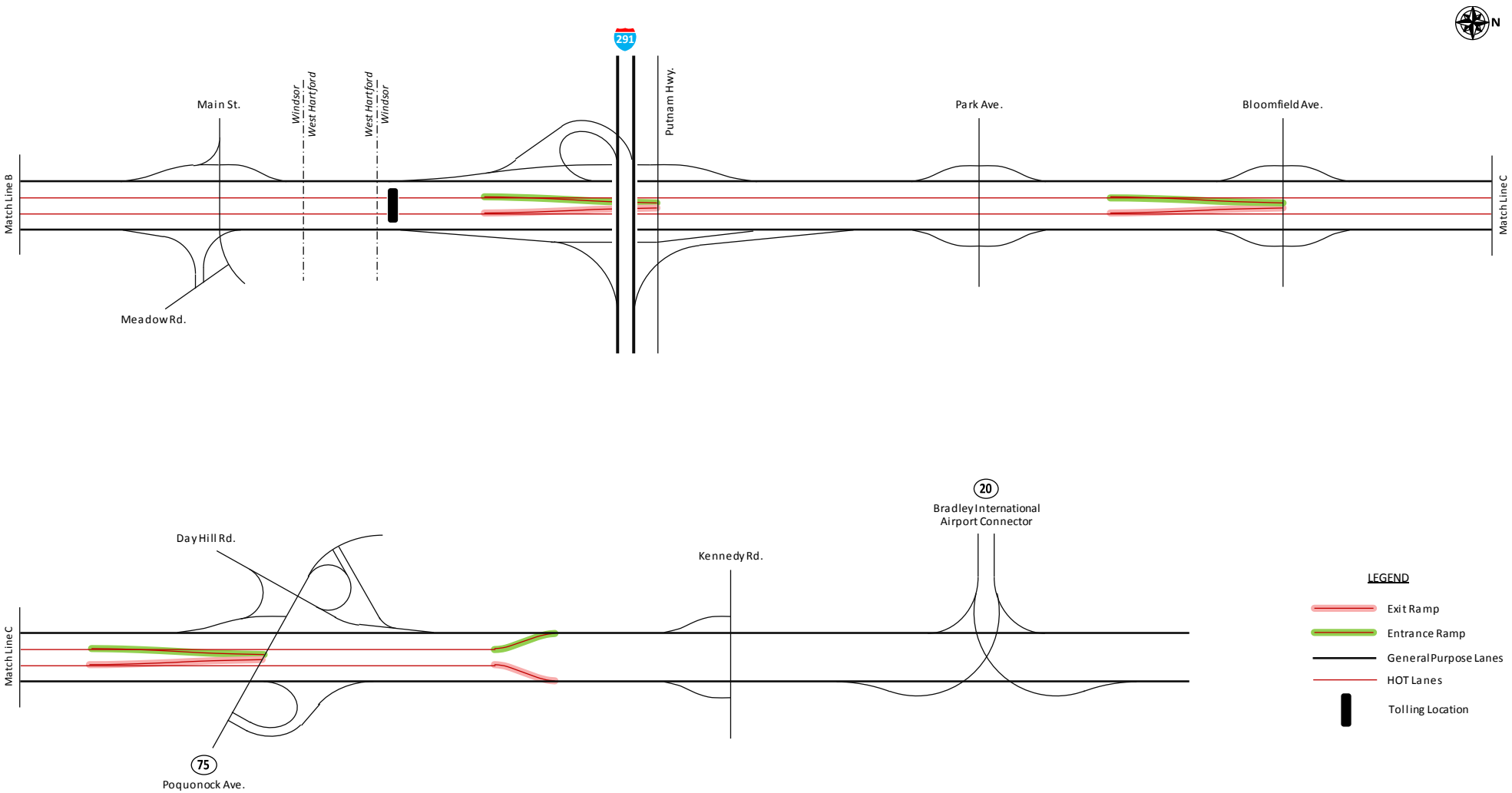
FIGURE ES-8



CDM Smith

ALTERNATIVE 7 - I-91 HOV TO HOT CONVERSION

FIGURE ES-9



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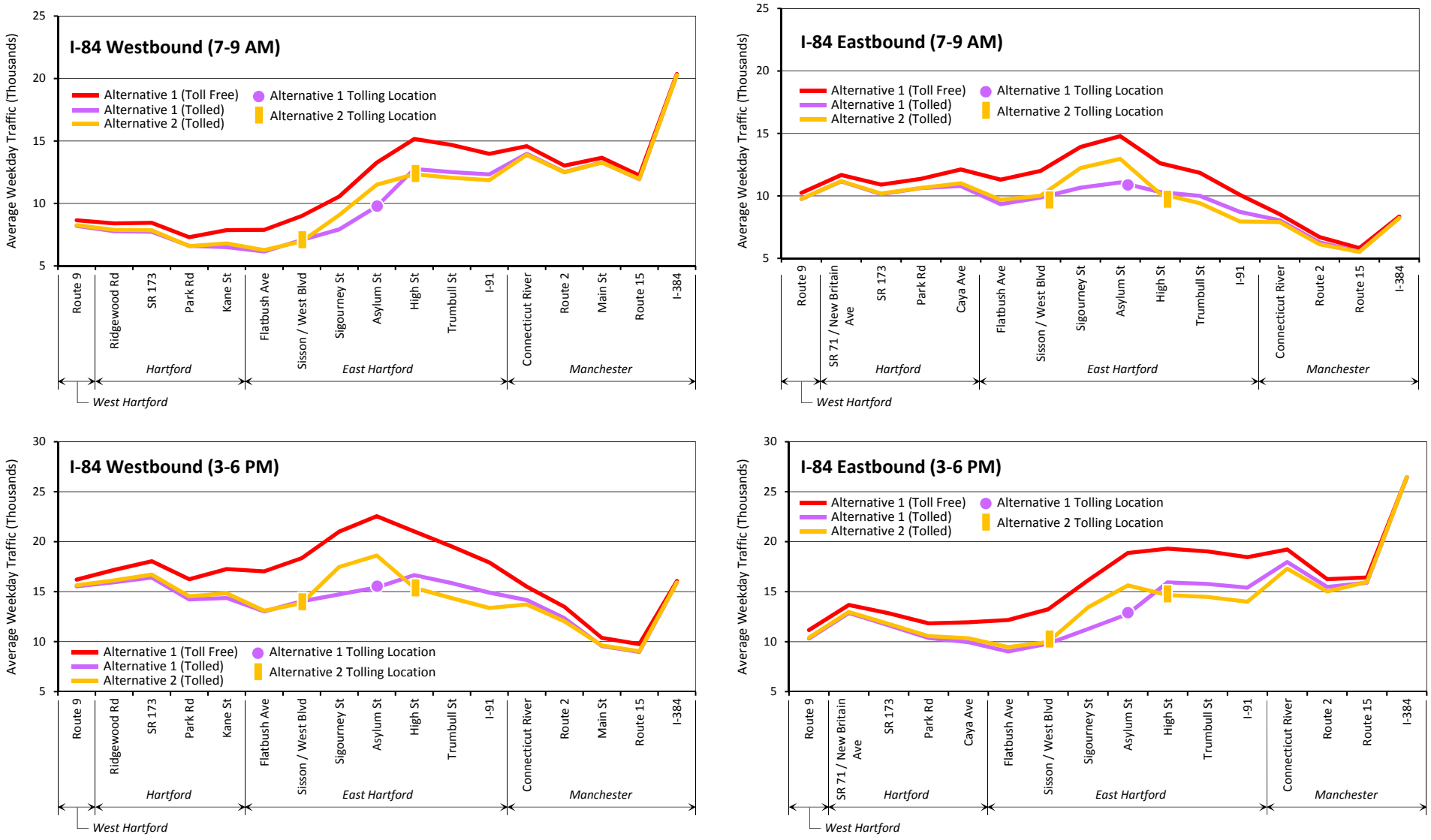
ALTERNATIVE 7 - I-91 HOV TO HOT CONVERSION

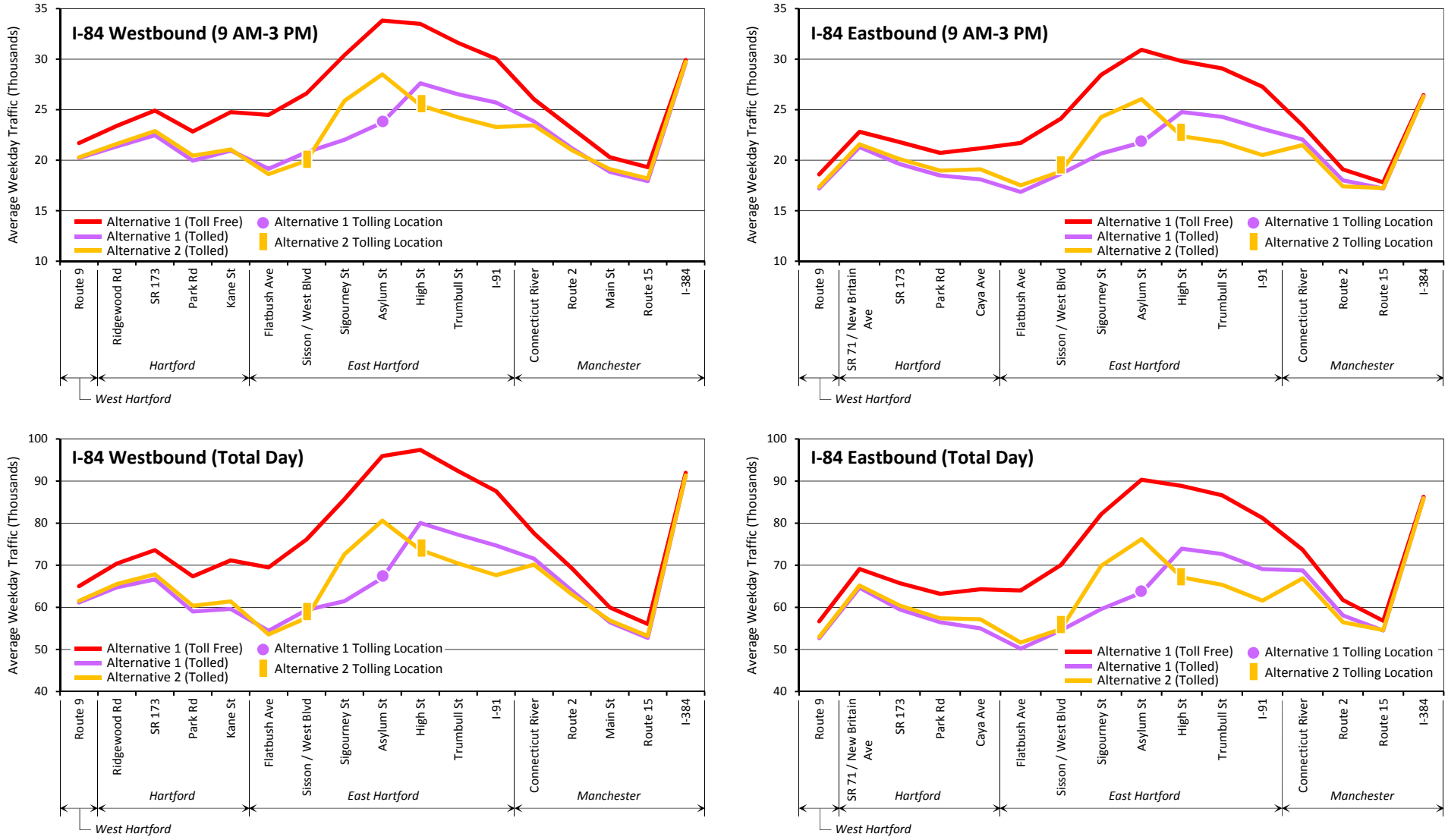
FIGURE ES-10



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 1 (TOLLED), ALTERNATIVE 2 (TOLLED) AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

FIGURE ES-11



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 1 (TOLLED), ALTERNATIVE 2 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

FIGURE ES-12

the limits, traffic is similar among all three alternatives. Clearly, the diversion is concentrated locally, with traffic exiting I-84 at an earlier interchange, entering I-84 at a later interchange, or using a local highway or arterial to enter/exit Hartford to avoid the toll.

As would be expected under Alternative 1, the largest reduction in traffic occurs at the tolling location, where a 30 percent reduction in average weekday traffic could be expected. The percentage of retained traffic increases the further away from the tolling location, with only a 5 percent reduction in traffic estimated west of the Route 9 interchange. The roadway network and the frequency of interchanges in Hartford allow for traffic to exit I-84 prior to the tolling location or enter I-84 beyond the tolling location. Because a significant amount of the traffic on I-84 in Hartford has origins or destinations in the local area, coupled with relatively dense network, a significant amount of toll avoidance would be possible (even at the relatively modest toll rate assumed).

Alternative 2, assumes two tolling locations; one located just west of the Sisson Avenue interchange and the second location located east of the Asylum Street interchange. As expected, traffic reductions are highest at the two tolling locations, where a roughly 24 percent reduction in traffic is estimated under a tolled condition. Through the Viaduct section (just west and east of the Sigourney interchange), traffic is estimated to be about 85 percent of toll free volumes. Overall, percent retained levels tend to be higher under Alternative 2 when compared to Alternative 1. The exception being on the eastern end of I-84 (west of the CT River), where the high volume of traffic to and from the east at the Asylum/Broad Street interchanges is now subject to a toll, whereas under Alternative 1, this movement is not tolled.

Toll Free versus Alternative 3 and Alternative 4

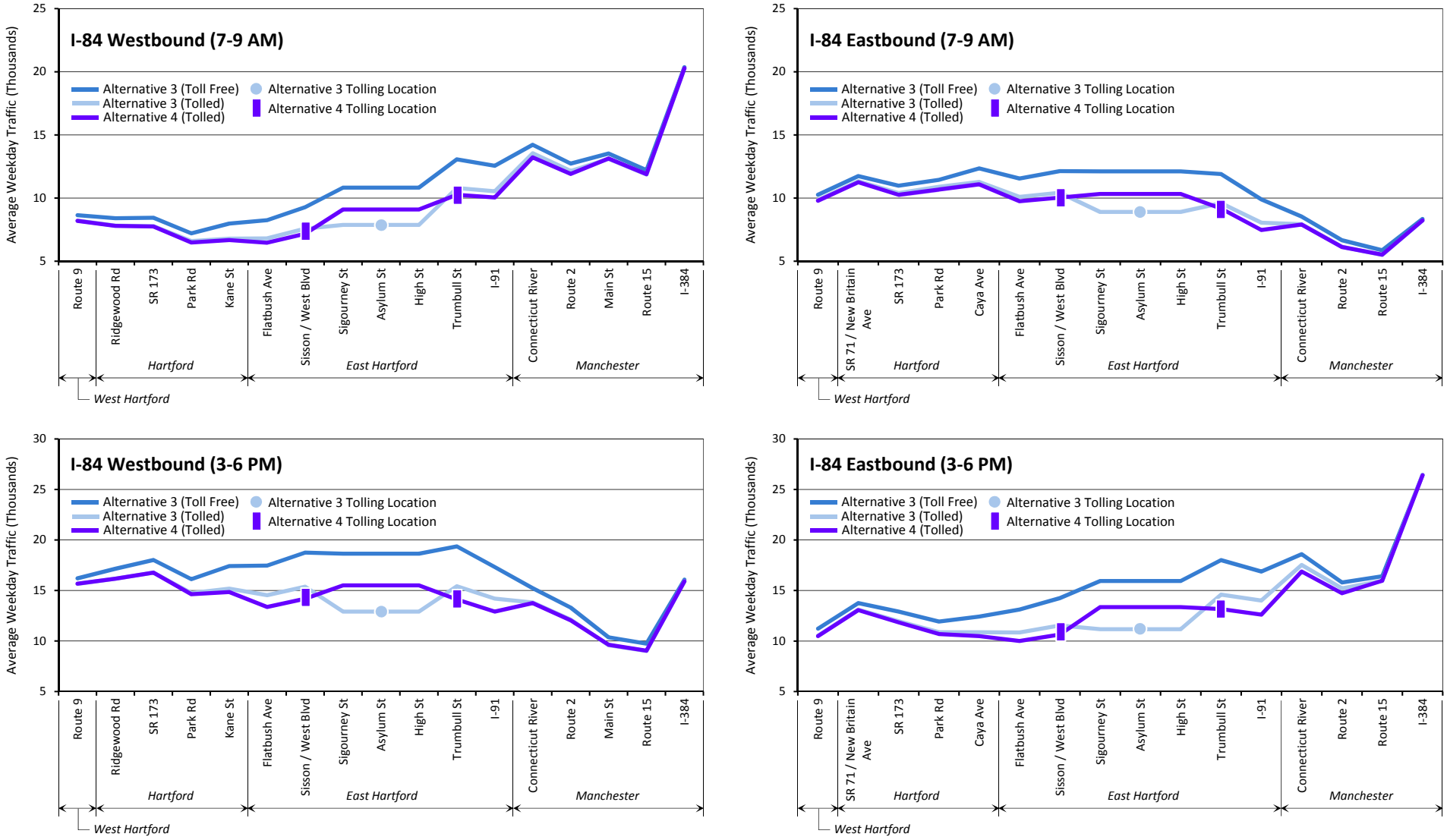
Figures ES-13 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for toll free conditions under this build configuration, Alternative 3 (point toll), and Alternative 4 (two tolling locations). All three of these volume profiles reflect the physical changes of a major reconstruction of I-84 in Hartford and the consolidation of interchanges into two major interchanges. Demand through the Viaduct section of I-84 under this build configuration is estimated to be lower than the no build (current) configuration. Under tolling, traffic under these alternatives have similar reactions to those found in Alternative 1 and 2. **Figure ES-14** shows the same information, but for the Midday period and for the average weekday total.

Toll Free versus Alternative 5

Figures ES-15 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for toll free conditions under this build configuration and Alternative 5 (two tolling locations). **Figure ES-16** shows the same information, but for the Midday period and for the average weekday total. Under tolling, traffic is estimated to behave similar to Alternative 2 and 4. Volumes through the Viaduct section, including the sum of volumes on both the I-84 mainline and the C-D road fall in between those estimated for Alterative 2 and Alternative 4, which is attributed to the physical difference among the alternatives.

Alternative 6 - I-84 Expanded Tolling

Figures ES-17 displays 2020 and 2040 estimated volumes in thousands for a scenario that considers tolling I-84 between Hartford and NY along I-84. Both tolled and toll free traffic estimates are shown at each of the assumed 11 tolling locations for 2020 and 2040. Passenger vehicles equipped with a transponder would be charged $0.50 at each location during the peak periods and $0.35 during off peak periods. Passenger vehicles not equipped with a transponder would be assessed a toll that is 50



2020 ESTIMATED AVERAGE DAILY TRAFFIC
ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 3 (TOLLED), ALTERNATIVE 4 (TOLLED)
AM (7-9 AM) AND PM (3-6 PM) PERIODS

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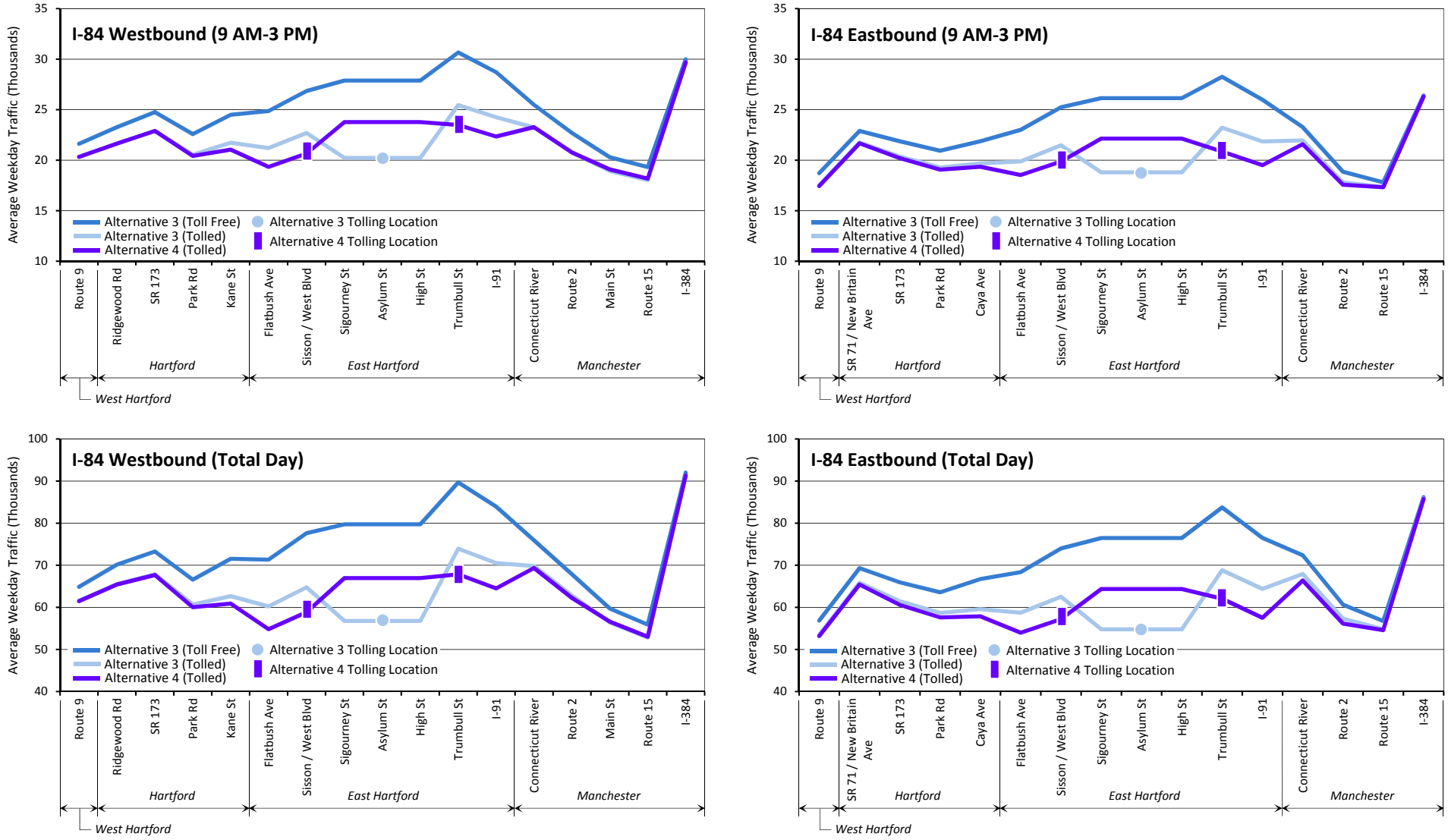
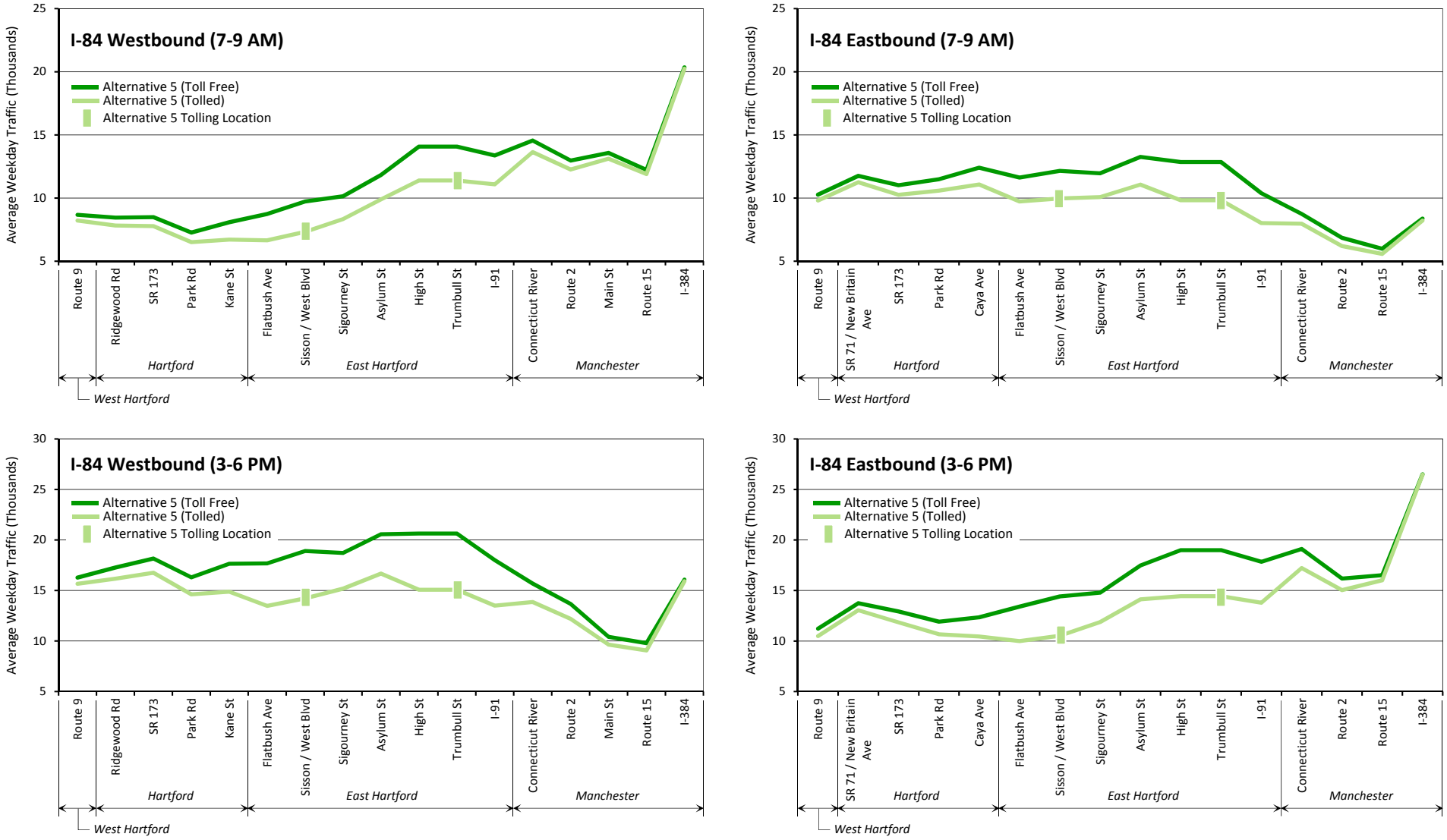
FIGURE ES-13



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 3 (TOLLED), ALTERNATIVE 4 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

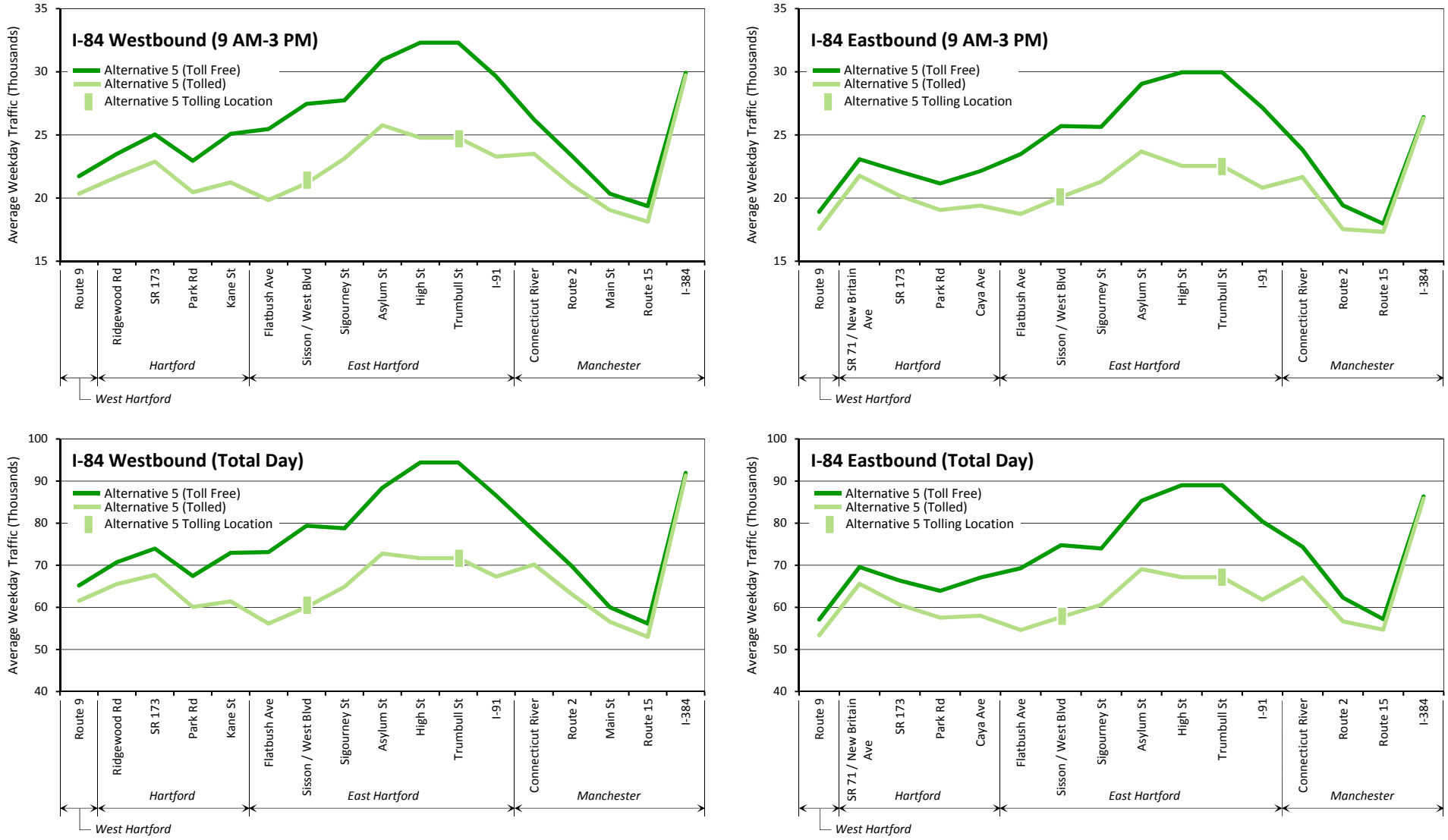
FIGURE ES-14



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 5 (TOLL FREE), ALTERNATIVE 5 (TOLLED) AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

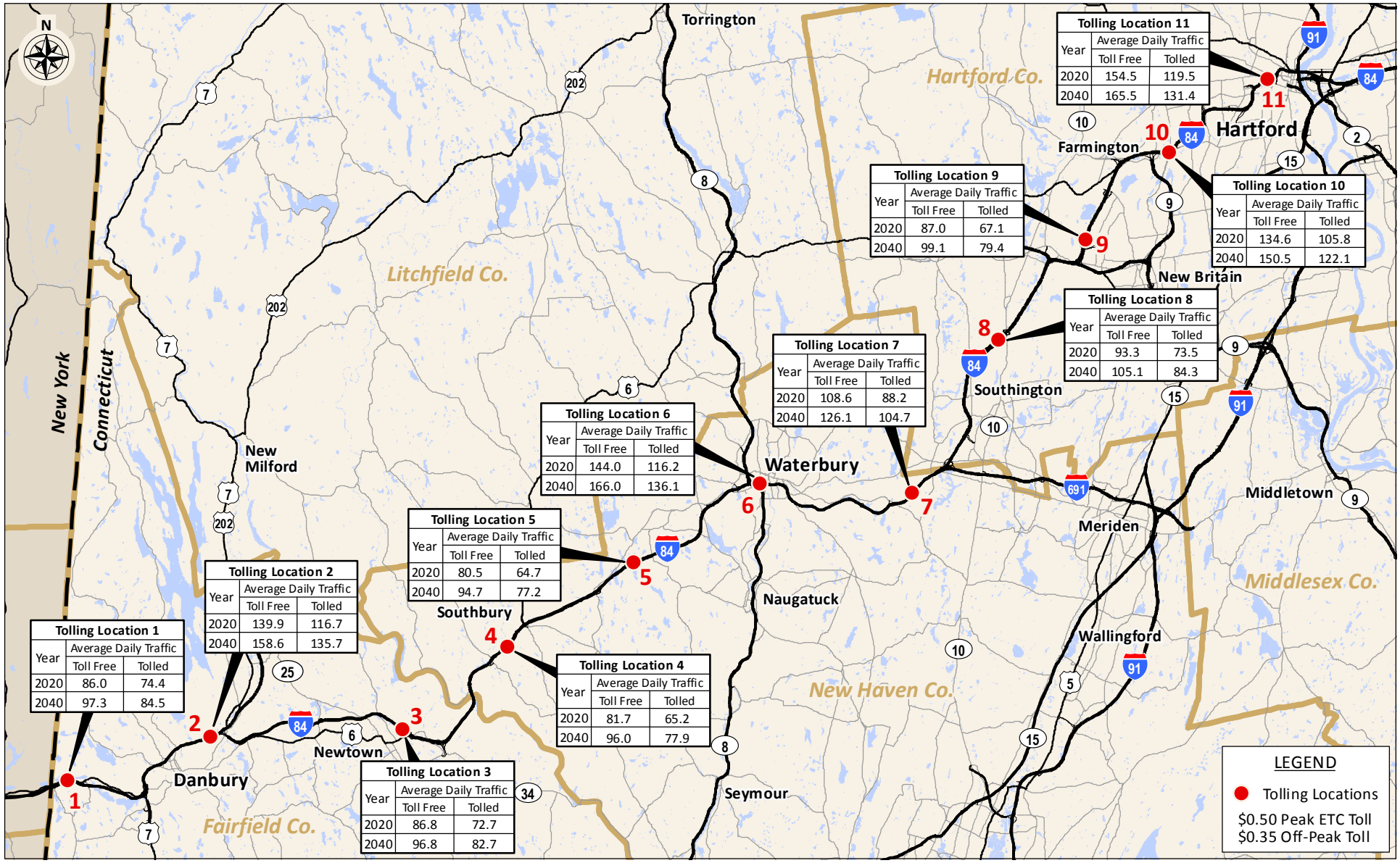
FIGURE ES-15



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 5 (TOLL FREE), ALTERNATIVE 5 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

FIGURE ES-16



Tolling Location 1

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	86.0	74.4
2040	97.3	84.5

Tolling Location 2

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	139.9	116.7
2040	158.6	135.7

Tolling Location 3

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	86.8	72.7
2040	96.8	82.7

Tolling Location 4

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	81.7	65.2
2040	96.0	77.9

Tolling Location 5

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	80.5	64.7
2040	94.7	77.2

Tolling Location 6

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	144.0	116.2
2040	166.0	136.1

Tolling Location 7

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	108.6	88.2
2040	126.1	104.7

Tolling Location 8

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	93.3	73.5
2040	105.1	84.3

Tolling Location 9

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	87.0	67.1
2040	99.1	79.4

Tolling Location 10

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	134.6	105.8
2040	150.5	122.1

Tolling Location 11

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	154.5	119.5
2040	165.5	131.4

ALTERNATIVE 6 - EXPANDED I-84 TOLLING (NY-HARTFORD): GANTRY LOCATIONS

CDM Smith

FIGURE ES-17

percent higher than the transponder toll rate. Trucks would be charged a proportionately higher toll rate depending on the number of axles.

In general, it is estimated that approximately 82 percent of the toll free traffic on average would be retained at the tolling locations. Some toll locations would tend to have higher diversion while others would have lower diversion depending on the relative attractiveness and ease of using an alternate route, travel patterns, and traffic composition. Actual tolling locations and toll rates would be further refined if such a tolling alternative was to move forward.

Alternative 7 – I-91 and I-84 High Occupancy Toll (HOT) Lanes

Figure ES-18 displays the 2020 estimated AM peak period volumes in thousands for the I-91 HOT lanes Alternative in the southbound and northbound directions. The southbound direction is the heaviest travel direction during the AM Peak Period. It should be noted that the toll system of the HOT lanes would be set dynamically to manage the amount of single occupant vehicles (SOVs) entering the HOT lanes at any time, thereby ensuring that the HOT lanes provide a reliable and time savings alternative to the general purpose lanes. Typically, the total traffic that is allowed on a HOT lane to ensure a reliable travel speed is around 1,500 vehicles per lane per hour. In addition, the tolling policy utilized for this analysis assumed a traffic maximization rather than a revenue optimization approach, meaning that the lowest toll rate was selected that limited volume to 1,500 vehicles per lane per hour.

During both the 7-8AM and 8-9AM peak hours in the southbound direction, there are about 700 high occupancy vehicles (HOVs) in the HOT lane, and another 700 to 800 SOVs that are estimated to be willing to pay a toll to utilize the time savings and reliability benefit of the HOT lane. The northbound direction is the off peak direction during the AM and thus far fewer vehicles are estimated to use the HOT lane.

Figure ES-19 displays the same information for the I-91 HOT lanes, but for the PM peak period hours. During the PM peak period, congestion is present in both the southbound and northbound directions on I-91. Between the hours of 4 and 6PM in each travel direction, between 1,100 and 1,500 single occupant vehicles and about 1,200 to 1,300 high occupancy vehicles are estimated to use the HOT lane, respectively.

Figures ES-20 displays the 2020 estimated AM peak period volumes in thousands for the I-84 HOT lanes. During the AM peak period, the major travel direction is westbound as large amounts of traffic are heading to Hartford employment centers. During the 7 to 8AM peak hour, an estimated 800 SOVs would choose to use the HOT lanes over the general purpose lanes. This is in addition to the 700 HOVs.

Figure ES-21 displays the same information for the I-84 HOT lanes, but for the PM peak period. The eastbound direction is the peak travel direction. An estimated 1,700 SOVs would utilize the HOT lanes during the 4 to 6PM time period rather than driving in the general purpose lanes. This is in addition to the 1,300 HOVs.

The purpose of converting the existing HOV lanes to HOT lanes would be to increase the utilization of the available capacity of the HOV lanes by allowing single occupant vehicles the choice to use the lanes in exchange for paying a toll. This would have the effect of moving traffic out of the existing general purpose lane traffic stream and therefore should provide some measurable congestion relief to the existing general purpose lanes. The other often cited benefit from these projects is that the HOT lane provides a reliable trip when it is needed most. To demonstrate this potential, model output was

| Southbound | | |

Southbound

	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Kennedy Rd.	4.5	0.0	0.0	4.5	9.8	0.0	0.0	9.8	3.3	0.0	0.0	3.3	17.6	0.0	0.0	17.6
Poquonock Ave.	4.3	0.4	0.3	5.0	9.1	0.9	1.0	11.0	3.1	0.3	0.3	3.7	16.5	1.6	1.6	19.7
Bloomfield Ave.	4.6	0.4	0.3	5.3	9.8	1.0	1.2	12.0	3.4	0.3	0.3	4.0	17.8	1.7	1.8	21.3
Park Ave.	5.3	0.5	0.3	6.1	10.7	1.2	1.5	13.4	3.7	0.4	0.3	4.4	19.7	2.1	2.1	23.9
SR 291	5.5	0.5	0.3	6.3	10.7	1.2	1.5	13.4	3.9	0.4	0.3	4.6	20.1	2.1	2.1	24.3
Windsor Ave.	4.6	0.5	0.3	5.4	8.8	1.2	1.5	11.5	3.5	0.4	0.3	4.2	16.9	2.1	2.1	21.1
Jennings Rd.	4.6	0.5	0.3	5.4	8.9	1.2	1.5	11.6	3.6	0.4	0.3	4.3	17.1	2.1	2.1	21.3
Liebert Rd.	5.9	0.0	0.0	5.9	12.5	0.1	0.1	12.7	4.6	0.0	0.0	4.6	23.0	0.1	0.1	23.2

Northbound

	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Kennedy Rd.	5.8	0.0	0.0	5.8	13.8	0.0	0.0	13.8	4.0	0.0	0.0	4.0	23.6	0.0	0.0	23.6
Poquonock Ave.	6.0	0.3	0.5	6.8	14.1	1.2	1.0	16.3	4.0	0.2	0.2	4.4	24.1	1.7	1.7	27.5
Bloomfield Ave.	5.0	0.3	0.5	5.8	10.8	1.2	1.0	13.0	3.8	0.2	0.2	4.2	19.6	1.7	1.7	23.0
Park Ave.	5.6	0.3	0.5	6.4	11.7	1.2	1.1	14.0	4.2	0.2	0.2	4.6	21.5	1.7	1.8	25.0
SR 291	5.8	0.3	0.5	6.6	12.0	1.2	1.1	14.3	4.3	0.2	0.2	4.7	22.1	1.7	1.8	25.6
Windsor Ave.	5.3	0.3	0.5	6.1	11.0	1.3	1.1	13.4	4.2	0.2	0.2	4.6	20.5	1.8	1.8	24.1
Jennings Rd.	5.5	0.3	0.5	6.3	11.4	1.3	1.1	13.8	4.4	0.2	0.2	4.8	21.3	1.8	1.8	24.9
Liebert Rd.	6.5	0.0	0.0	6.5	13.0	0.1	0.1	13.2	4.5	0.0	0.0	4.5	24.0	0.1	0.1	24.2

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - PM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-91 HOT LANES

CDM Smith

FIGURE ES-19

	Westbound																Eastbound															
	6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total				6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Dobson Rd.	3.5	0.0	0.0	3.5	6.1	0.0	0.0	6.1	5.2	0.0	0.0	5.2	14.8	0.0	0.0	14.8	1.3	0.0	0.0	1.3	2.2	0.0	0.0	2.2	2.2	0.0	0.0	2.2	5.8	0.0	0.0	5.8
Hartford Tpke.	4.1	0.1	0.0	4.2	6.5	0.3	0.4	7.2	5.6	0.4	0.2	6.2	16.2	0.8	0.6	17.6	1.6	0.0	0.0	1.6	2.7	0.0	0.0	2.7	2.7	0.0	0.0	2.7	7.0	0.0	0.0	7.1
SR 30	4.5	0.1	0.0	4.6	7.3	0.3	0.4	8.0	6.1	0.4	0.2	6.7	17.9	0.8	0.6	19.3	1.8	0.0	0.0	1.8	2.9	0.0	0.0	2.9	3.0	0.0	0.0	3.0	7.8	0.0	0.0	7.8
Pleasant Valley Rd.	4.2	0.1	0.1	4.4	6.8	0.4	0.5	7.7	5.7	0.5	0.4	6.6	16.7	1.0	1.0	18.7	1.7	0.1	0.1	1.9	2.8	0.1	0.1	3.0	2.8	0.1	0.1	3.0	7.3	0.3	0.3	7.9
US 44	4.1	0.1	0.1	4.3	7.4	0.4	0.5	8.3	6.1	0.5	0.4	7.0	17.6	1.0	1.0	19.6	1.8	0.1	0.1	2.0	2.9	0.1	0.1	3.1	3.1	0.1	0.1	3.3	7.8	0.3	0.3	8.4
I-384	6.3	0.2	0.2	6.7	10.6	0.7	0.8	12.1	9.1	0.8	0.7	10.6	26.0	1.7	1.7	29.4	2.5	0.1	0.1	2.7	3.9	0.1	0.1	4.1	4.1	0.1	0.1	4.3	10.4	0.3	0.3	11.0
SR 15	3.8	0.0	0.0	3.8	6.4	0.0	0.0	6.4	5.6	0.0	0.0	5.6	15.8	0.0	0.0	15.8	1.8	0.0	0.0	1.8	2.8	0.0	0.0	2.8	3.2	0.0	0.0	3.2	7.8	0.0	0.0	7.8

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - AM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-84 HOT LANES

CDM Smith

FIGURE ES-20

	Westbound																Eastbound															
	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total				3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Dobson Rd.	3.3	0.0	0.0	3.3	6.8	0.0	0.0	6.8	2.3	0.0	0.0	2.3	12.4	0.0	0.0	12.4	4.2	0.0	0.0	4.2	10.2	0.0	0.0	10.2	3.4	0.0	0.0	3.4	17.8	0.0	0.0	17.8
Hartford Tpke.	3.8	0.1	0.0	3.9	7.9	0.2	0.0	8.1	2.8	0.1	0.0	2.9	14.5	0.4	0.0	14.9	4.9	0.1	0.2	5.2	11.7	0.6	0.9	13.2	4.3	0.1	0.1	4.5	20.9	0.8	1.2	22.9
SR 30	4.1	0.1	0.0	4.2	8.4	0.2	0.0	8.6	3.0	0.1	0.0	3.1	15.5	0.4	0.0	15.9	5.5	0.1	0.2	5.8	13.3	0.6	0.9	14.8	4.6	0.1	0.1	4.8	23.4	0.8	1.2	25.4
Pleasant Valley Rd.	3.7	0.1	0.3	4.1	7.5	0.3	0.6	8.4	2.5	0.1	0.1	2.7	13.7	0.5	1.0	15.2	5.0	0.2	0.4	5.6	12.3	0.8	1.1	14.2	4.1	0.2	0.1	4.4	21.4	1.2	1.6	24.2
US 44	3.8	0.1	0.3	4.2	7.6	0.3	0.6	8.5	2.6	0.1	0.1	2.8	14.0	0.5	1.0	15.5	5.5	0.2	0.4	6.1	13.2	0.8	1.1	15.1	4.5	0.2	0.1	4.8	23.2	1.2	1.6	26.0
I-384	5.2	0.2	0.3	5.7	10.3	0.4	0.6	11.3	3.7	0.2	0.2	4.1	19.2	0.8	1.1	21.1	7.5	0.3	0.5	8.3	17.7	1.3	1.7	20.7	5.9	0.3	0.2	6.4	31.1	1.9	2.4	35.4
SR 15	3.4	0.0	0.0	3.4	6.5	0.0	0.0	6.5	2.2	0.0	0.0	2.2	12.1	0.0	0.0	12.1	5.6	0.0	0.0	5.6	14.0	0.0	0.0	14.0	4.2	0.0	0.0	4.2	23.8	0.0	0.0	23.8

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - PM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-84 HOT LANES

CDM Smith

FIGURE ES-21

summarized for two conditions; operation of the HOV lanes as they exist today versus a HOT lane operation.

Table ES-1 shows 2020 estimated average travel speeds along the general purpose lanes and the HOV or HOT lanes for the AM and PM peaks over the limits of the project. The top half of the table shows the average speeds under a continued operation of the HOV lanes, while the bottom half of the table shows the estimated average speeds under a HOT operation. The left half of the table shows results for the I-91 corridor, while the right half displays the results for the I-84 corridor. The shading highlights the peak periods.

The I-91 southbound general purpose (GP) travel speeds in the southbound direction under current HOV operation are estimated to operate at 46 mph during both the 8 to 9AM hour and the 4 to 6PM period. Under HOT operation, these general purpose lane speeds are estimated to increase to 54 and 55 mph, respectively. The northbound general purpose lane travel speeds during the 4 to 6PM time period are estimated to increase from 51 mph under an HOV operation to 56 mph during a HOT operation.

The I-84 westbound general purpose (GP) travel speeds under current HOV operation are estimated to operate at 50 mph during the 7 to 8AM hour. Under HOT operation, these general purpose lane speeds are estimated to increase to 54mph. The eastbound general purpose lane travel speeds during the 4 to 6PM time period are estimated to increase from 51 mph under an HOV operation to 55 mph during a HOT operation.

Table ES-1
Alternative 7: 2020 I-91 and I-84 Estimated Speeds
HOV versus HOT Operation

	I-91 Average Travel Speed - Current HOV operation						I-84 Average Travel Speed - Current HOV operation					
	I-91 Southbound			I-91 Northbound			I-84 Westbound			I-84 Eastbound		
Time Period	GP	HOV	Total	GP	HOV	Total	GP	HOV	Total	GP	HOV	Total
6:00-7:00	66	70	66	67	70	68	66	70	66	67	70	67
7:00-8:00	48	69	49	65	70	65	50	70	51	67	70	67
8:00-9:00	46	70	47	65	70	65	59	69	60	66	70	67
9:00-3:00	64	70	65	66	70	66	67	70	67	66	70	66
3:00-4:00	61	70	61	55	70	56	67	70	67	59	70	60
4:00-6:00	46	69	48	51	69	52	67	70	67	51	70	52
6:00-7:00	60	70	60	67	70	67	67	70	67	65	70	65
7:00-6:00	68	70	68	68	70	68	67	70	67	67	70	67

	I-91 Average Travel Speed - HOT Operation						I-84 Average Travel Speed - HOT Operation					
	I-91 Southbound			I-91 Northbound			I-84 Westbound			I-84 Eastbound		
Time Period	GP	HOT	Total	GP	HOT	Total	GP	HOT	Total	GP	HOT	Total
6:00-7:00	66	70	67	67	70	68	66	70	66	67	70	67
7:00-8:00	55	62	56	65	70	65	54	65	55	67	70	67
8:00-9:00	54	61	56	65	70	65	61	67	62	66	70	67
9:00-3:00	65	70	66	66	70	66	67	70	67	66	70	66
3:00-4:00	63	69	64	60	69	61	67	70	67	61	69	62
4:00-6:00	55	61	56	56	65	58	67	70	67	55	65	56
6:00-7:00	63	69	63	67	70	67	67	70	67	65	70	65
7:00-6:00	68	70	68	68	70	68	67	70	67	67	70	67

Shading indicates peak hours between 7AM and 9AM and between 4PM and 6PM.

While these potential general purpose lane speed improvements along I-91 and I-84 are quite significant, the southern termini of the existing I-91 and I-84 HOV lanes if converted to HOT lanes should be further evaluated operationally to determine if allowing extra vehicles exiting from the HOT lane would impact highway operations. Physical changes along the southern termini segments of each HOT lane will likely need to be considered in order to mitigate any operational impacts and fully recognize the speed improvements along the general purpose lanes from a HOV to HOT conversion.

I-84 Hartford Traffic Operations Findings

A special operations model was created in order to assess the potential operational impacts from tolling I-84 in Hartford. The microsimulation model was built to include the transportation network which could be potentially impacted by the alternatives, including local arterials through Hartford. The microsimulation model includes I-84 from Trout Brook Drive (Exit 42) in West Hartford to the Middle Turnpike / U.S. 6 / U.S. 44 (Exit 61) in Manchester. The model also includes portions of I-91 from Brainard Road (Exit 27) to Trumbull Street (Exit 32B). Also included are the connections to I-384, Route 15, and Route 2. The microsimulation model also includes a significant portion of the arterial system in downtown Hartford. **Figure ES-22** highlights in orange the roadways which were explicitly simulated in the model.

Figure ES-22
Simulation Model Geographic Limits

Source of Aerial Imagery: Google Maps

During analysis of 2040 No-Toll (Toll Free) scenarios, it was recognized that 2040 conditions would see significant increases in congestion far above the already heavily congested conditions of today, even at very modest growth rates. This finding would make the output from the simulation model unstable and of little use due to "gridlock" conditions in portions of the network. The goal of this congestion relief study was not to determine the roadway improvements needed to satisfy 2040 demand conditions, but to estimate the feasibility of adding all electronic tolling on I-84 and the impacts of potential diversions onto the surrounding roadways, including onto Hartford's arterial roadways. Given that the 2040 demands cannot be adequately served by the No Build network or by the preliminary build alternatives as received during the course of this study, the decision was made to examine the tolling impacts under the existing traffic demands conditions (2012 demand levels). As such, all subsequent simulation analyses conducted were simulated using the 2012 demands.

I-84 Operations Analysis

Two different tolling scenarios were simulated to assess the potential impact of tolling on operations of I-84 and the adjoining arterial streets in Hartford and West Hartford. These included a single point toll (Alternative 1 Tolled) and a scenario with two tolling locations (Alternative 2 Tolled). In both cases, tolling operations would be fully electronic and no toll barriers would exist.

Alternative 1 Tolled - Single Point Toll Scenario

In the point toll scenario, a single toll gantry would be located along the current Aetna viaduct location between the Sigourney Street and Capital Avenue ramps. At the gantry location, a peak period toll of one dollar ($1.00) for a passenger vehicle equipped with a transponder would be charged per vehicle passing the gantry in either the eastbound or westbound direction. Vehicles without a transponder

were assumed to be assessed a $1.50 toll to account for the additional cost of processing, mailing, and collecting the toll from video toll users. Trucks would be assessed a proportionally higher toll rate.

Figure ES-23 displays the Alternative 1 tolling speed contours versus the toll free condition for the AM Peak Period. Under the tolling alternative, a single point toll gantry is located at the existing Aetna Viaduct between the Asylum Street and Sigourney Street ramps. Under these conditions, the Asylum Street off-ramp from I-84 Westbound serves as the last exit before the toll gantry, and sees additional traffic demands from those vehicles trying to avoid paying the toll. During the AM Peak Period under existing conditions (toll free), this off-ramp and the resulting signal delays at Asylum Street and Farmington Avenue are the source of a major bottleneck, with the demand frequently exceeding the storage space on the off-ramp and queues can be seen to spill back and affect the mainline operations of I-84 eastbound. In the AM Peak Period Point Toll simulation conditions, the effects of the additional demand for the Asylum Street off-ramp create even more congestion problems along I-84 westbound. In the eastbound direction during the AM Peak Period, the congestion that does exist on I-84 from the Flatbush on ramp westward is alleviated under the tolled condition as overall demand is reduced under tolling.

Figure ES-24 displays the Alternative 1 tolling speed contours versus the toll free condition for the PM Peak Period. During the PM Peak Period in the westbound direction, the Alternative 1 Toll Free condition sees the largest bottleneck in the westbound direction approaching at the left hand exit to Flatbush Avenue. Under the Alternative 1 toll scenario, the volume of traffic traveling along westbound I-84 is somewhat reduced due to local diversions to arterial streets and long distance diversion to regional alternatives (e.g. I-684). However, despite the reduced traffic demand, the increased demand for traffic exiting I-84 at the Asylum Street off-ramp to avoid paying the toll creates a new bottleneck that is reminiscent of the bottleneck in the same location in the AM Peak Period. Although more minor in nature than in the AM peak, this can still be seen to create slow moving traffic along I-84 westbound as far east as the tunnel on I-84 in the downtown area. In the PM Peak Period in the eastbound direction, the severe bottleneck seen in the 2012 Alternative 1 Toll Free conditions at the Bulkeley Bridge over the Connecticut River remains in the 2012 Alternative 1 Point Toll scenario. However, due to the slightly reduced volumes for traffic on I-84 from combined arterial and regional

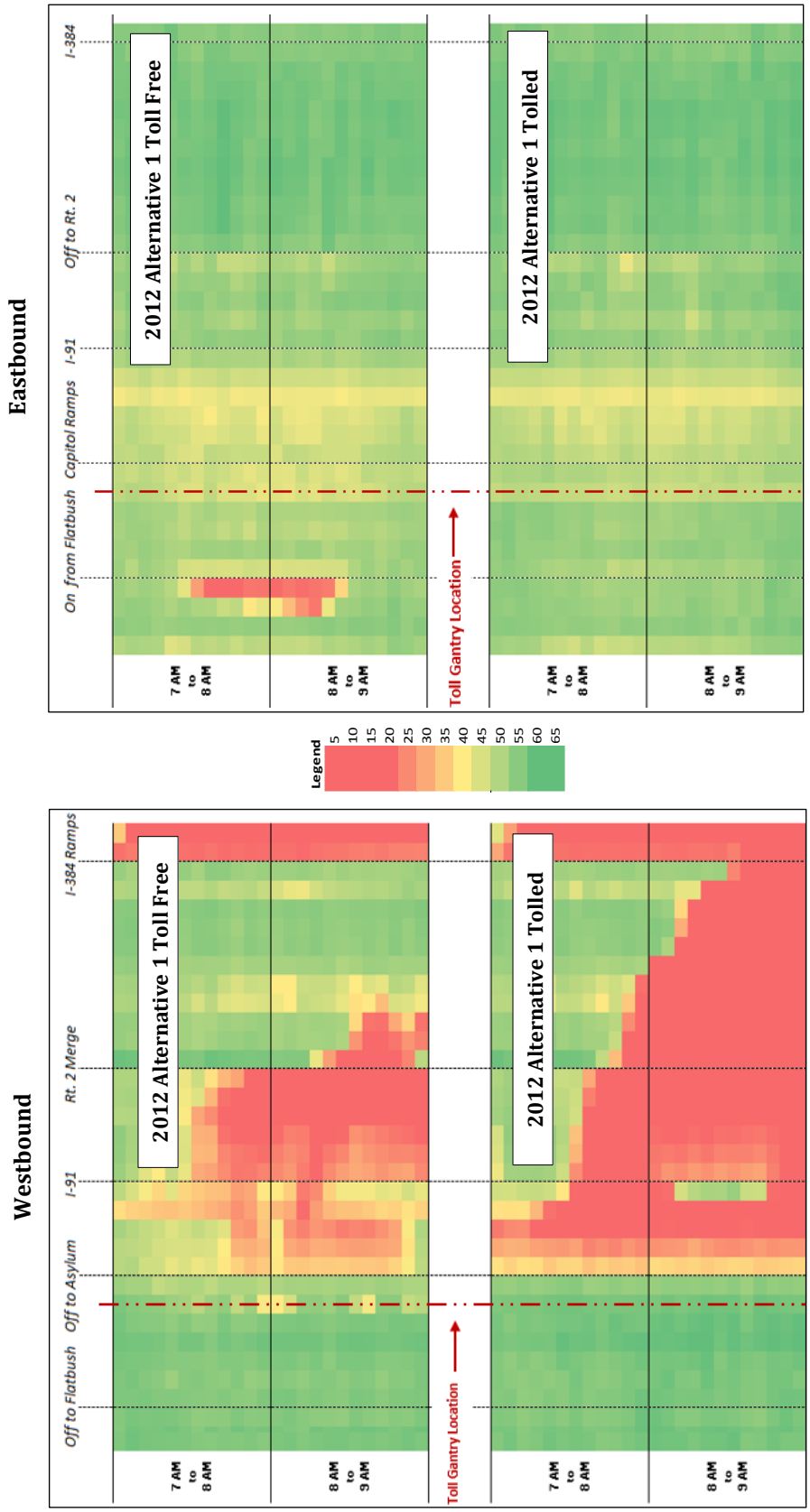


Figure ES-23
I-84 Speed Contours for AM Peak Period
Alternative 1 Toll Free Versus Alternative 1 Point Toll

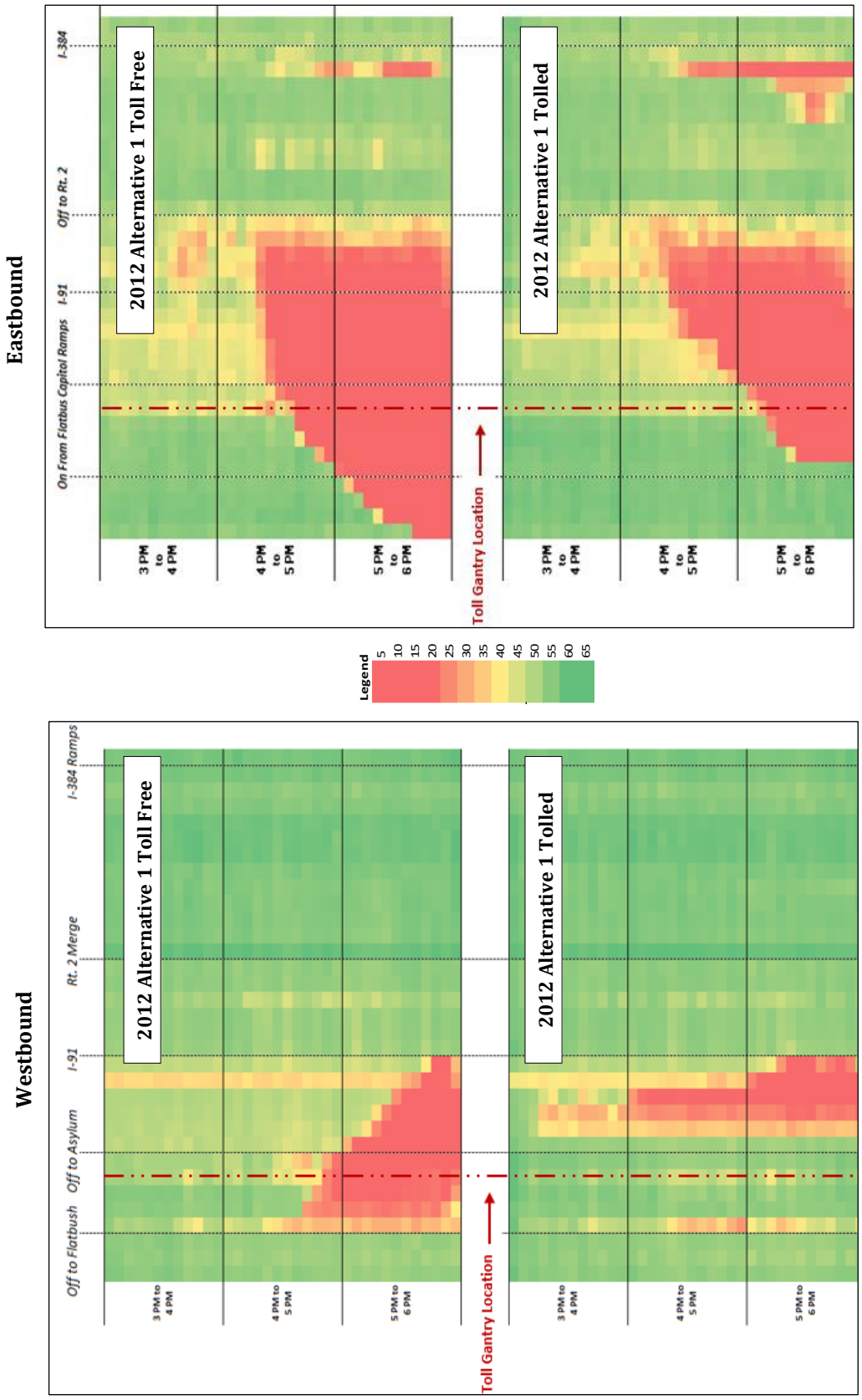


Figure ES-24
I-84 Speed Contours for PM Peak Period
Alternative 1 Toll Free Versus Alternative 1 Point Toll

toll diversions, the bottleneck, while still severe and backing up for miles, is reduced over the 2012 Alternative 1 Toll Free conditions.

Alternative 2 Tolled - Two Tolling Locations Scenario

In the two tolling locations scenario, two separate toll gantries would be implemented and located east of the westbound I-84 Asylum Street off-ramp, and west of the West Boulevard ramps. At each gantry location, a fifty cent ($0.50) peak period toll would be collected in either direction. While the overall toll for a through trip on I-84 would remain the same as for the single point toll scenario, splitting the toll into two collection points could reduce diversion impacts for local Hartford-based traffic.

Figure ES-25 displays the Alternative 2 tolling speed contours versus the toll free condition for the AM Peak Period. In the westbound direction, I-84 sees large operational improvements at the Asylum off-ramp, with traffic now flowing near free flow conditions throughout the AM Peak Period. This improvement in operations is caused by the combined reduction in the demand from traffic diverting from the toll locations. This diversion traffic takes two forms; first, regional diversions which avoid the I-84 Corridor through Hartford, and second, local diversion traffic. For local diversion traffic, drivers avoid paying the toll at the first gantry location east of Asylum off ramp by exiting at the previous off-ramp to Main Street immediately upstream of the first toll gantry location. Drivers trying to get to the downtown Hartford area use the Main Street off-ramp to Chapel Street, and then have to make a left turn at either Market Street, Main Street or Trumbull Street to reach the downtown area, while more westerly destined trips continue along Chapel Street and then seek to turn left at Pleasant Street or High Street. All these intersections have limited left turn capacity, and even with timing adjustments to increate left turn capacities, the signals are not able to accommodate the additional diverted traffic and eventually queues extend along Main Street and back onto the I-84 mainline. Immediately downstream of the Bulkeley Bridge, the four travel lanes of I-84 split to feed the off-ramp to I-91 Northbound and the Main Street off-ramp, with only two lanes continuing on I-84. These diverges are very closely spaced, and create additional weaving friction as vehicles position themselves in the correct lane. When the Main Street off-ramp queue eventually spills back to the I-84 Mainline, this weaving becomes increasing more difficult, and queues quickly build on I-84. In the eastbound direction, operations in the AM Peak Period improve slightly under the tolled condition, as the reduced I-84 demand eliminates the minor 2012 Alternative 1 Toll Free bottleneck approaching Flatbush Avenue, and the entire corridor to operates at or near free flow speed conditions.

Figure ES-26 displays the Alternative 2 tolling speed contours versus the toll free condition for the PM Peak Period. In the westbound direction, operations at the Flatbush Avenue bottleneck improve as the toll diversions reduce the throughput demand at this location. While the bottleneck does still form, it occurs later in the PM Peak Period and is lessened in its severity. In the eastbound direction, the major bottleneck approaching the Bulkeley Bridge over the Connecticut River continues to form and create severe congestion, although the effects of the congestion are somewhat improved due to the reduction in demand to cross the Bulkeley Bridge. The bottleneck west of the I-384 diverge, which is caused by merging and weaving vehicles approaching the I-384 diverge, is increased in severity. This bottleneck is worsened as diverted traffic joins back onto I-84 after crossing the Connecticut River at the Founders Bridge (local diversion traffic) or the Charter Oak Bridge (regional diversions). The additional demands on merging and weaving along I-84 approaching the I-384 diverge create a moderate increase in the bottleneck severity.

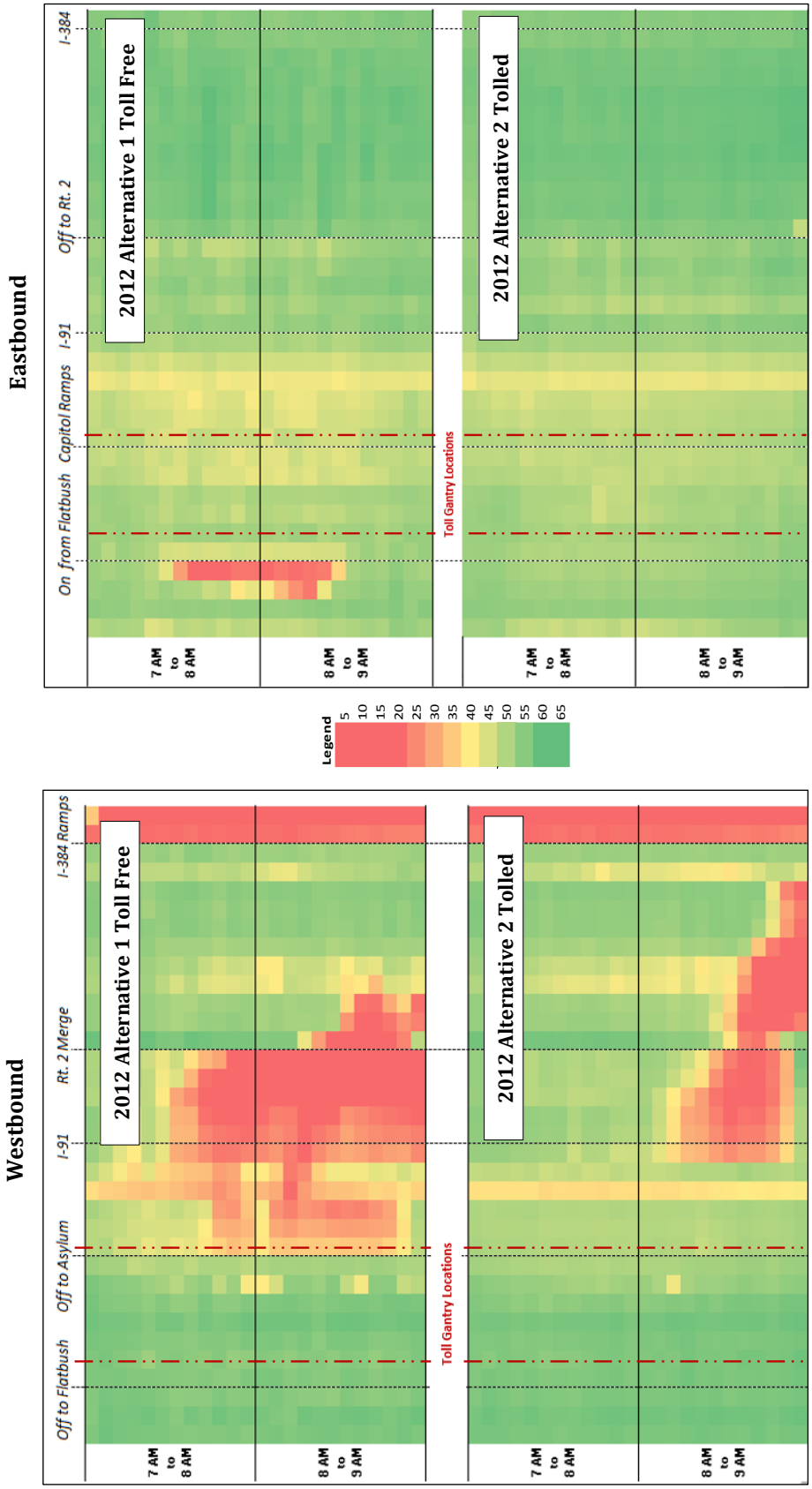


Figure ES-25
I-84 Speed Contours for AM Peak Period
Alternative 1 Toll Free Versus Alternative 2 Tolled

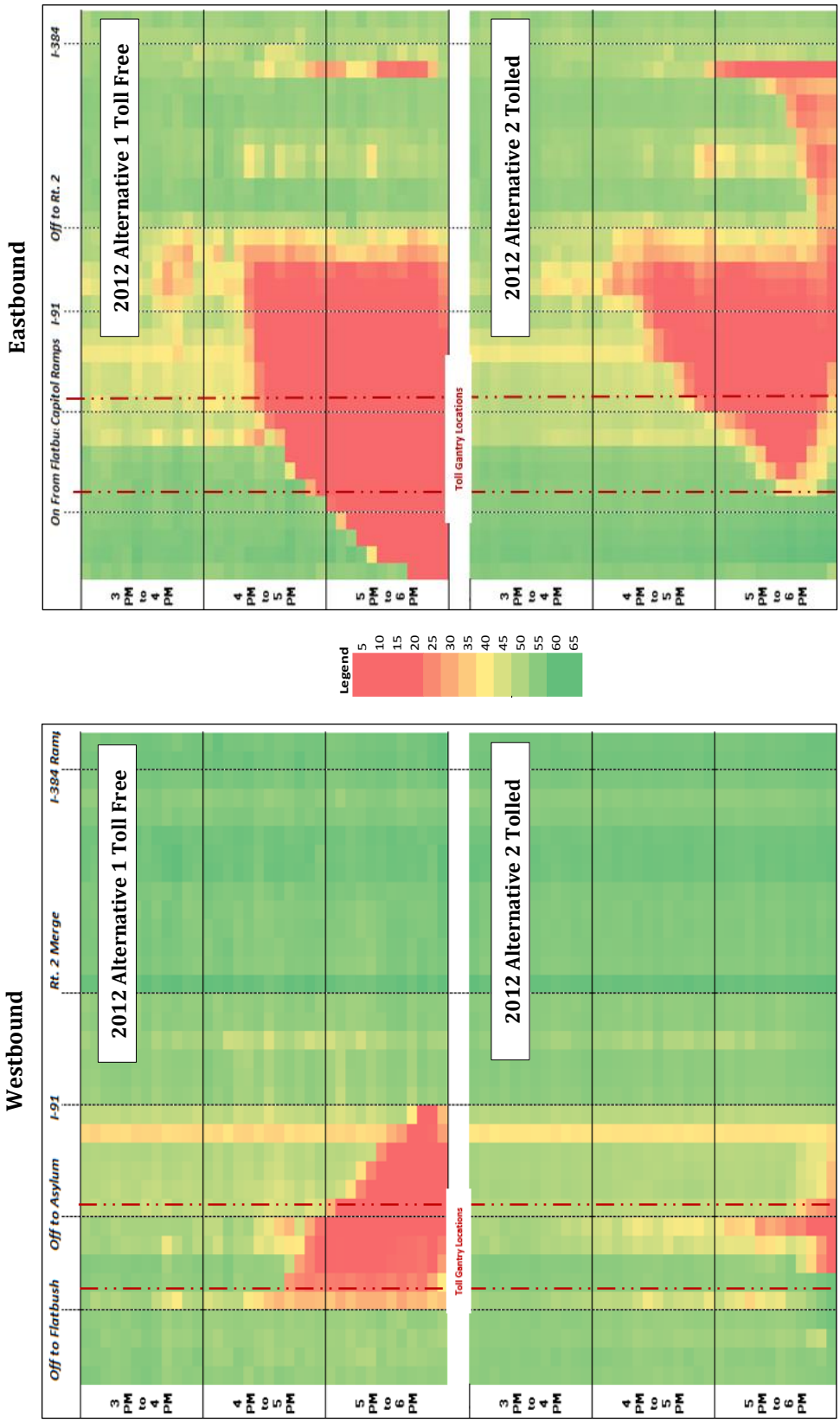


Figure ES-26
I-84 Speed Contours for PM Peak Period
Alternative 1 Toll Free Versus Alternative 2 Tolled

Systemwide Performance Measures

While the previous sections quantified the impacts of tolling on the I-84 freeway operations, the operational impacts on the arterials and local roadways were also examined. Vehicle miles travelled (VMT), vehicle hours travelled (VHT), and average travel speeds were summarized for the simulated area. **Figure ES-27** presents average travel speeds for different classes of roadways throughout the AM and PM Peak Periods for the 2012 No Build (Alternative 1 Toll Free), 2012 Single Point Toll (Alternative 1 Tolled), and 2012 Two Tolling Locations (Alternative 2 Tolled) scenarios.

In the 2012 Single Point Toll scenario, westbound traffic seeks to exit from I-84 predominately at the Asylum Street off-ramp and use alternative local diversion routes through the surface street network to avoid paying the toll. Similarly, eastbound traffic on I-84 exits early at Prospect Avenue to avoid the point toll gantry along the viaduct. In the 2012 Split Toll scenario, local diversion traffic is somewhat more dispersed, but the network still sees diversion traffic exiting westbound I-84 onto the Main Street off-ramp and eastbound off-ramp traffic at Prospect Avenue and Capital Avenue. Under both tolling scenarios, from these exit points, the local diversion traffic will use the surface street arterial network to complete their trips, with relatively significant increases in traffic seen along the major east-west arterials, including Farmington Avenue, Capital Avenue, Park Street, and Chapel Street.

In both the AM and PM Peak Periods, this local diversion traffic creates additional demand for the arterial and local street roadways, some which are already operating at or near capacity during peak conditions. While the simulation analyses considered minor additional improvements such as re-striping of turn lanes or addition or extension of turn bays which would not likely require right-of-way takings or major construction efforts, the arterial system still operates at capacity in key locations and significant increases in congestion can be seen, and results in the decrease of the arterial and local roadway average speeds. In both conditions, this effect is more impactful in lowering the operational conditions on the arterial in the already more congested PM Peak Period.

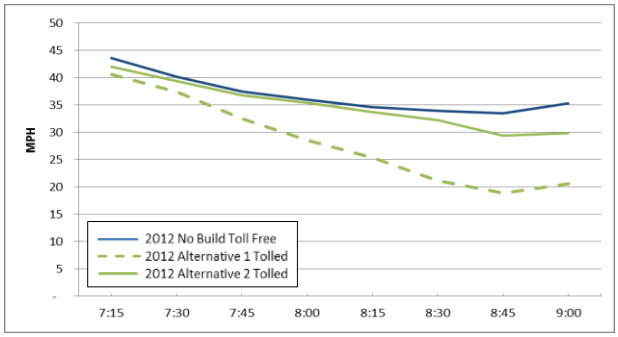
These impacts are much more significant in the Point Toll scenario where the diversion vehicles are more concentrated and add to an already oversaturated operating condition at the Asylum Street off-ramp. While these problems may possibly be resolved with a redesign of the Asylum Avenue, Farmington Avenue, and Broad Street intersections, significant improvements would likely be needed. Overall in the AM Peak Period, the total VMT on the study area roadways increased on the arterials and local roadways, with more substantial increases in VHT and decreases in the average speed. This effect is even stronger in the PM Peak Period, with average travel speeds across the entire surface street network dropping by more than half during the core of the peak period.

The Two Toll Location scenario (Alternative 2) operates better that the Single Point Toll scenario (Alternative 1) as the vehicles avoiding to pay the toll are spread across more exits as compared to the point toll scenario. An additional benefit of the two tolling locations is that it discourages travel on the already congested Asylum Street off-ramp. While that traffic primarily diverts to the Main Street off-ramp (Exit 50), there could be better opportunities to add capacity along Chapel Street to accommodate the increase in demand.

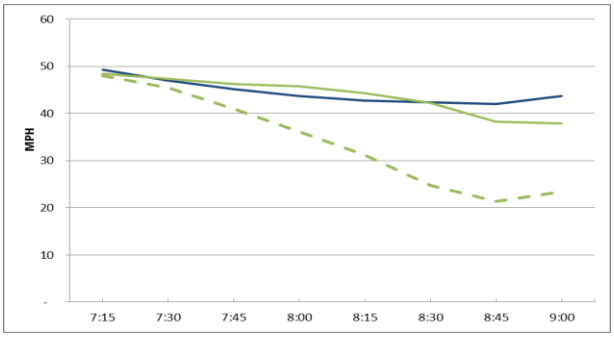
Overall, during the AM Peak Period in the Two Tolling Location scenario, the operations on the arterials see more demand, with VHT increases and average speed decreases. However, the local roadways do not see as large of a deterioration of operational conditions, which is an indication that the arterial roadways are better able to serve the additional local diversion traffic without that traffic seeking even lower class roadways to avoid increased congestion. During the PM Peak Period,

Figure ES-27
Average Travel Speeds

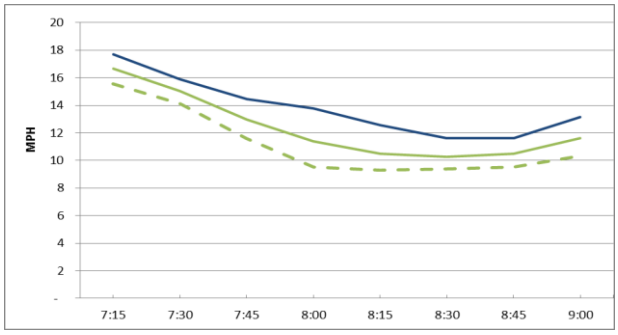
AM Peak Period



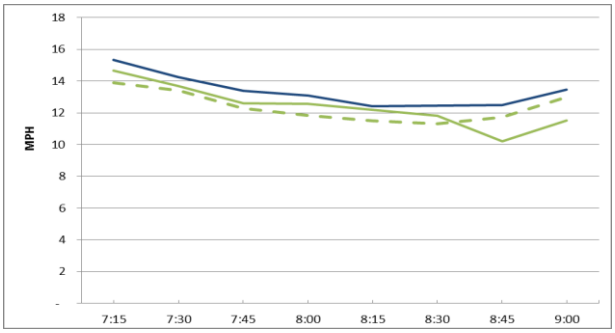
Network Wide



Freeway and Ramps

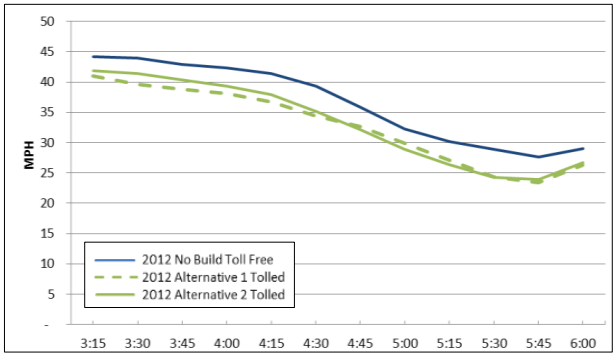


Arterial Streets

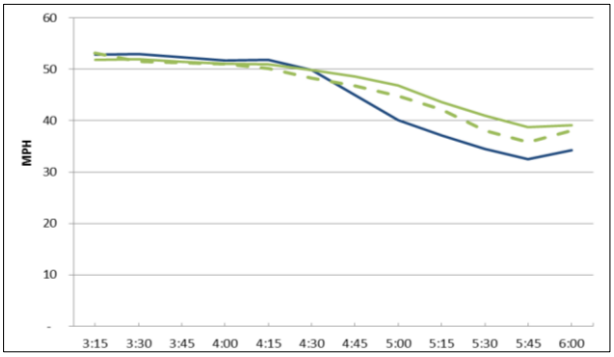


Local and Collector Streets

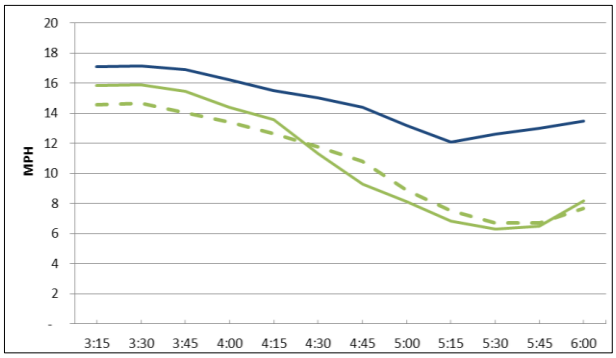
PM Peak Period



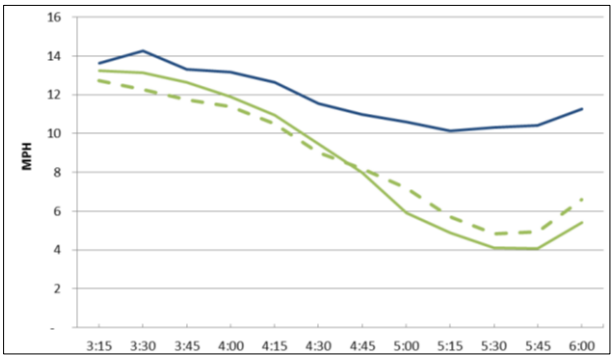
Network Wide



Freeway and Ramps



Arterial Streets



Local and Collector Streets

however, the increase in VHT and decrease in average speeds are relatively close in relative magnitude, indicating that the surface street network is saturated and vehicles are seeking even the lowest local class roadways to attempt to avoid congestion on the arterial network.

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. **Table ES-2** shows the 25-year annual trip and gross toll revenue (2014 dollars) stream for Alternatives 1, 2, 3, 4, 5 and 6. 25-year average annual estimates spanning over 2020-2044 are included at the bottom of the table, as well as the annual percent growth rate during this period. Alternative 1 is estimated to produce 46.3 million trips and yield $44.7 million in toll revenue annually on average over the 25-year span. Alternative 2 is estimated to produce 55.5 million trips and $42.9 million in toll revenue annually on average. Alternative 3 is estimated to produce 39.8 million trips and $38.0 million in toll revenue annually on average. Alternative 4 is estimated to produce 54.3 million trips and $41.8 million in toll revenue annually on average. Alternative 5 is estimated to produce 56.4 million trips and $43.6 million in toll revenue annually on average. Alternative 6 is estimated to produce 160.2 million trips and $186.8 million in toll revenue annually on average. The estimated toll revenue for Alternative 6 is approximately 4 to 5 times higher than the other alternatives.

Table ES-2
Estimated Annual Trips and Toll Revenue

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Year	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue
2020	43,428,000	$41,668,000	52,649,000	$40,189,000	37,323,000	$35,411,000	51,428,000	$39,179,000	53,440,000	$40,932,000	148,283,000	$173,102,000
2021	43,659,000	$41,910,000	52,882,000	$40,403,000	37,518,000	$35,618,000	51,658,000	$39,390,000	53,681,000	$41,147,000	149,226,000	$174,188,000
2022	43,890,000	$42,153,000	53,116,000	$40,619,000	37,713,000	$35,826,000	51,890,000	$39,602,000	53,923,000	$41,363,000	150,175,000	$175,281,000
2023	44,123,000	$42,397,000	53,351,000	$40,836,000	37,910,000	$36,036,000	52,123,000	$39,815,000	54,165,000	$41,581,000	151,129,000	$176,380,000
2024	44,358,000	$42,643,000	53,587,000	$41,054,000	38,108,000	$36,247,000	52,356,000	$40,030,000	54,409,000	$41,799,000	152,090,000	$177,487,000
2025	44,593,000	$42,890,000	53,824,000	$41,273,000	38,306,000	$36,459,000	52,591,000	$40,245,000	54,654,000	$42,019,000	153,057,000	$178,600,000
2026	44,830,000	$43,139,000	54,062,000	$41,493,000	38,506,000	$36,672,000	52,826,000	$40,462,000	54,901,000	$42,240,000	154,030,000	$179,721,000
2027	45,068,000	$43,389,000	54,302,000	$41,714,000	38,707,000	$36,886,000	53,063,000	$40,680,000	55,148,000	$42,462,000	155,010,000	$180,848,000
2028	45,307,000	$43,641,000	54,542,000	$41,937,000	38,909,000	$37,102,000	53,301,000	$40,899,000	55,396,000	$42,685,000	155,995,000	$181,983,000
2029	45,548,000	$43,894,000	54,783,000	$42,161,000	39,112,000	$37,319,000	53,540,000	$41,119,000	55,646,000	$42,910,000	156,987,000	$183,125,000
2030	45,789,000	$44,148,000	55,026,000	$42,385,000	39,316,000	$37,537,000	53,780,000	$41,340,000	55,897,000	$43,135,000	157,985,000	$184,274,000
2031	46,032,000	$44,404,000	55,269,000	$42,612,000	39,521,000	$37,757,000	54,021,000	$41,563,000	56,148,000	$43,362,000	158,990,000	$185,430,000
2032	46,277,000	$44,662,000	55,514,000	$42,839,000	39,727,000	$37,977,000	54,263,000	$41,787,000	56,401,000	$43,590,000	160,000,000	$186,593,000
2033	46,522,000	$44,921,000	55,760,000	$43,068,000	39,934,000	$38,200,000	54,506,000	$42,012,000	56,655,000	$43,819,000	161,018,000	$187,763,000
2034	46,769,000	$45,181,000	56,006,000	$43,297,000	40,142,000	$38,423,000	54,750,000	$42,238,000	56,910,000	$44,049,000	162,041,000	$188,941,000
2035	47,018,000	$45,443,000	56,254,000	$43,528,000	40,352,000	$38,648,000	54,996,000	$42,465,000	57,167,000	$44,281,000	163,072,000	$190,127,000
2036	47,267,000	$45,707,000	56,503,000	$43,761,000	40,562,000	$38,874,000	55,242,000	$42,694,000	57,424,000	$44,514,000	164,108,000	$191,320,000
2037	47,518,000	$45,972,000	56,753,000	$43,994,000	40,774,000	$39,101,000	55,490,000	$42,924,000	57,683,000	$44,748,000	165,152,000	$192,520,000
2038	47,770,000	$46,238,000	57,004,000	$44,229,000	40,986,000	$39,330,000	55,738,000	$43,155,000	57,943,000	$44,983,000	166,202,000	$193,728,000
2039	48,024,000	$46,506,000	57,257,000	$44,465,000	41,200,000	$39,560,000	55,988,000	$43,387,000	58,204,000	$45,219,000	167,259,000	$194,943,000
2040	48,279,000	$46,776,000	57,510,000	$44,702,000	41,415,000	$39,791,000	56,239,000	$43,621,000	58,466,000	$45,457,000	168,322,000	$196,166,000
2041	48,535,000	$47,048,000	57,764,000	$44,940,000	41,631,000	$40,023,000	56,491,000	$43,856,000	58,729,000	$45,696,000	169,392,000	$197,397,000
2042	48,793,000	$47,321,000	58,019,000	$45,180,000	41,848,000	$40,257,000	56,744,000	$44,093,000	58,993,000	$45,937,000	170,469,000	$198,635,000
2043	49,052,000	$47,596,000	58,275,000	$45,421,000	42,066,000	$40,492,000	56,998,000	$44,331,000	59,259,000	$46,179,000	171,552,000	$199,881,000
2044	49,312,000	$47,872,000	58,532,000	$45,663,000	42,286,000	$40,728,000	57,254,000	$44,570,000	59,526,000	$46,422,000	172,642,000	$201,135,000
Revenue in 2014 Dollars.												
25Yr Avg Pct Change	0.5%	0.6%	0.4%	0.5%	0.5%	0.6%	0.4%	0.5%	0.5%	0.5%	0.6%	0.6%
25Yr Avg 2020-2044	46,300,000	$44,700,000	55,500,000	$42,900,000	39,800,000	$38,000,000	54,300,000	$41,800,000	56,400,000	$43,600,000	160,200,000	$186,800,000

Table ES-3 shows the 25-year annual trip and gross toll revenue stream for Alternative 7. Over 25 years, Alternative 7 is estimated to produce 3.0 million trips and $1.2 million (2014 dollars) and 2.7 million trips and $1.2 million (2014 dollars) in toll revenue annually for the I-91 and I-84 HOT lanes, respectively.

Table ES-3
Estimated Annual Trips and Gross Toll Revenue
Alternative 7

	I-91 HOT Lanes			I-84 HOT Lanes		
	Annual	Annual Gross Toll Revenue		Annual	Annual Gross Toll Revenue	
Year	Toll Trips	Future Year $	2014 Dollars	Toll Trips	Future Year $	2014 Dollars
2020	2,097,000	$1,048,000	$903,700	1,945,000	$1,160,000	$1,000,300
2021	2,155,000	$1,095,000	$921,200	1,997,000	$1,206,000	$1,014,600
2022	2,214,000	$1,145,000	$939,800	2,051,000	$1,255,000	$1,030,000
2023	2,275,000	$1,197,000	$958,500	2,106,000	$1,305,000	$1,045,000
2024	2,338,000	$1,251,000	$977,300	2,162,000	$1,357,000	$1,060,100
2025	2,403,000	$1,308,000	$996,900	2,220,000	$1,411,000	$1,075,400
2026	2,469,000	$1,367,000	$1,016,400	2,279,000	$1,467,000	$1,090,800
2027	2,537,000	$1,429,000	$1,036,600	2,341,000	$1,526,000	$1,107,000
2028	2,607,000	$1,494,000	$1,057,300	2,403,000	$1,587,000	$1,123,200
2029	2,679,000	$1,561,000	$1,077,800	2,468,000	$1,651,000	$1,140,000
2030	2,753,000	$1,632,000	$1,099,400	2,534,000	$1,717,000	$1,156,600
2031	2,829,000	$1,706,000	$1,121,200	2,602,000	$1,785,000	$1,173,100
2032	2,907,000	$1,783,000	$1,143,200	2,671,000	$1,856,000	$1,190,000
2033	2,988,000	$1,864,000	$1,166,000	2,743,000	$1,931,000	$1,207,900
2034	3,070,000	$1,949,000	$1,189,400	2,817,000	$2,008,000	$1,225,400
2035	3,155,000	$2,037,000	$1,212,800	2,892,000	$2,088,000	$1,243,200
2036	3,242,000	$2,129,000	$1,236,700	2,970,000	$2,171,000	$1,261,100
2037	3,331,000	$2,226,000	$1,261,500	3,049,000	$2,258,000	$1,279,600
2038	3,423,000	$2,326,000	$1,286,000	3,131,000	$2,349,000	$1,298,700
2039	3,518,000	$2,432,000	$1,311,800	3,215,000	$2,442,000	$1,317,200
2040	3,615,000	$2,542,000	$1,337,700	3,301,000	$2,540,000	$1,336,600
2041	3,715,000	$2,657,000	$1,364,100	3,389,000	$2,642,000	$1,356,400
2042	3,817,000	$2,777,000	$1,390,900	3,480,000	$2,748,000	$1,376,400
2043	3,922,000	$2,903,000	$1,418,600	3,573,000	$2,858,000	$1,396,600
2044	4,030,000	$3,034,000	$1,446,400	3,669,000	$2,973,000	$1,417,400
Annual Pct Change	2.8%	4.5%	2.0%	2.7%	4.0%	1.5%
25 year Annual Avg	2,963,560	$1,875,680	$1,154,848	2,720,320	$1,931,640	$1,196,904

During the study, a conceptual look at the technical and operational aspects of the toll collection system to be implemented under AET of the I-84 corridor and of the I-91 and I-84 HOV lanes was conducted. In addition, preliminary tolling capital costs and tolling operations and maintenance costs were estimated for the seven tolling alternatives. Tolling operations and maintenance costs were estimated for both a Connecticut self-operated tolling operation and an outsourced tolling operation.

Table ES-4 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. For the I-84 Hartford based alternatives (1-5), cumulative net toll revenue over a 25-year period is estimated to range between $768 Million to $990 Million. Alternative 6 which includes expanded tolling between Hartford and New York is estimated to produce between $4.064 and $4.365 Billion in cumulative net toll revenue over a 25-year period. Alternative 7 is estimated to produce annual gross toll revenue that is higher than the annual tolling O&M costs. However, including the tolling capital cost amortized over a ten-year period in addition to the tolling O&M costs and subtracting from the gross toll revenue results in an overall negative net toll revenue for the HOT lanes.

Table ES-4
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	$44,700,000	$3,765,600	$1,308,960	$39,625,440	$990,636,000
2	$42,900,000	$4,057,200	$1,525,080	$37,317,720	$932,943,000
3	$38,000,000	$3,570,000	$1,275,000	$33,155,000	$828,875,000
4	$41,800,000	$4,020,000	$1,500,960	$36,279,040	$906,976,000
5	$43,600,000	$4,083,600	$1,467,000	$38,049,400	$951,235,000
6	$186,800,000	$8,968,800	$3,220,560	$174,610,640	$4,365,266,000
7	$2,351,752	$2,116,800	$1,276,440	-$1,041,488	-$26,037,000

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	$44,700,000	$6,770,400	$1,308,960	$36,620,640	$915,516,000
2	$42,900,000	$7,878,000	$1,525,080	$33,496,920	$837,423,000
3	$38,000,000	$5,995,200	$1,275,000	$30,729,800	$768,245,000
4	$41,800,000	$7,724,400	$1,500,960	$32,574,640	$814,366,000
5	$43,600,000	$7,975,200	$1,467,000	$34,157,800	$853,945,000
6	$186,800,000	$21,002,400	$3,220,560	$162,577,040	$4,064,426,000
7	$2,351,752	$1,885,200	$1,276,440	-$809,888	-$20,247,000

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 value pricing on I-84 through Hartford could provide congestion relief on one of the most heavily travelled and congested corridors in the State. Given the significant cost of replacing the I-84 Viaduct, toll revenue was also a key output of the

analysis that needs to be considered across alternatives. The three primary performance metrics utilized across alternatives for this study were:

1. Congestion reduction (speed improvements) for I-84 drivers;
2. Local diversion and network impacts; and
3. Net toll revenue.

I-84 Tolling Summary

On I-84 within Hartford, two tolling configurations were evaluated with the CRCOG travel demand model specifically refined for this analysis:

1. Single point toll located on the Viaduct segment of I-84; and
2. Two tolling locations, located west of the Sisson Avenue Interchange and east of the Asylum Interchange

While there were two build configurations evaluated in addition to the No Build alternative, the estimated traffic diversions attributed to tolling among these specific physical configurations did not vary significantly. The physical configuration of the alternatives contributed to larger variations in demand across the alternatives.

Because a large amount of the traffic on I-84 in Hartford has origins or destinations in the local area, coupled with a relatively dense network, a significant amount of toll avoidance would be possible (even at the relatively modest toll rate assumed). This is particularly evident with respect to a single point toll on the I-84 Viaduct in Hartford (Alternative 1 and 3). Traffic would be able to exit I-84 prior to the single point tolling location or enter I-84 beyond the single point tolling location to avoid the toll. For example, the ramps to and from the west at the Sisson Avenue interchange under Alternative 1 would be expected to increase significantly, as additional traffic would exit and enter I-84 at this location, rather than travelling through the tolling location to exit or enter at their preferred interchange. The other issue that was observed is that a significant uptick in volume on the ramps to and from the east at the Asylum interchange would occur to avoid passing through the tolling location. The existing demand at these ramps, particularly in the AM peak is already at levels that contribute to operational issues along I-84. In general, about a 30 percent reduction in traffic was estimated at the single point tolling location. From a regional diversion standpoint, only about 5 percent of the overall reduction in traffic at the tolling location can be attributed to longer distance regional diversion to avoid the toll.

The inclusion of two tolling locations within Hartford (Alternatives 2, 4, and 5) performs better than a single tolling point as the toll rate at each tolling location is half the toll of the single tolling point and thus results in lower diversion levels. The inclusion of two tolling locations also tends to disperse the diversion more widespread to the network rather than a single point toll. About a 24 percent reduction in traffic is estimated at each tolling location. The levels of diversion are still significant and were shown to be problematic to the local network if tolling locations are not carefully considered and potential mitigation strategies are not employed.

Alternative 6 which assumes a corridor approach to tolling was developed as the study evolved. It assumed 11 tolling locations along I-84 between Hartford and New York. Overall, about 82 percent of the traffic at the tolling locations is estimated to be retained under this alternative. The corridor approach to tolling has advantages of spreading out the cost of tolls, enables toll locations to be chosen

that may be less conducive to diversion than a dense urban network environment, and can help generate significantly more revenue for costly investments throughout the corridor than a single tolling point.

Estimated net toll revenue over a 25-year period for Alternatives 1 through 5 ranged between $768 million and $991million. Alternative 6 is estimated to produce more than $4.0 Billion over a 25-year period. Revenue is in 2014 dollars.

I-84 and I-91 HOT Lanes Summary

Analysis of a potential conversion of the existing I-84 and I-91 HOT lanes showed the potential for significant congestion benefits to both corridors as single occupant vehicles would now have the choice of using the existing HOV lanes for a fee. By reducing volumes in the general purpose lanes, travel speeds during the congested peak hours were shown to increase significantly. It should be noted that the western and southern termini of the I-84 and I-91 HOV lanes, respectively, if converted to HOT lanes would need further study to evaluate any physical changes needed to mitigate any operational issues which could be caused by more traffic exiting from the HOT lane into the general purpose lanes. Not addressing this potential issue could all but wipe out the benefits provided by the HOT lanes. Since the analysis and toll rate selection focused on "filling up" the HOT lanes to the maximum extent possible while preserving the free flow speeds of the HOT lane, the estimated annual net revenue is modest for each corridor. Estimated annual gross toll revenue would cover tolling operations and maintenance costs, but including the capital cost of tolling results in a net loss for the lanes. However, slightly higher toll rates could be implemented to off-set the cost if needed, with the objective of making it a revenue neutral or slightly positive stand-alone project.

I-84 Microsimulation Summary

A microsimulation model of Hartford was developed to estimate the impacts of tolling in Hartford on the operations of both I-84 and the adjoining surface street roadways in Hartford. Based on the microsimulation modeling analysis completed for this project, significant insight was gained in terms of probable impacts of the Hartford tolling scenarios.

Of the two tested tolling scenarios (Alternative 1 and 2), Alternative 2 (two tolling locations) is the better candidate for further study with improved operations of the freeway. The westbound direction of I-84 in the AM peak period experiences significant congestion under current conditions extending back from the Asylum Street off-ramp. Under Alternative 2, large operational improvements are experienced with traffic now flowing near free flow conditions throughout the AM Peak Period. Other time periods and travel directions see moderate improvements in congestion as compared to the westbound AM period. Utilizing two tolling locations both minimizes and better distributes the local toll diversion traffic onto the surrounding arterial street system.

However, there are still several areas and intersections of the Hartford street network that may need additional capacity improvements to accommodate the toll traffic diversion to keep Hartford's roadways operating at acceptable levels of operations. For example, In Alternative 2, local drivers could avoid paying the toll at the first gantry location east of Asylum off ramp by exiting at the previous off-ramp to Main Street immediately upstream of the first toll gantry location. Drivers trying to get to downtown Hartford area would use the Main Street off-ramp to Chapel Street, and then would make a left turn at either Market Street, Main Street or Trumbull Street to reach the downtown area, while more westerly destined trips continue along Chapel Street and then seek to turn left at Pleasant Street or High Street. All these intersections have limited left turn capacity, and even with timing adjustments to increate left turn capacities, the signals are not able to accommodate the

additional diversion traffic and eventually queues extend along Main Street and back onto the I-84 mainline. Immediately downstream of the Bulkeley Bridge, the four travel lanes of I-84 split to feed the off-ramp to I-91 Northbound and the Main Street off-ramp, with only two lanes continuing on I-84. These diverges are very closely spaced, and create additional weaving friction as vehicles position themselves in the correct lane. When the Main Street off-ramp queue eventually spills back to the I-84 Mainline, this weaving becomes increasing more difficult, and queues quickly build on I-84.

The arterials and intersections being impacted will ultimately depend on the configuration of the I-84 Viaduct replacement project as this alone could affect the patterns in and out of Hartford. If tolling is to be considered in the future, the local Hartford network would need further analysis once a final build alternative is selected by the I-84 Viaduct Study Team. Additional technical analysis should be conducted around the specific location of tolling points, the magnitude of toll rates during the peak and off peak time periods, toll discount policies, and revised tolling capital and operational cost estimates for a selected tolling system and operation should be developed. Similar refined analysis should be conducted for the I-91 and I-84 HOV to HOT projects if moved forward.

Chapter 1
Introduction

CDM Smith was selected by the Connecticut Department of Transportation (ConnDOT) to perform a congestion pricing study of the Interstate 84 Viaduct in Hartford under the Federal Highway Administration (FHWA) Value Pricing Pilot Program (VPPP). The VPPP is a federal tolling program that allows an exception to the prohibition on tolling the Interstate Highway System. This program initially authorized in ISTEA (as the Congestion Pricing Pilot Program) and continued in subsequent surface transportation authorization acts, encourages implementation of a variety of pricing strategies to manage highway congestion. Under VPPP, tolls may be imposed on existing toll-free highways, bridges, and tunnels, so long as variable pricing is used to manage demand for the facility. This study included the assembly and collection of traffic and travel time data, a stated preference survey to estimate motorists' value of time in the study corridor, and a detailed traffic modeling and toll revenue evaluation for pricing alternatives. This chapter provides a summary of the study objectives, study area, project team, and report structure.

Study Objective and Scope

The grant application submitted by the ConnDOT specifically outlined the I-84 Viaduct through Hartford as a pricing candidate due to its high travel demand, significant congestion, and imminent need of replacement. Value Pricing may provide a supplemental funding source, helping to offset the costs that surround such a critical, yet highly expensive replacement. The I-84 Viaduct, built in 1965 is the ¾ mile long section of elevated highway between the Sisson Avenue interchange and the Asylum and Capitol Avenue interchanges. The use of value pricing in combination with physical and operational improvements to the I-84 corridor through Hartford was evaluated with the purpose of relieving congestion on one of the most heavily travelled and congested corridors in the State. The study also examined converting the existing high occupancy vehicle (HOV) lanes along I-91 and I-84 to high occupancy toll (HOT) lanes where single occupant vehicles would be allowed access to the existing HOV lanes in exchange for paying a toll.

In addition, the study scope also provides for an understanding of how traffic will be diverted and its impact on the operations of the already congested local roadway network. Given the significant cost of replacing the I-84 Viaduct, toll revenue was also a key factor that was considered across alternatives. To support the technical analysis for this congestion pricing study, CDM Smith implemented a data collection plan including collection of traffic counts, roadway travel speed data, a stated preference survey and information on regional and local travel patterns.

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

- Development of a current traffic volume and speed profile for I-84 and I-91, including detailed analysis by time of day and travel direction;
- Conducting a Stated Preference (SP) Survey in the I-84 Hartford travel corridor to estimate motorists value of time;

- Enhancement of the Capitol Region Council of Governments (CRCOG) Travel Demand Model;
- Development of an I-84 micro-simulation traffic model in order to analyze the operational impacts on I-84 and surrounding local roadways under a toll application;
- Estimation of the traffic diversion that can be anticipated from tolling on the I-84 Viaduct; and
- Estimation of annual gross toll revenue, tolling capital costs, tolling operating costs, and net toll revenue for final tolling alternatives;

Study Area

The regional study area was defined as I-84 from Route 9 in West Hartford to the end of the I-84 HOV lanes in Vernon, and from the I-91 HOV lanes in Windsor to I-691 in Meriden. **Figure 1-1** depicts the regional study area, with major transportation facilities I-91, Route 15, Route 9, and Route 2 running north-south and I-84, I-691 (not shown in figure), I-384, and I-291 running east-west. **Figure 1-2** shows I-84 through the downtown area with the Viaduct section highlighted. Major arterials parallel to I-84 include Farmington and Capitol Avenues. Chapter 2 provides additional discussion of I-84 and the surrounding roadway network.

Study Team

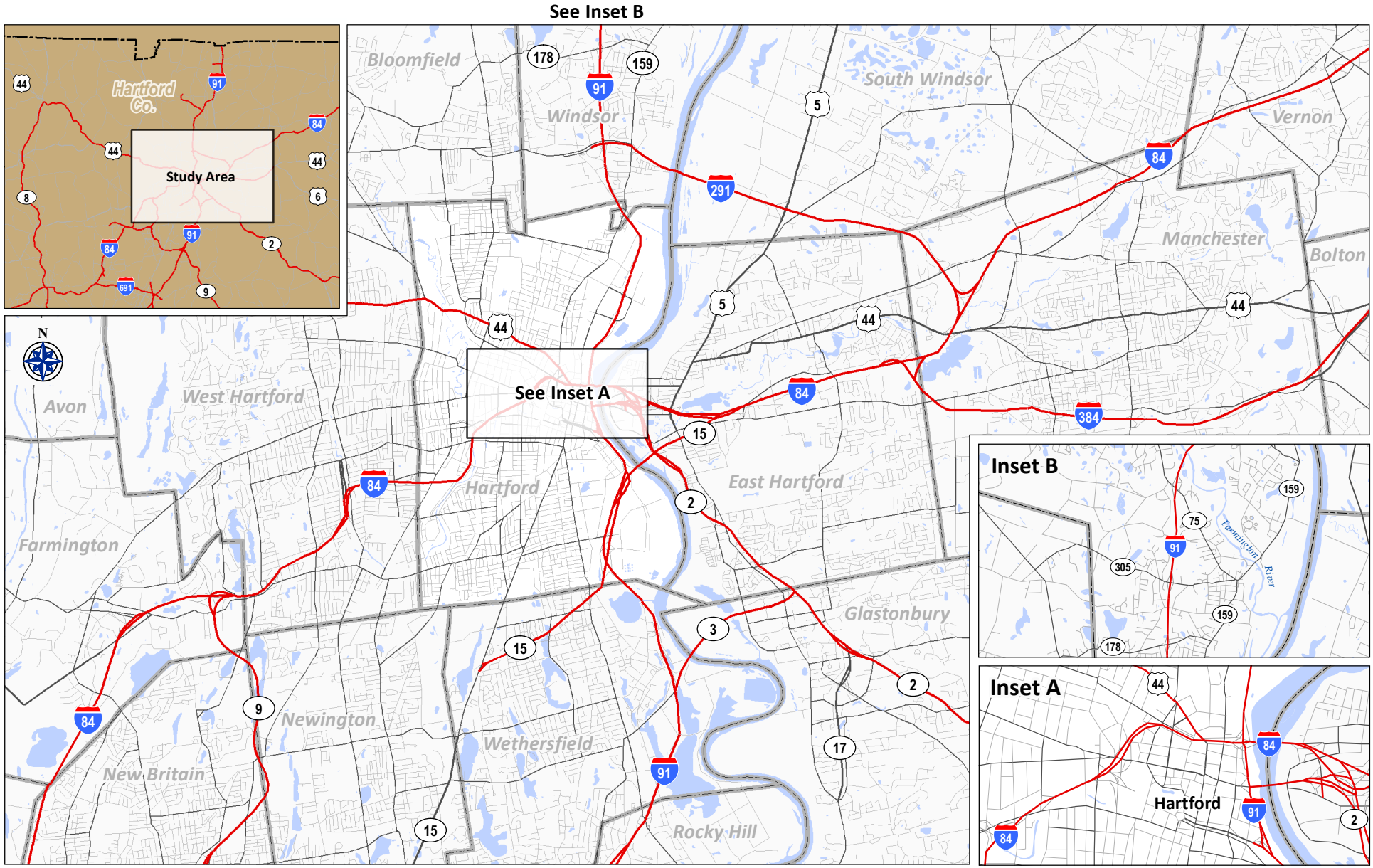
CDM Smith was the prime consultant with overall responsibility for successful completion of the congestion pricing study. In addition to overall project management and Study Team coordination responsibilities, CDM Smith personnel were responsible for coordinating data collection activities, enhancement of the CRCOG travel demand model, traffic and toll revenue analysis, and the preparation of study documentation. CDM Smith was assisted by two 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-84 travel corridor. The survey provided estimates of value of time, which is a key input parameter in modeling expected travel behavior under tolling.
- **Cambridge Systematics Inc. (CS)** – CS developed a simulation traffic operations model of the I-84 study area to support operational analysis of various pricing and physical alternatives for I-84. This model provides the necessary tool to properly evaluate the potential congestion reduction on I-84 and the operational impacts to the local roadway network from diversion; the key objectives of the study.

Report Structure

Chapter 2, **Existing Traffic Conditions**, provides a traffic profile of both I-84 and I-91, including details on travel speeds. Additional information is provided on in-state/out-of-state percentages, occupancy data, and truck percentages.

Chapter 3, **Model Development**, provides a summary of the CRCOG Travel Demand Model and the methodology used to calibrate it to a four time period traffic assignment. Tables and figures displaying calibration summaries are provided.



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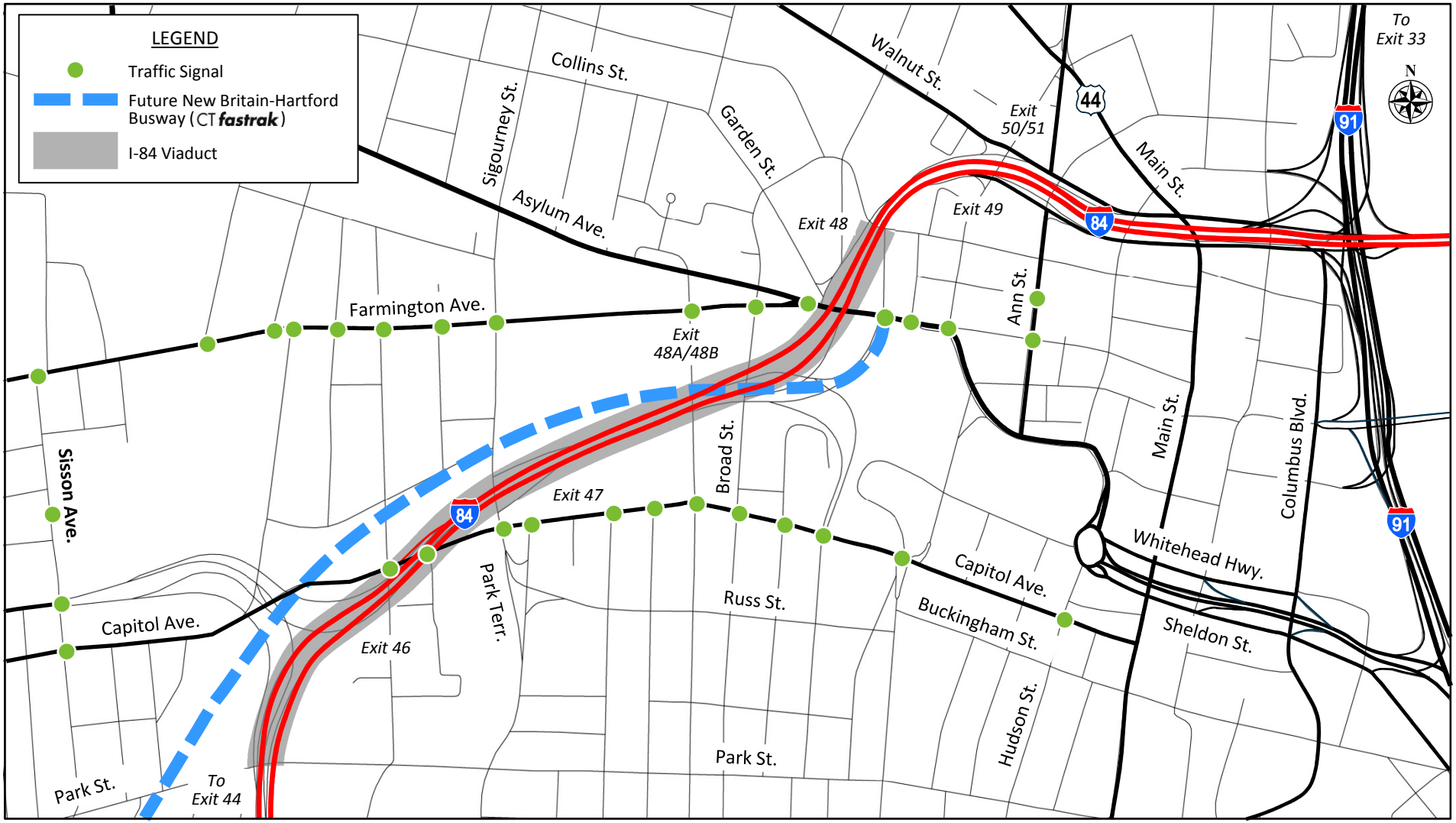
REGIONAL STUDY AREA

FIGURE 1



CDM Smith

I-84 VIADUCT LOCATION MAP

FIGURE 2

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 are included in **Appendix A**

Chapter 5, **Traffic and Revenue Analysis**, provides a summary of the 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.

Chapter 6, **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 7, **Operations Analysis**, provides the results of the simulation modeling and operational analysis of I-84 and the local network for the alternatives. Separate reports are included in **Appendix B,** documenting the development and calibration of the simulation model and the future year analysis of the various alternatives.

Appendix A, **Stated Preference Survey Reports**

Appendix B, **Simulation Model Development, Calibration, and Analysis Reports**

Chapter 2

Existing Traffic Conditions

To support the technical analysis for this congestion relief study, CDM Smith implemented a data collection plan. Traffic counts, roadway travel speed data, and information on regional and local travel patterns were obtained. This chapter explains the physical attributes of I-84 and I-91, data collection efforts in the study area, and presents summaries of the data which are used to support the congestion relief study

Project Area Description

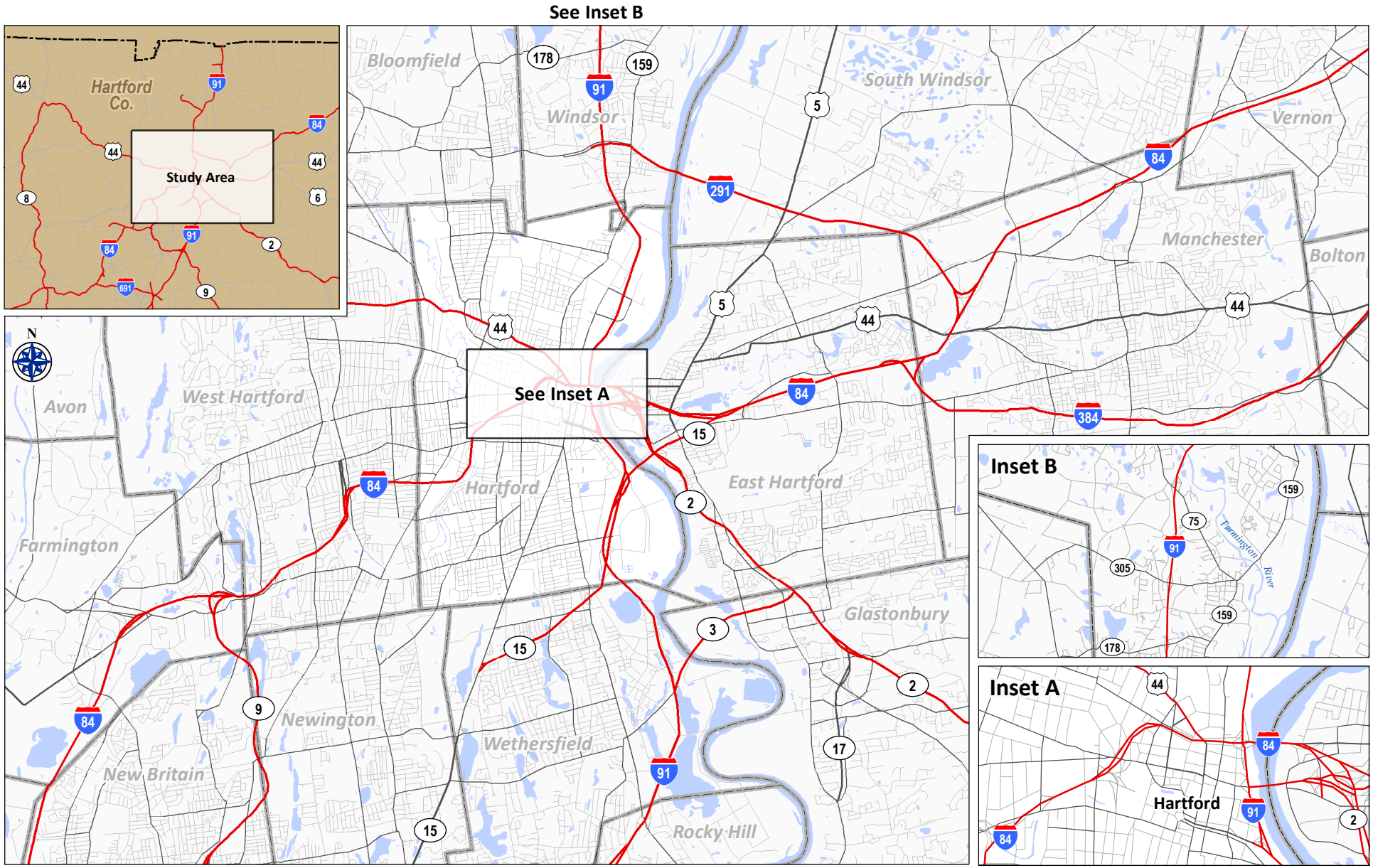
The regional study area was defined as I-84 from Route 9 in West Hartford to the end of the I-84 HOV lanes in Vernon, and from the I-91 HOV lanes in Windsor to I-691 in Meriden. **Figure 2-1** depicts the regional study area, with major transportation facilities I-91, Route 15, Route 9, and Route 2 running north-south and I-84, I-691, I-384, and I-291 running east-west. **Figure 2-2** shows I-84 through the downtown area with the Viaduct section highlighted. Major arterials parallel to I-84 include Farmington and Capitol Avenues. However, these arterials contain a number of signalized intersections and provide limited opportunity to accommodate spill over demand from I-84, particularly during peak hours.

Figures 2-3 through 2-5 depict I-84 schematically from the Route 9 interchange in Farmington west of Hartford to just east of Exit 64 in Vernon. Interchange numbers, the number of lanes, and posted speed limits are displayed. In general, I-84 has 3 general purpose lanes in each direction, with sections containing additional auxiliary lanes or in some instances additional general purpose lanes. The cross-section widens to 5 general purpose lanes in each direction between Roberts Street and the I-384 interchange. East of the I-384 interchange, I-84 contains 3 general purpose lanes in each direction. The limits of the HOV lanes are shown in red and extend from just north of Exit 64 (Vernon) in the east to Founders Bridge in the westbound direction and to west of the Charter Oak Bridge in the eastbound direction. The posted speed limits are 50 mph in Hartford, increasing to 65 mph east of the I-84/I-384 interchange.

Figures 2-6 and 2-7 depict I-91 schematically from Exit 27 south of the Route 15 Charter Oak Bridge connection with I-91 south of Hartford to just north of Exit 40 (Bradley Field Connector). Interchange numbers, the number of lanes, and posted speed limits are displayed. In general, I-91 has 3 general purpose lanes in each direction, with sections containing additional auxiliary lanes south of I-84. The cross-section widens to 4 general purpose lanes in each direction between the terminus of the HOV lanes at the north and Exit 40, and then returns to 3 lanes in each direction north of Exit 40. The limits of the HOV lanes extend from just south of Exit 40 in the north to Liebert Road in the south about one-mile north of the I-84 interchange. The posted speed limits are 50 mph through the Hartford area, increasing to 55 mph between Exits 33 and 34, before increasing to 65 mph north of Exit 34.

Data Collection

CDM Smith developed a data collection plan to gather information on current levels of traffic, travel speeds and regional, local, and commercial vehicle travel movements. This data builds the foundation for performing a detailed traffic and revenue study along I-84 through Hartford, including the study of



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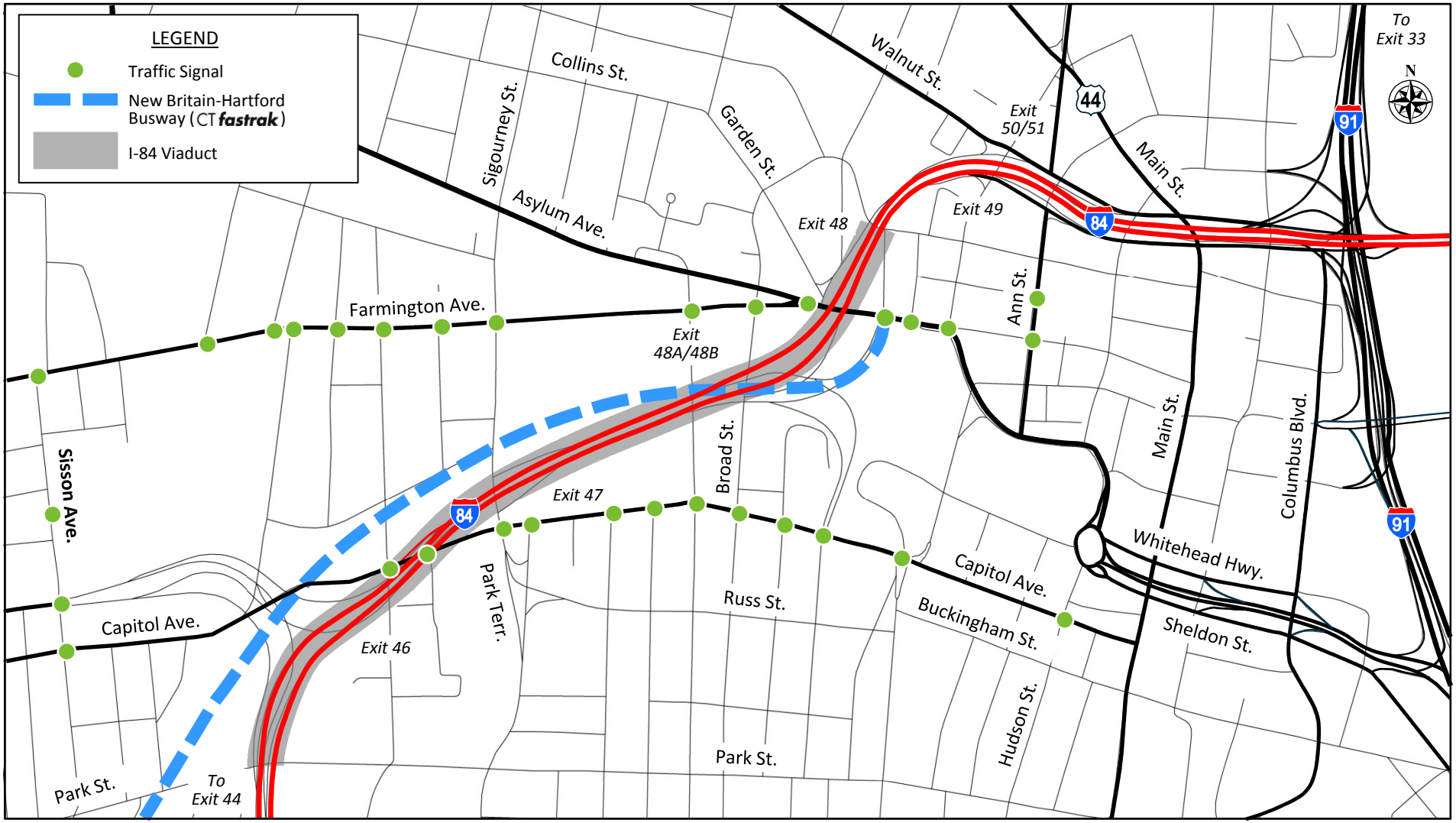
REGIONAL STUDY AREA

FIGURE 2-1



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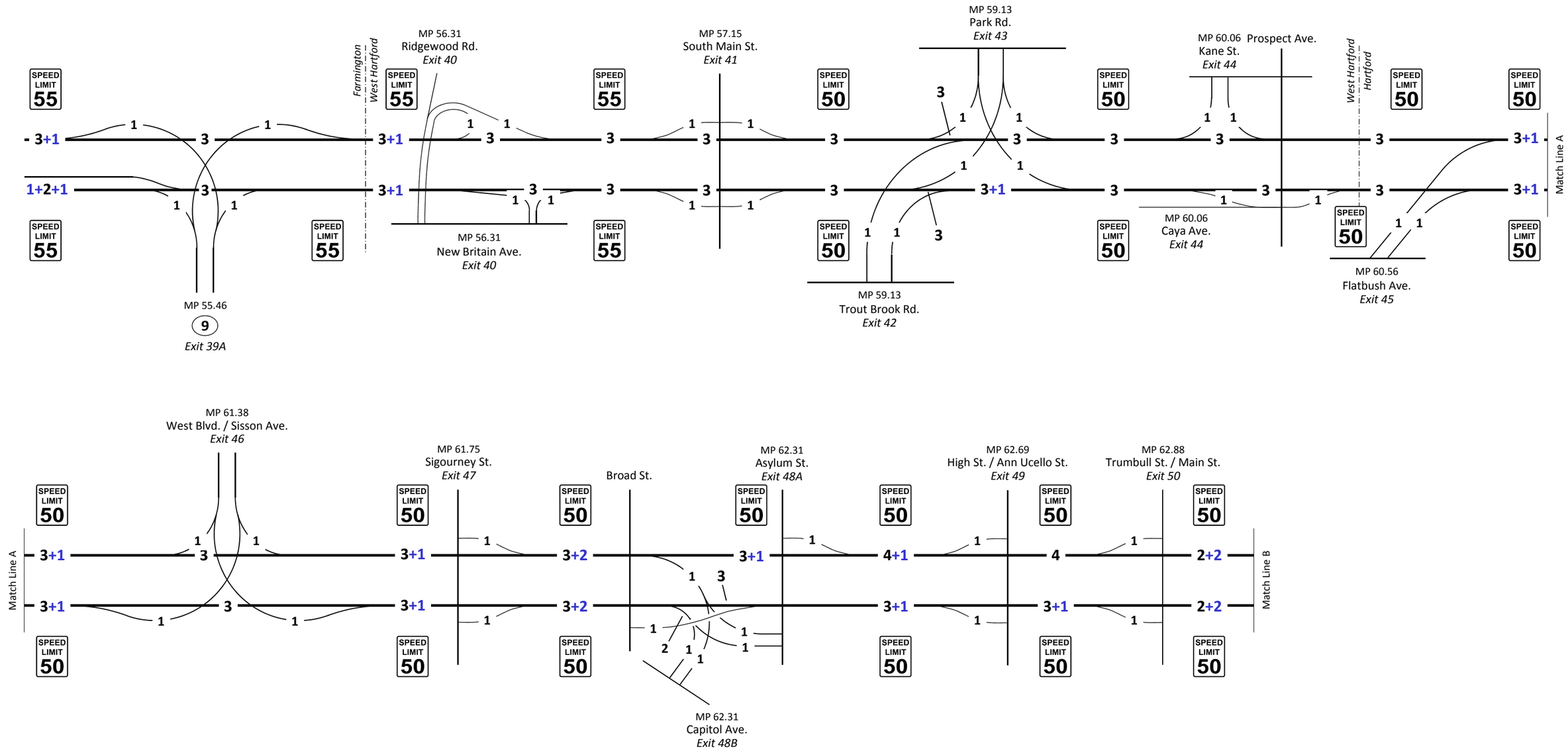
I-84 VIADUCT LOCATION MAP

FIGURE 2-2



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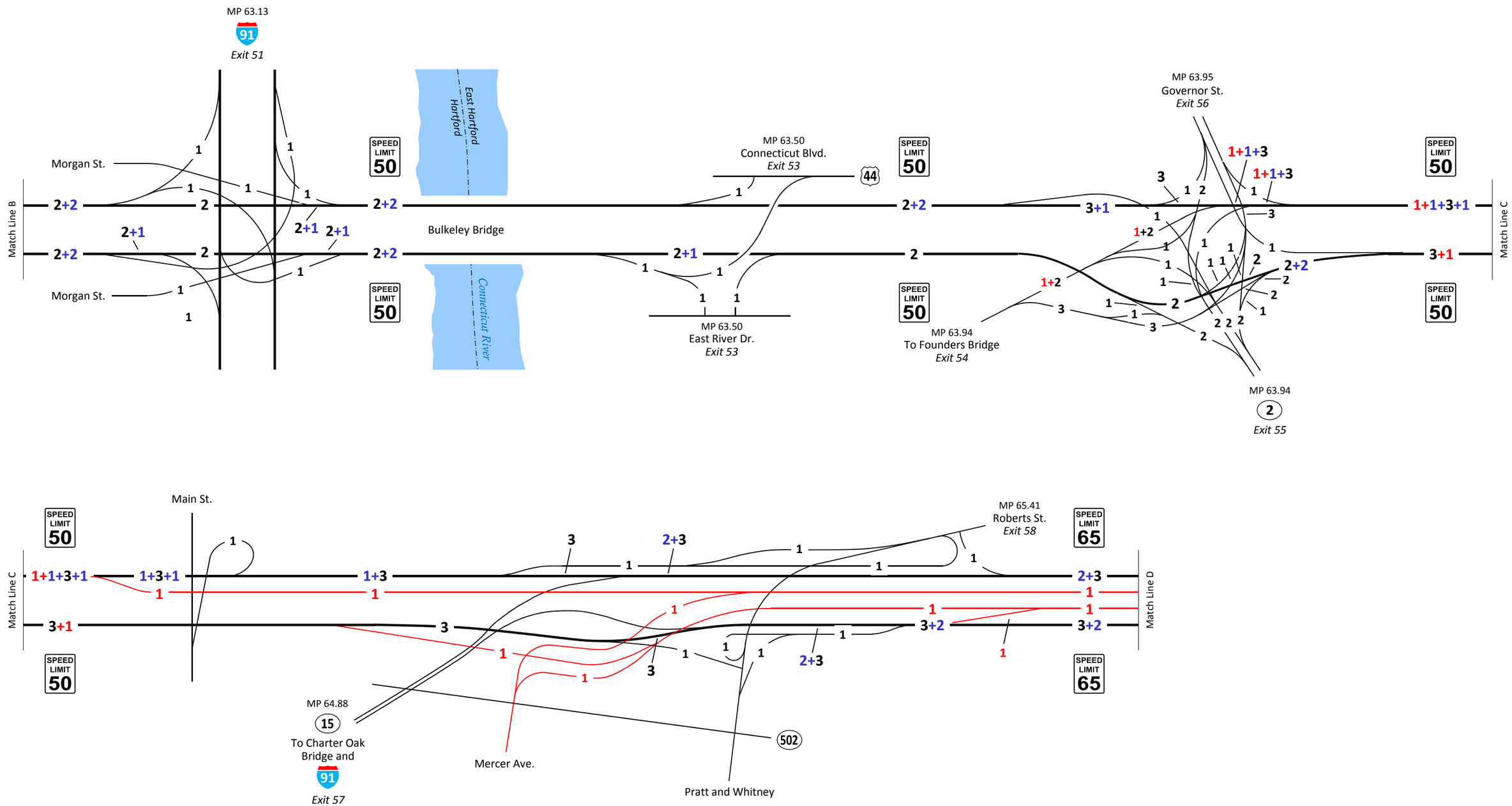
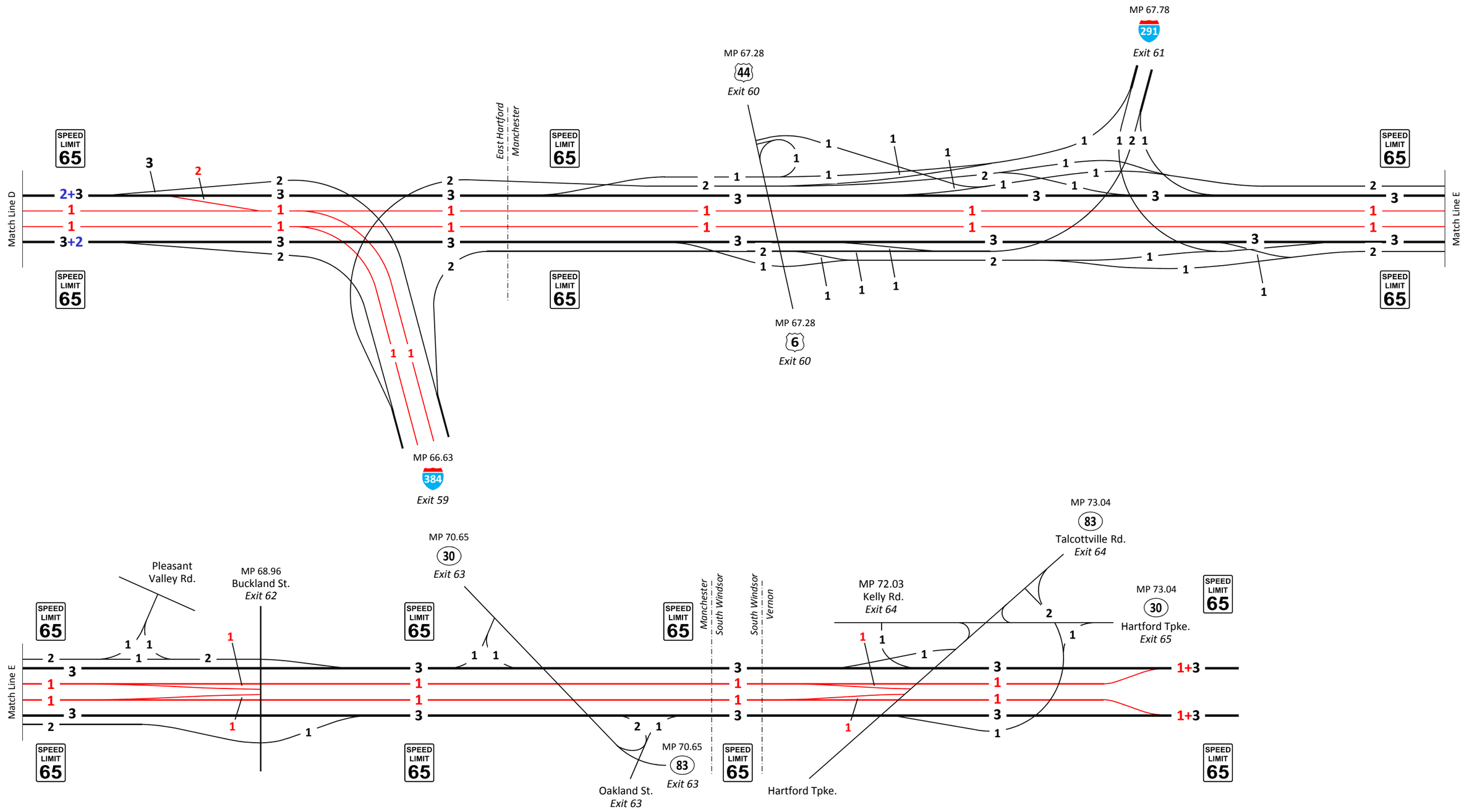
NUMBER OF LANES AND POSTED SPEED LIMITS - I-84

FIGURE 2-3



NUMBER OF LANES AND POSTED SPEED LIMITS - I-84

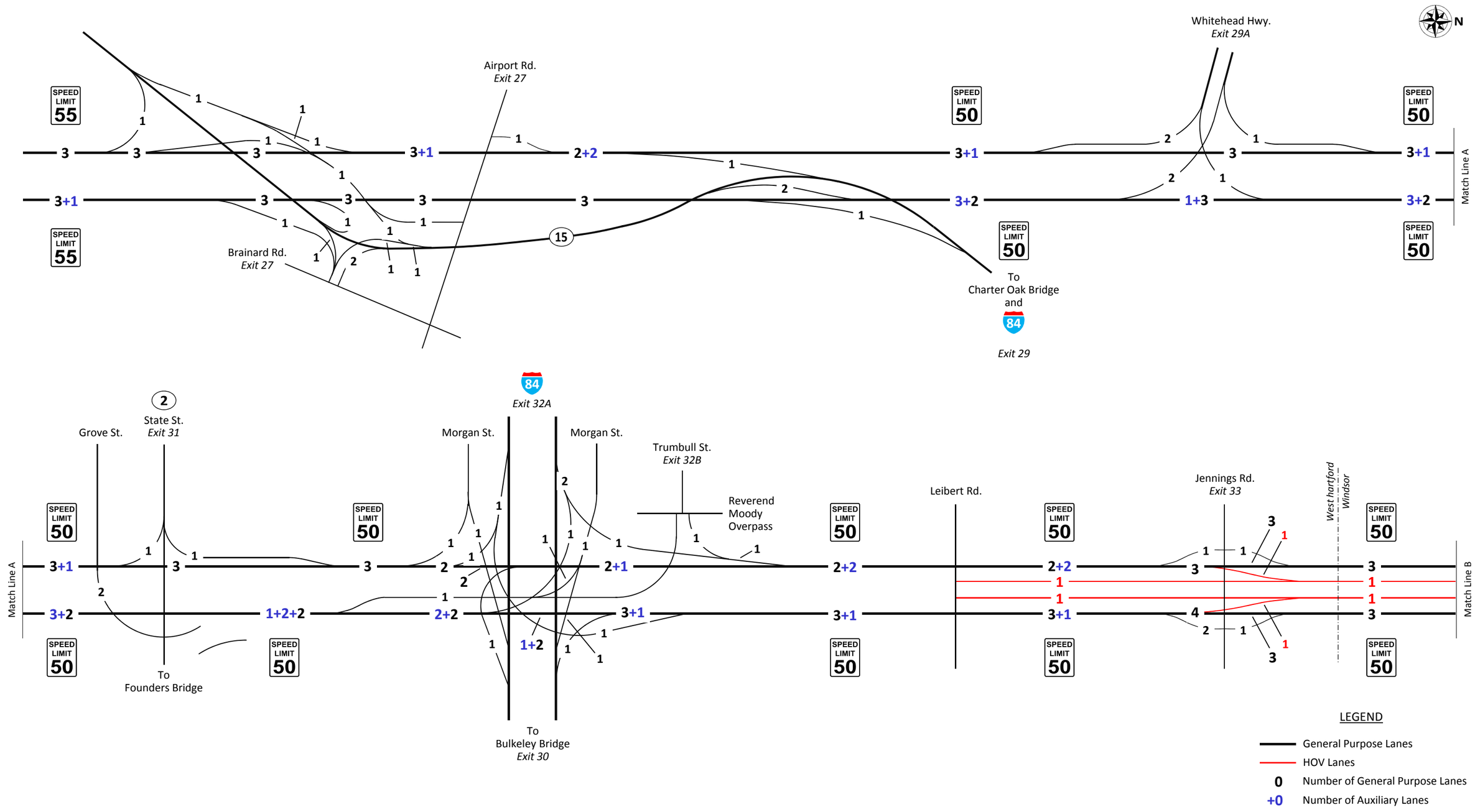
FIGURE 2-4



CDM Smith

NUMBER OF LANES AND POSTED SPEED LIMITS - I-84

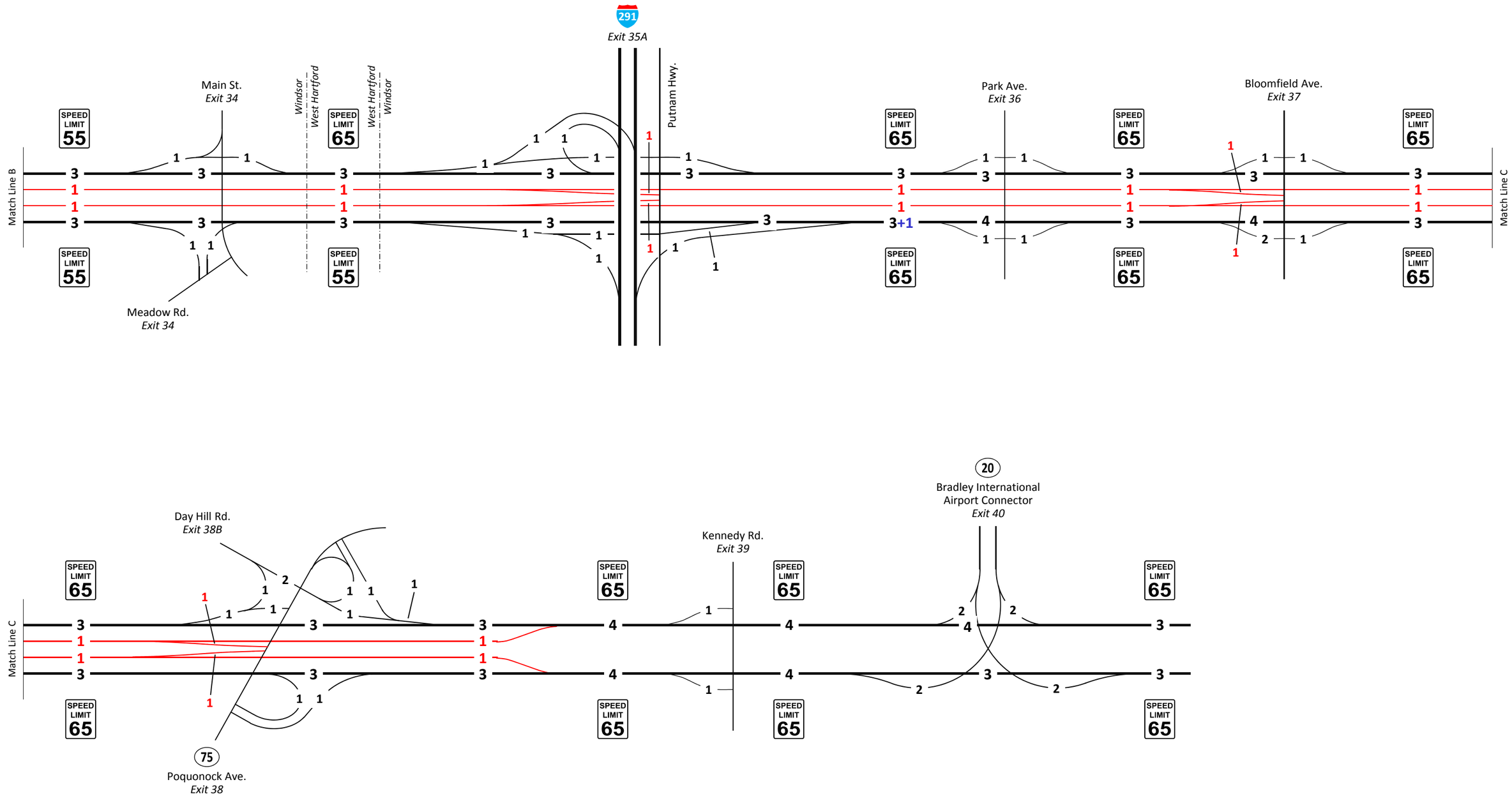
FIGURE 2-5



CDM Smith

NUMBER OF LANES AND POSTED SPEED LIMITS - I-91

FIGURE 2-6



NUMBER OF LANES AND POSTED SPEED LIMITS - I-91

FIGURE 2-7

a potential conversion of the I-84 and I-91 HOV lanes to high occupancy toll (HOT) lanes. The data also supports the calibration of a base year travel demand model for the I-84 and I-91 study corridors. CDM Smith will utilize the model to evaluate the revenue potential and resulting diversion for pricing scenarios in the Hartford region.

Traffic Counts

CDM Smith developed a comprehensive list of count locations within the study area. Locations not covered by existing data, were counted in January and February of 2013 by a sub-consultant through the parallel I-84 Corridor Improvement Project being conducted by others. Traffic volumes in the study area are discussed in the following sections.

Historical Traffic Growth

Available historical average daily traffic (ADT) for I-84 and I-91 was assembled from the CT DOT's Traffic Monitoring Volume Information Traffic Count Data. **Table 2-1** displays 20 years of historical ADT. I-84 over the Connecticut River has remained fairly constant over the last 20 years, and particularly over the last 10 years, with ADTs of around 141,000. I-91 north of Jennings Road (between Exit 33 and 34) has seen modest growth over the last 20 years at an average annual percent change (AAPC) of a little more than 1 percent. In addition to these two mainline locations, six ramps connecting I-91 and I-84 are shown. Most of these ramps have seen little or no growth in the last 20 years. The largest growth, about 1 percent per year has been experienced on the I-84 westbound on ramp from the I-91 northbound off ramp.

Monthly Traffic Variations

Monthly traffic variations at four Interstate locations in the study area were assembled (**Figure 2-8**). Traffic on I-84 and I-91 is highest during the summer months with the lowest traffic months occurring during the winter months. Summer months are shown to be approximately 5 to 10 percent higher than average weekday traffic with winter months showing travel levels at 5 to 10 percent lower than average daily traffic.

The State Route locations show May and June with the highest traffic levels throughout the year, with the lowest levels during the winter months of January and December. It's interesting to note that traffic on these routes increase from January to their highest level during May and June, before dropping considerably starting in July and remaining fairly consistent for the rest of the year. Overall, traffic levels throughout the year are fairly consistent in the area, ranging between 5 to 10 percent around the average.

Table 2-1
Historical Average Daily Traffic Volumes

Year	I-84 On The Bulkeley Bridge	I-91 Between Exit 33 and Exit 34	I-84 WB Off Ramp To I-91 NB (Exit 51)	I-84 EB Off Ramp To I-91 SB (Exit 52)	I-84 EB On Ramp From I-91 SB	I-84 EB Off Ramp to I-91 NB (Exit 51 Flyover)	I-84 WB On Ramp From I-91 NB	I-84 WB On Ramp From I-91 SB
1992	138,900	114,300	21,100	10,000	18,500	-	9,800	22,200
1993	144,700	120,600	-	-	-	-	-	-
1994	140,800	120,800	19,400	-	15,100	21,100	-	-
1995	134,600	117,700	14,800	10,700	15,100	22,300	10,500	23,600
1996	132,900	120,100	15,200	-	-	-	-	-
1997	135,500	-	-	-	-	-	-	-
1998	139,000	-	14,300	10,200	14,400	22,600	10,200	23,200
1999	143,500	-	-	-	-	-	-	-
2000		-	-	-	-	-	-	-
2001	141,800	-	14,800	10,200	14,500	21,900	11,200	23,300
2002	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-
2004	141,400	-	14,900	11,300	15,500	23,600	12,400	23,100
2005	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-
2007	141,400	-	13,000	9,400	13,100	20,500	11,900	21,300
2008		140,800	15,200	-	14,500	-	12,500	21,900
2009	-	129,900	-	-	15,900	-	12,500	23,000
2010	141,100	140,400	15,900	10,900	14,500	22,000	11,800	23,100
2011								
2012								
AAPC								
92-10	0.09%	1.15%	-1.56%	0.48%	-1.34%		1.04%	0.22%
95-10	0.31%	1.18%	0.48%	0.12%	-0.27%	-0.09%	0.78%	-0.14%
98-10	0.13%		0.89%	0.55%	0.06%	-0.22%	1.22%	-0.04%

Source: CTDOT

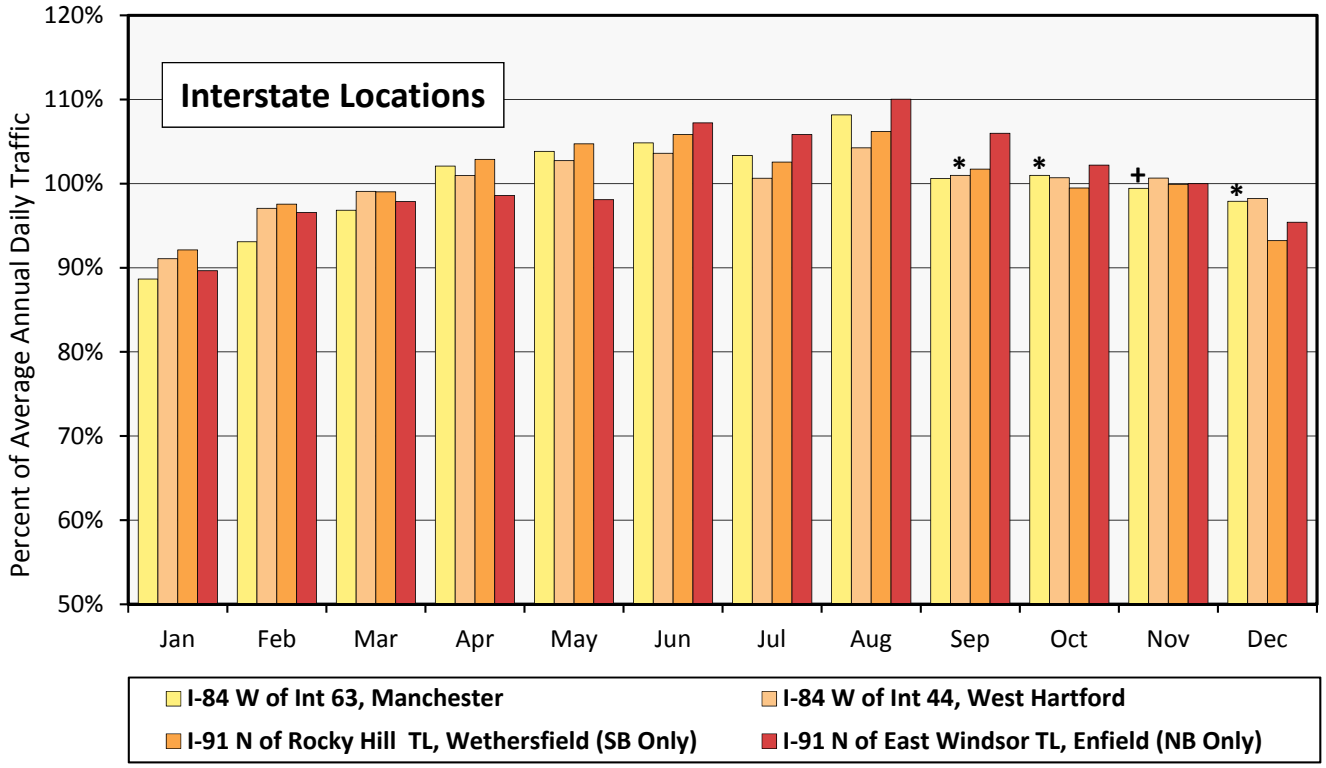
Daily Traffic Variations

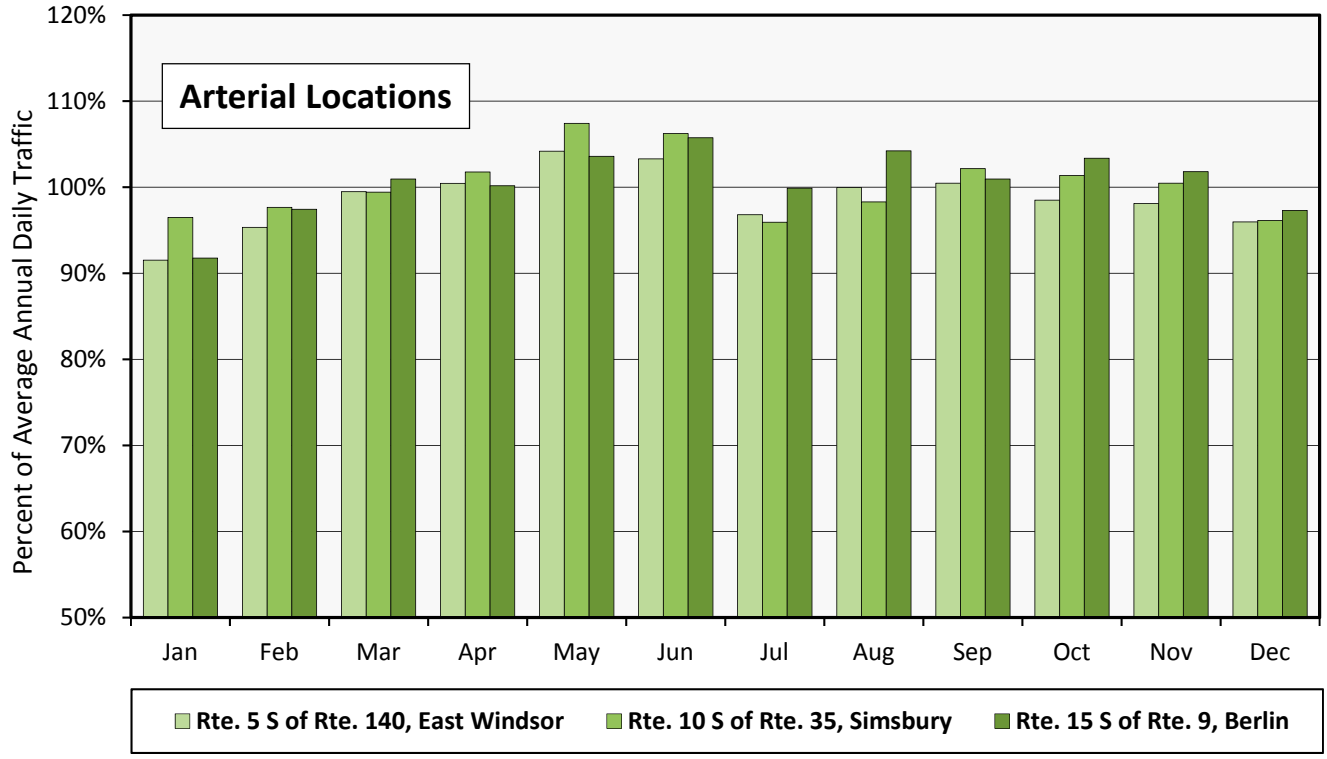
Figure 2-9 displays the daily variations at the same Interstate and State Route locations as presented in the monthly variations. Interstate traffic increases throughout the week to the highest level on Friday, which is roughly 12 to 20 percent higher than the average daily traffic. Weekend traffic is roughly 80 to 90 percent of average weekday traffic. Sunday carries the lowest amount of traffic at these Interstate locations.

The State Route locations show a similar pattern of traffic increasing during the work week, with Friday having the highest levels of traffic. Traffic is lowest on Sunday, and is considerably lower at roughly 70 percent of the average daily traffic.

Truck Percentages

Table 2-2 displays truck percentages for 10 locations in the Hartford area. On a daily basis on I-84, passenger vehicles account for about 92 percent of total traffic, while medium and large trucks account for 3 percent and 5 percent, respectively. A medium truck is defined as buses and single unit



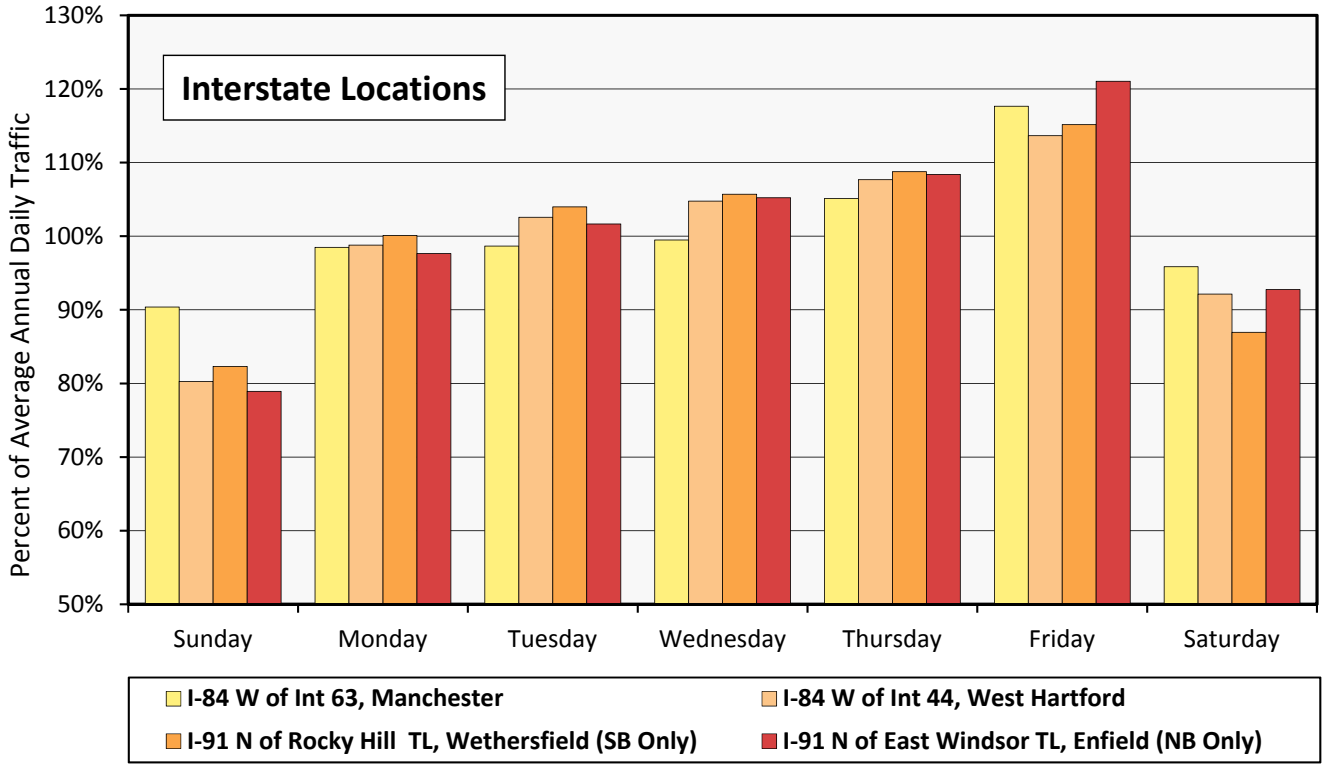


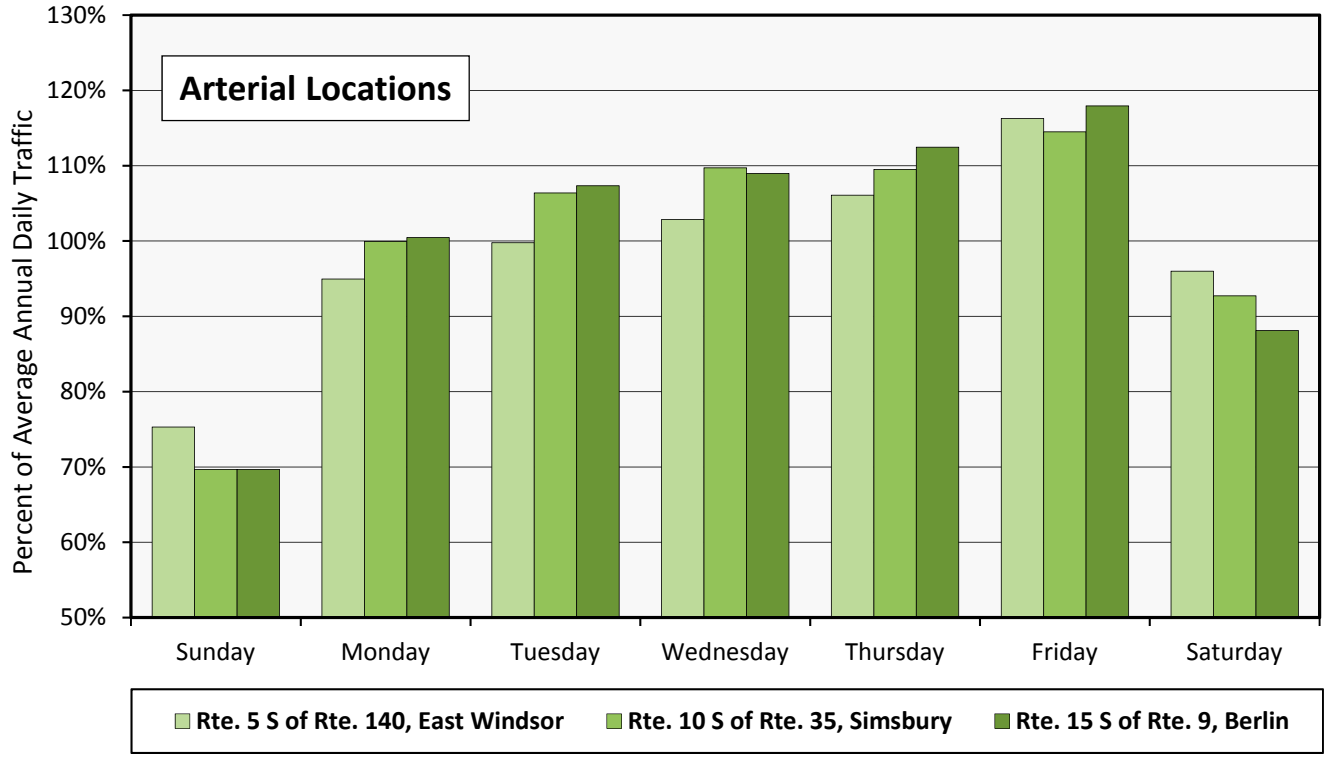
*** - Based on 2011 data.**
+ - Estimated based on available 2011 and 2012 data.

2012 MONTHLY VARIATIONS AT SELECTED COUNT LOCATIONS

CDM Smith

FIGURE 2-8





2012 DAILY VARIATIONS AT SELECTED COUNT LOCATIONS

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FIGURE 2-9

Table 2-2
Truck Percentages

Location	7AM-9AM			9AM-3PM			3PM-6PM			6PM-7AM			Total Day		
	Cars	Med Truck	Large Truck	Cars	Med Truck	Large Truck	Cars	Med Truck	Large Truck	Cars	Med Truck	Large Truck	Cars	Med Truck	Large Truck
I-84 btw Flatbush Ave. and Kane St. Off-Ramps	93.6%	3.3%	3.1%	90.8%	4.2%	5.0%	94.7%	2.0%	3.3%	90.9%	1.8%	7.4%	92.2%	2.8%	5.0%
I-84 btw Route 9 On-Ramp and Route 4 Off-Ramp	94.3%	2.9%	2.8%	90.0%	4.5%	5.5%	95.1%	1.8%	3.1%	90.3%	1.7%	8.1%	92.0%	2.8%	5.2%
I-84 btw I-384 and Roberts Rd. Off-Ramps	93.5%	2.8%	3.7%	90.9%	3.7%	5.4%	94.6%	1.8%	3.7%	88.6%	1.8%	9.6%	92.0%	2.4%	5.6%
I-384 btw Spencer St (Exit 1) and Keeney St (Exit 2)	96.5%	2.7%	0.9%	95.4%	3.4%	1.1%	97.8%	1.5%	0.7%	97.7%	1.0%	1.3%	97.1%	1.9%	1.0%
I-91 btw Wethersfield Cove Brdg and Rt 15 Ramps	92.1%	3.5%	4.4%	87.0%	5.3%	7.6%	92.8%	2.9%	4.4%	86.6%	2.8%	10.6%	89.0%	3.7%	7.4%
I-91 at Farmington River	92.0%	3.5%	4.5%	87.9%	5.3%	6.7%	94.4%	2.5%	3.2%	90.0%	2.4%	7.7%	90.8%	3.4%	5.7%
I-91 S of Route 99 / Silas Deane Hwy. (Int. 24)	93.1%	2.9%	3.9%	88.0%	4.6%	7.4%	94.0%	2.3%	3.7%	87.7%	2.4%	9.9%	90.1%	3.1%	6.8%
Route 3 at Connecticut River (Putnam Bridge)	97.4%	1.7%	0.9%	95.4%	3.1%	1.5%	97.5%	1.6%	0.9%	96.7%	1.5%	1.8%	96.6%	2.1%	1.3%
Route 15 / Wilbur Cross Hwy. SB S of I-91	95.3%	3.5%	1.2%	93.3%	5.3%	1.4%	97.2%	1.9%	1.0%	96.4%	2.2%	1.4%	95.5%	3.3%	1.3%
I-84 CD Off-Ramp to I-384 EB	93.7%	3.7%	2.5%	90.4%	5.9%	3.7%	95.8%	2.5%	1.7%	94.1%	2.3%	3.6%	93.6%	3.6%	2.9%

Notes: Medium Truck is a bus or single unit truck, Large Truck is a multi-unit truck

trucks such as a FedEx truck, while a large truck is defined as a multi-unit truck such as a tractor-trailer. A slightly higher truck percentage is experienced on I-91, with passenger cars making up about 90 percent of the vehicle mix, and medium and large trucks accounting for 3-4 percent and 6-7 percent, respectively. As expected, truck percentages increase during the midday (9AM-3PM) and overnight hours (6PM-7AM). During the midday, truck percents account for about 10 to 12 percent of the traffic on I-84 and I-91 in the Hartford area, with large trucks making up about 55 to 60 percent of total trucks. During the overnight, truck percents also account for about 10 to 12 percent of the traffic on I-84 and I-91 in the Hartford area, but the number of large trucks account for about 80 percent of the truck mix.

Screenline Counts

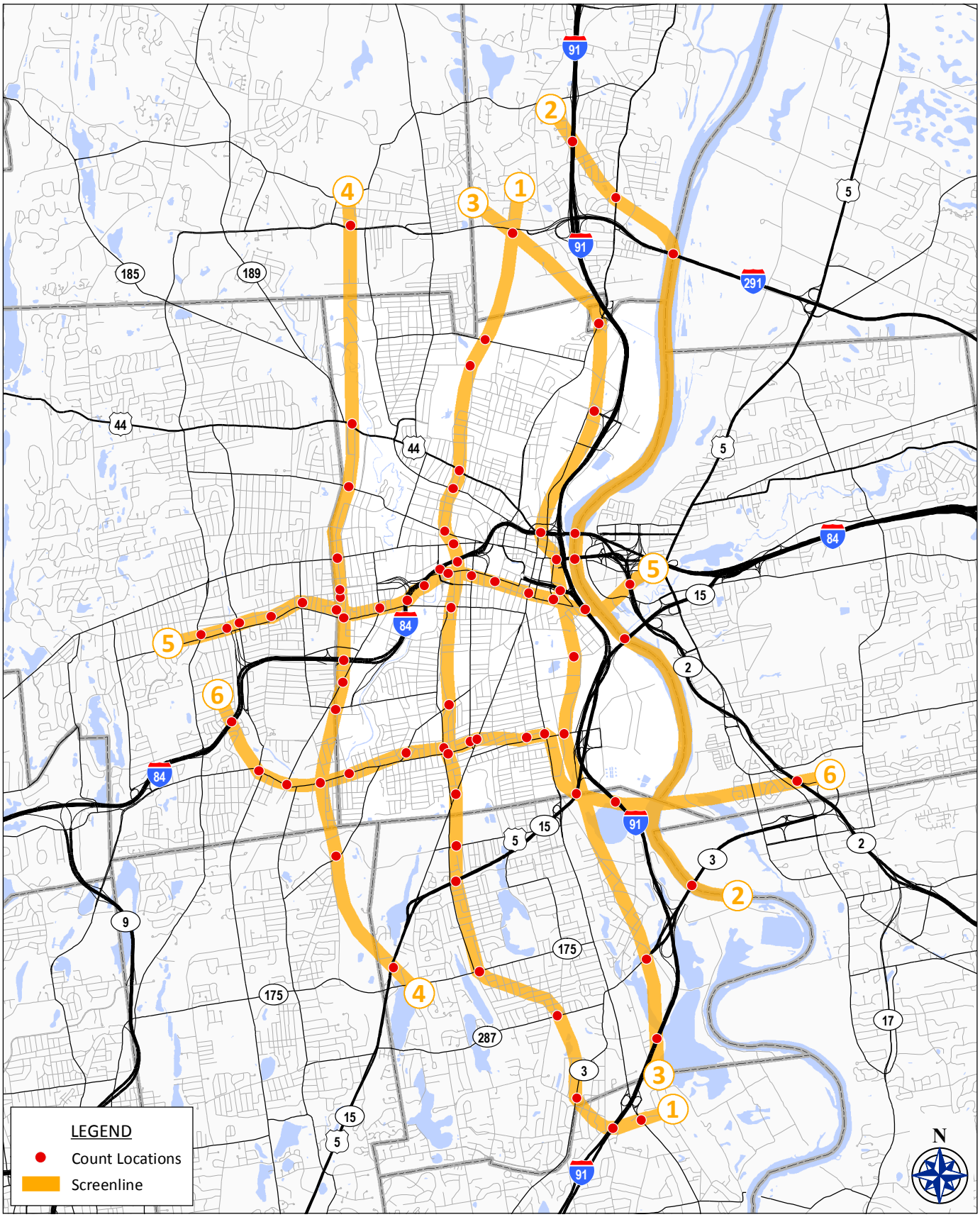
A series of north-south and east-west "screenlines" (**Figure 2-10**) were developed and a corresponding list of count locations was identified (**Table 2-3**). Traffic counts were collected through existing sources and where not available, new counts were conducted and summarized into tabular format. 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 a useful tool 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.

Screenline 1 crosses the I-84 Viaduct east of Sigourney Street. I-84 at this location carries nearly 29 percent of the screenline demand. Similarly, I-91 carries nearly 28 percent of the total screenline demand. The four major roadways to the north of I-84 (Farmington Avenue, Asylum Avenue, Homestead Avenue, and US 44) carry significant volumes in the range of 13,000 vehicles on an average weekday. South of I-84 on Screenline 1, Capitol Avenue and Park Street carry similar volumes in the range of 8,000 vehicles, while New Britain Avenue carries more than 14,000 vehicles.

Screenline 2 runs along the Connecticut River, covering the Putnam Bridge at the south to the Bissell Bridge at the north before turning west to cross Route 159 and I-91. More than 139,000 vehicles cross the Bulkeley Bridge on I-84, which is more than double of any other river crossing on the screenline. The Charter Oak Bridge (Route 5 Wilbur Cross Highway) is the second highest and carries nearly 67,000 vehicles on an average weekday.

Screenline 3 runs north to south, just west of I-91. I-84 carries more than 161,000 vehicles, as it picks up an additional 22,000 vehicles to/from the west at I-91. State Street and Whitehead Parkway to the south of I-84 also carry significant volumes with a combined total of nearly 73,000 vehicles. To the north of I-84, Jennings Road carries nearly 24,000 vehicles.

Screenline 4 is the last of the screenlines that run north to south and cuts through I-84 east of Prospect Avenue. I-84 carries 125,000 vehicles at this location, a significant drop-off from the 170,000 vehicles through the Viaduct section less than two miles away. To the south of I-84, Flatbush Avenue and New Britain Avenue both carry more than 17,000 vehicles on an average weekday. To the north of I-84, major east-west feeder routes to the downtown are included in the screenline.



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TRAFFIC COUNT AND PROJECT SCREENLINE LOCATION MAP

FIGURE 2-10

Table 2-3
2012 Average Weekday Traffic – Screenlines

Screen-line	Roadway	Location	Cross Street	% of Total Screenline	2010 AWDT Counts
Screenline 1: Through I-84 Viaduct					
1	Route 99 / Silas Deane Hwy.	S of	I-91	3.2%	18,450
1	I-91 SB	S of	Route 99 / Silas Deane Hwy.	13.8%	80,901
1	I-91 NB	S of	Route 99 / Silas Deane Hwy.	14.1%	82,685
1	Route 3 / Maple St.	N of	Griswold Rd.	1.3%	7,345
1	Route 287 / Prospect St.	Between	Griswold Rd. and Wolcott Hill Rd.	2.1%	12,354
1	Route 175 / Wells Rd.	E of	Ridge Rd.	1.6%	9,091
1	Wilbur Cross Highway / Route 15 SB	N of	Berlin Tpke.	3.6%	20,836
1	Wilbur Cross Highway / Route 15 NB	N of	Berlin Tpke.	3.9%	22,963
1	Route 314 / Jordan Ln.	E of	Ridge Rd.	1.3%	7,556
1	Route 543 / Maple Ave.	N of	Fairfield Ave.	2.0%	11,705
1	Route 529 / White St.	E of	Fairfield Ave.	1.0%	6,002
1	New Britain Ave.	E of	Summit St.	2.4%	14,168
1	Park St.	E of	Zion St.	1.4%	8,153
1	Capitol Ave.	E of	Park Terrace	1.3%	7,546
1	I-84 WB	E of	Sigourney St.	14.6%	85,602
1	I-84 EB	E of	Sigourney St.	14.3%	83,593
1	Farmington Ave. EB & WB	Between	Flower St and Sigourney St.	2.4%	13,900
1	Asylum Ave.	E of	Sigourney St.	2.3%	13,567
1	Homestead Ave. EB & WB	Between	Garden St and Sigourney St.	2.2%	12,801
1	US 44 / Albany Ave.	Between	Sigourney St. and Vine St.	2.3%	13,405
1	Vine St.	S of	Mental Health Center	1.1%	6,622
1	Tower Ave.	W of	Waverly St.	2.0%	11,479
1	Route 218 / Putnam Hwy	W of	I-291 Ramps	5.9%	34,624
1	**Total**			**100.0%**	**585,349**
Screenline 2: Connecticut River					
2	Route 3 SB	at	Connecticut River (Putnam Bridge)	5.9%	30,375
2	Route 3 NB	at	Connecticut River (Putnam Bridge)	6.2%	32,029
2	Route 5 (Wilbur Cross Hwy)	SB over	the Connecticut River	6.0%	31,400
2	Route 5 (Wilbur Cross Hwy)	NB over	the Connecticut River	6.8%	35,500
2	Route 2	WB over	the Connecticut River (Founders Br.)	3.9%	20,318
2	Route 2	EB over	the Connecticut River (Founders Br.)	3.1%	16,071
2	I-84	WB over	the Connecticut River (Bulkeley Br.)	13.4%	69,470
2	I-84	EB over	the Connecticut River (Bulkeley Br.)	13.4%	69,605
2	I-291	WB at	Connecticut River (Bissell Bridge)	5.8%	30,252
2	I-291	EB at	Connecticut River (Bissell Bridge)	6.0%	31,254
2	Route 159 / Windsor Ave.	N of	I-291	1.6%	8,485
2	I-91 SB	Between	Route 178 / Park Ave. and I-291	13.6%	70,437
2	I-91 NB	Between	I-291 and Route 178 / Park Ave.	14.2%	73,961
2	**Total**			**100.0%**	**519,158**
Screenline 3: W of I-91					
3	I-91	N of	Route 99 / Silas Deane Hwy.	26.4%	147,400
3	Route 3 / Maple St.	W of	I-91	3.9%	21,700
3	Route 15 / Wilbur Cross Hwy SB	N of	I-91	5.0%	27,836
3	Route 15 / Wilbur Cross Hwy NB	N of	I-91	5.7%	32,063
3	Airport Rd.	W of	Locust St.	4.1%	22,700
3	Wawarme Ave.	W of	Locust St.	0.6%	3,300
3	Whitehead Parkway ML	W of	I-91	6.0%	33,377
3	State St.	E of	Columbus Blvd.	7.0%	39,356
3	I-84 ML	W of	I-91	28.9%	161,424
3	Jennings Rd.	W of	I-91	4.3%	23,843
3	Route 156 / Windsor Ave.	S of	I-91	2.0%	11,019
3	Route 218 / Putnam Hwy	W of	I-291 Ramps	6.2%	34,624
3	**Total**			**100.0%**	**558,643**

(continued)

Table 2-3 (continued)
2012 Average Weekday Traffic – Screenlines

Screenline 4: E of Prospect Ave.

4	Route 15 / Berlin Tpke NB	N of	Route 175 / E Cedar St.	14.9%	46,200
4	Route 176 / Hartford Ave.	N of	N Mountain Rd.	1.7%	5,276
4	Route 519 / New Britain Ave.	E of	Shield St.	5.7%	17,621
4	Flatbush Ave.	Between	New Park Ave. and I-84 Ramps	5.5%	17,024
4	New Park Ave.	N of	Prospect Ave.	2.8%	8,784
4	I-84 WB	Between	Flatbush Ave. Off-Ramp and Kane St. Off-Ramp	20.8%	64,403
4	I-84 EB	Between	Prospect Ave. On-Ramp and Flatbush Ave. On-Ramp	19.6%	60,878
4	Park St.	E of	Prospect Ave.	3.1%	9,661
4	Capitol Ave.	E of	Prospect Ave.	1.7%	5,218
4	West Blvd	E of	Prospect Ave.	2.2%	6,940
4	Farmington Ave.	E of	Prospect Ave.	3.6%	11,192
4	Asylum Ave.	E of	Prospect Ave.	3.3%	10,293
4	US 44 / Albany Ave.	E of	Route 189 / Bloomfield Ave.	6.7%	20,811
4	Route 218 Cottage Grove Rd.	W of	Granby St.	8.3%	25,816
4	**Total**			**100.0%**	**310,118**

Screenline 5: N of Park Rd. / Capitol Ave.

5	Route 173 / S Main St	N of	Park Rd.	3.1%	16,219
5	Raymond Rd.	N of	Park Rd.	1.3%	6,928
5	Trout Brook Dr.	N of	Park Rd.	4.7%	24,458
5	South Quaker Lane	N of	Park Rd.	2.0%	10,108
5	Arnoldale Rd.	N of	Park Rd.	0.6%	3,104
5	Prospect Ave.	N of	Park Rd.	2.3%	11,747
5	Sisson Ave.	N of	Park St.	1.9%	9,618
5	I-84 ML	Between	Flatbush Ave. and West Blvd. / Sisson Ave.	27.7%	143,106
5	Laurel St.	S of	Capitol Ave.	1.3%	6,594
5	Sigourney St. NB & SB	Under	I-84	2.7%	14,194
5	Broad St.	S of	Capitol Ave.	1.6%	8,522
5	Washington St.	S of	Capitol Ave.	2.2%	11,215
5	Main St.	S of	Capitol Ave.	1.9%	9,565
5	Columbus Blvd.	S of	Sheldon St. (N of Charter Oak Ave.)	3.1%	15,993
5	I-91 ML	Between	Route 15 / Wilbur Cross Hwy. and Whitehead Hwy.	21.4%	110,585
5	Route 2 ML	Between	East River Dr. and Pitkin St.	22.2%	114,888
5	**Total**			**100.0%**	**516,848**

Screenline 6: N of New Britain Ave. / White St.

6	I-84 ML	Between	Route 173 / S Main St. and Trout Brook Dr.	25.8%	125,797
6	S Quaker Lane	N of	Route 173 / New Britain Ave.	3.3%	15,886
6	New Park Ave.	N of	Route 173 / New Britain Ave.	2.8%	13,570
6	Newfield Ave.	N of	Route 173 / New Britain Ave.	2.4%	11,596
6	New Britain Ave.	N of	White St.	1.9%	9,270
6	Newbury St	N of	Eastview St. (Fairfield Ave. N of White St.)	0.2%	940
6	Broad St.	N of	White St.	1.5%	7,183
6	Maple St.	N of	White St.	3.7%	18,228
6	Franklin Ave.	N of	Brown St.	2.0%	9,625
6	Wethersfield Ave.	N of	Brown St.	2.3%	11,293
6	Route 15 / Wilbur Cross Hwy SB	S of	I-91	5.7%	27,836
6	Route 15 / Wilbur Cross Hwy NB	S of	I-91	6.6%	32,063
6	I-91 SB	Between	Route 15 and Wethersfield Cove	14.1%	68,792
6	I-91 NB	Between	Wethersfield Cove and Route 15	14.1%	68,942
6	Route 2 ML	N of	Route 3	13.7%	66,600
6	**Total**			**100.0%**	**487,621**

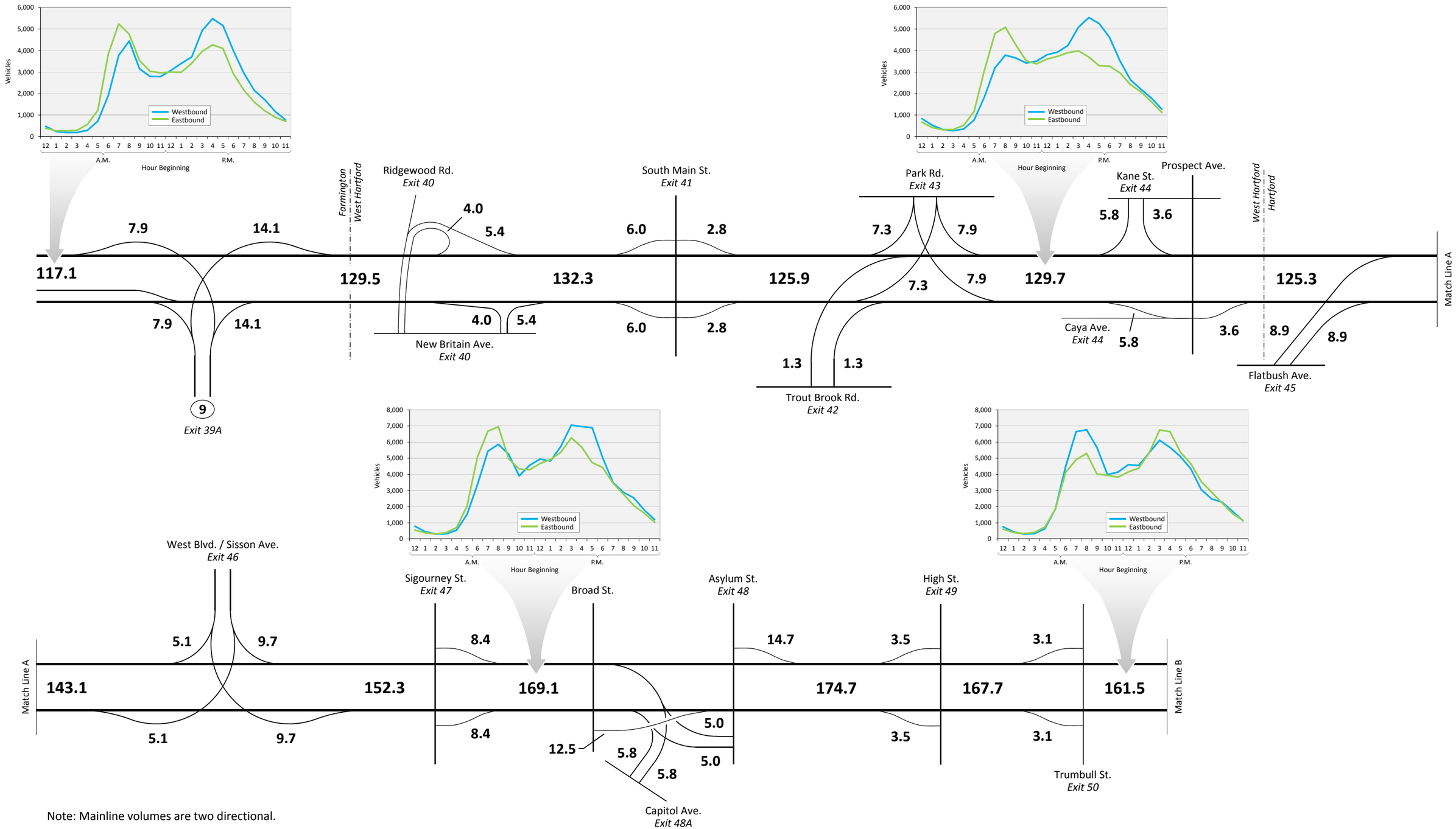
Screenline 5 runs east to west, traversing through north-south routes in Hartford, and passing through I-84 just west of the Sisson Avenue interchange. More than 143,000 vehicles utilize this section of I-84 on an average weekday. The screenline continues west and runs just north of Park Road. Although all these arterials carry significant traffic volumes, Trout Brook Drive carries nearly 25,000 vehicles as it feeds directly into the I-84 interchange at Exits 42 and 43. East of I-84, Sigourney Street which is in the heart of the Viaduct section, carries more than 14,000 vehicles. Continuing east, several other major arterials are shown as the screenline runs just south of Capitol Avenue.

Screenline 6 runs north of New Britain Avenue and White Street before turning northward to cross I-84 west of the Trout Brook Drive interchange. I-84 carries slightly less than 126,000 vehicles at this location. South Quaker Lane carries nearly 16,000 vehicles and New Park Avenue about 13,500, both of which are major north-south arterials. Further east, Maple Street is shown to carry more than 18,000 vehicles as it directly connects to the Berlin Turnpike to the south.

Balanced Traffic Profiles

Traffic count data at each on and off ramp and several mainlines along I-84 and I-91 was assembled from existing CT DOT count data and imported into a database for processing. This existing data and relevant new traffic counts that were conducted to cover the screenline locations were used to prepare a balanced hourly traffic profile for I-84 and I-91. The resulting average weekday volumes for I-84 are displayed (in thousands) in schematic format in **Figures 2-11 through 2-13**. The highest average weekday volumes along I-84 are just west of High Street (between exits 48 and 49), at nearly 175,000 vehicles. Significant volumes on the local interchanges throughout the downtown area can also be seen. Sisson Avenue ramps carry nearly 30,000 vehicles on an average weekday, with two-thirds of those oriented to and from the east. Capitol Avenue carries 21,600 vehicles on an average weekday, with all of this traffic oriented to and from the west. The Route 9 ramps to and from the east carry more than 28,000 vehicles on an average weekday. As would be expected, the interchange that handles the highest amount of traffic is I-91, carrying more than 70,000 vehicles to and from I-84 west. East of I-91, 139,100 vehicles cross the Bulkeley Bridge over the Connecticut River. Heading east, average weekday traffic drops considerably following connections with Route 44, Route 2, and Governors Street, before increasing back to nearly 160,000 vehicles east of the Route 15 and Roberts Street interchanges. The Charter Oak Bridge carries nearly 60,000 vehicles to and from I-84 east of the Connecticut River. Further east, the I-384 ramps carry nearly 72,000 vehicles, with 40,000 of those vehicles oriented to and from the west on I-84. Traffic volumes drop below 100,000 vehicles north of Exit 65, just north of the HOV lanes termini. Hourly volumes are also presented along mainline segments of the I-84 general purpose and HOV lanes where available, demonstrating the directional peaking characteristics over this stretch of I-84.

Average weekday volumes along I-91 are shown in **Figures 2-14 and 2-15**. Average weekday volume south of Brainard Road (Exit 27) is 137,700 vehicles, dropping considerably north of the ramps to the Charter Oak Bridge. Just north of I-84, volumes are at their highest at more than 150,000 vehicles. The HOV lanes carry about 8,000 vehicles on an average weekday. The ramps to and from the south at Jennings Road carry more than 22,000 vehicles on an average weekday. North of Jennings Road, traffic volumes on I-91 remain between 130,000 and 140,000 vehicles (including HOV volumes). The ramps to and from the south at the Bradley International Airport Connector carry nearly 32,000 vehicles, which are some of the highest volume ramps along this portion of I-91, behind only the ramps to/from I-84 west and the ramps to the Charter Oak Bridge. Hourly volumes are also presented along mainline segments of the I-91 general purpose and HOV lanes where available, demonstrating the directional peaking characteristics over this stretch of I-91.



Note: Mainline volumes are two directional.

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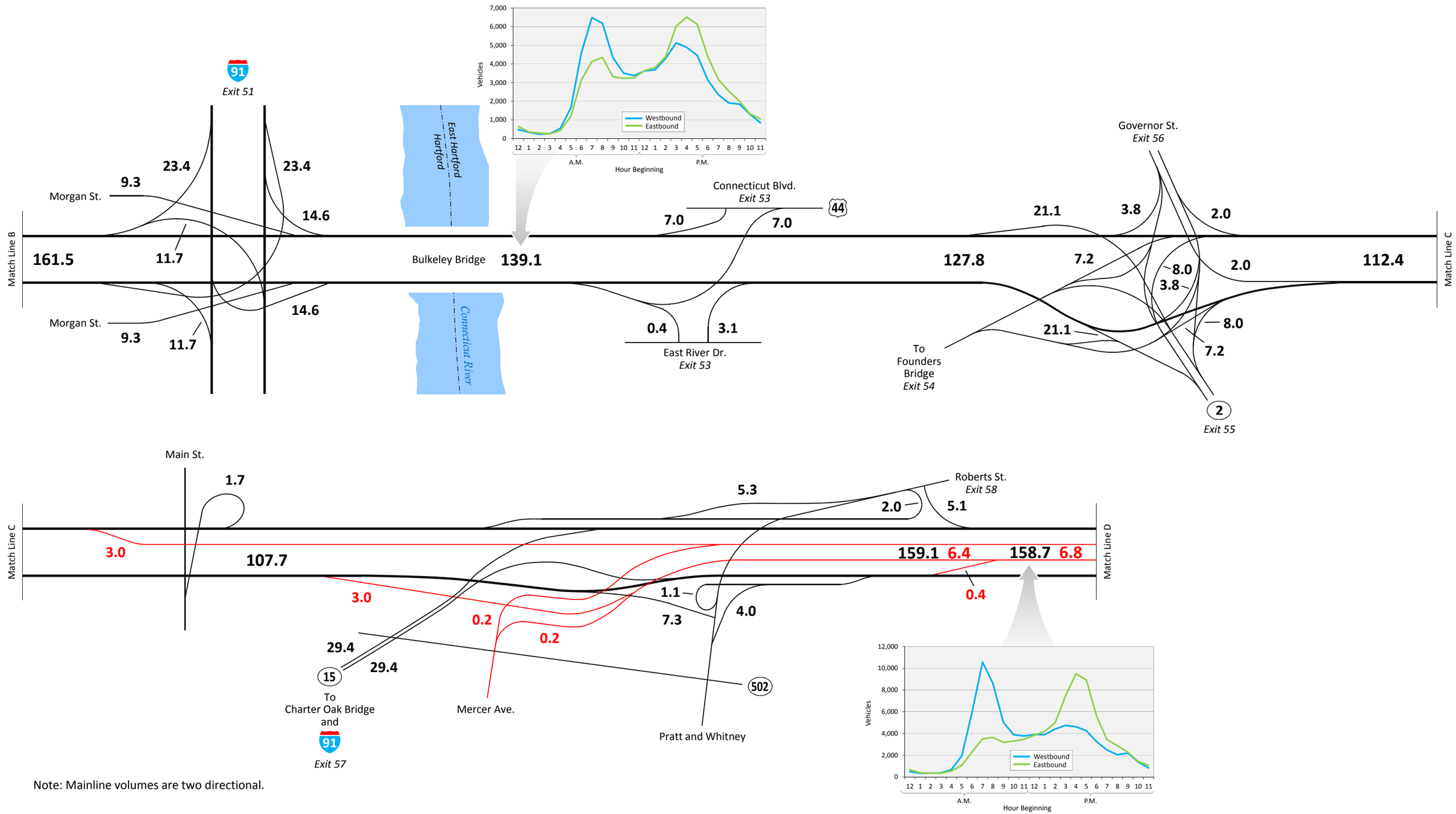
I-84 WEEKDAY TRAFFIC PROFILE

FIGURE 2-11



Note: Mainline volumes are two directional.

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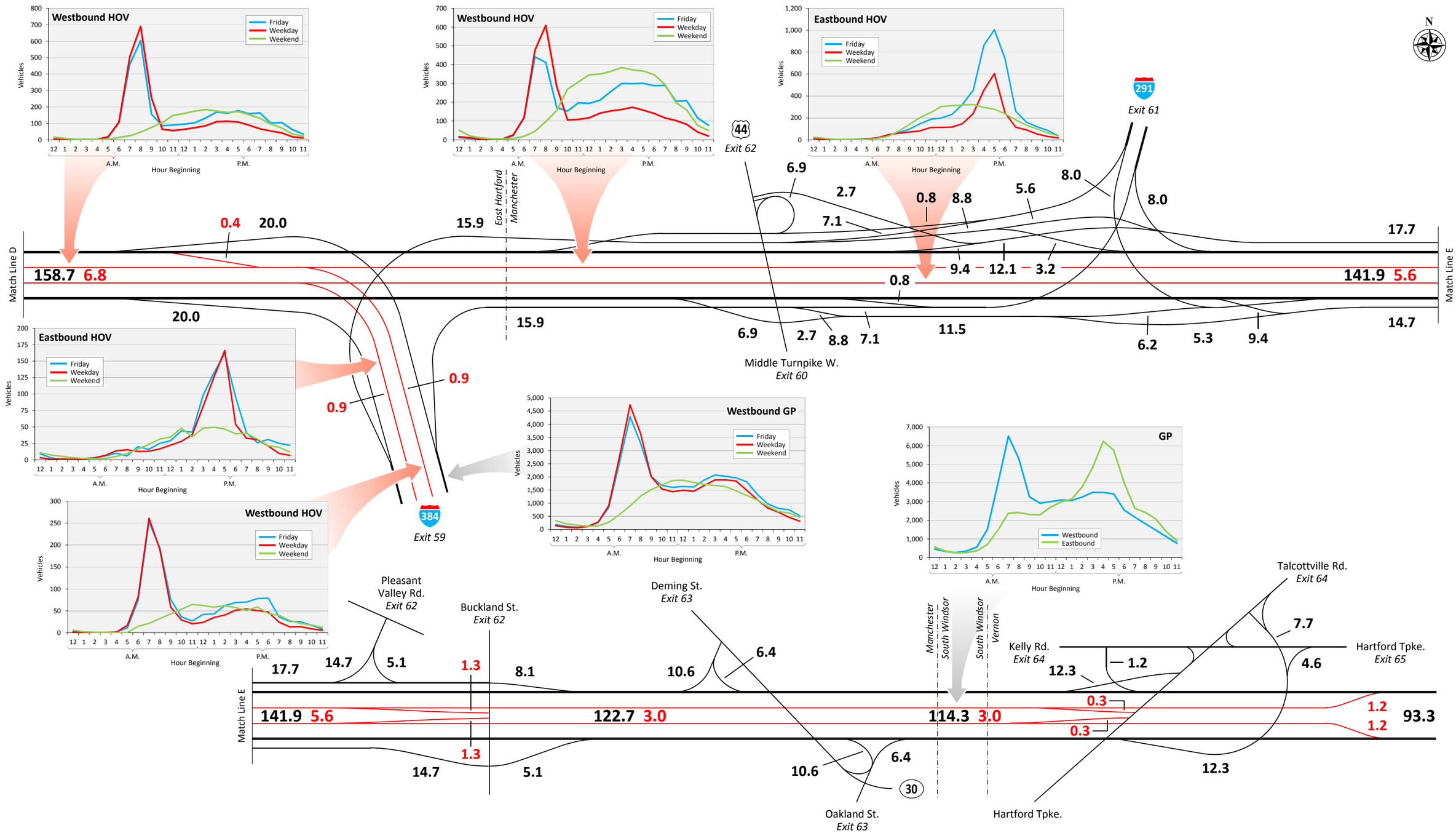
I-84 WEEKDAY TRAFFIC PROFILE

FIGURE 2-12



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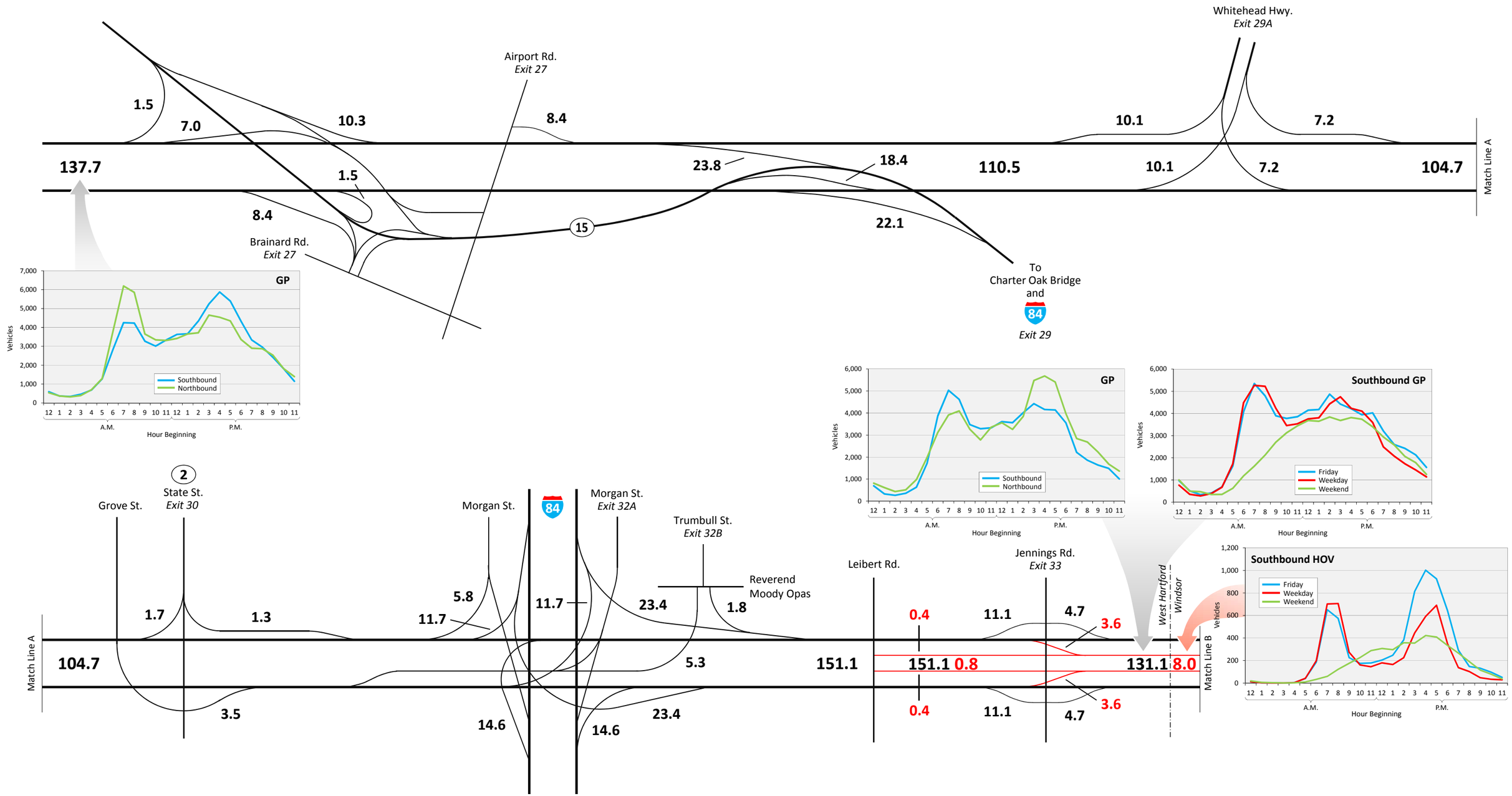
I-84 WEEKDAY TRAFFIC PROFILE

FIGURE 2-13



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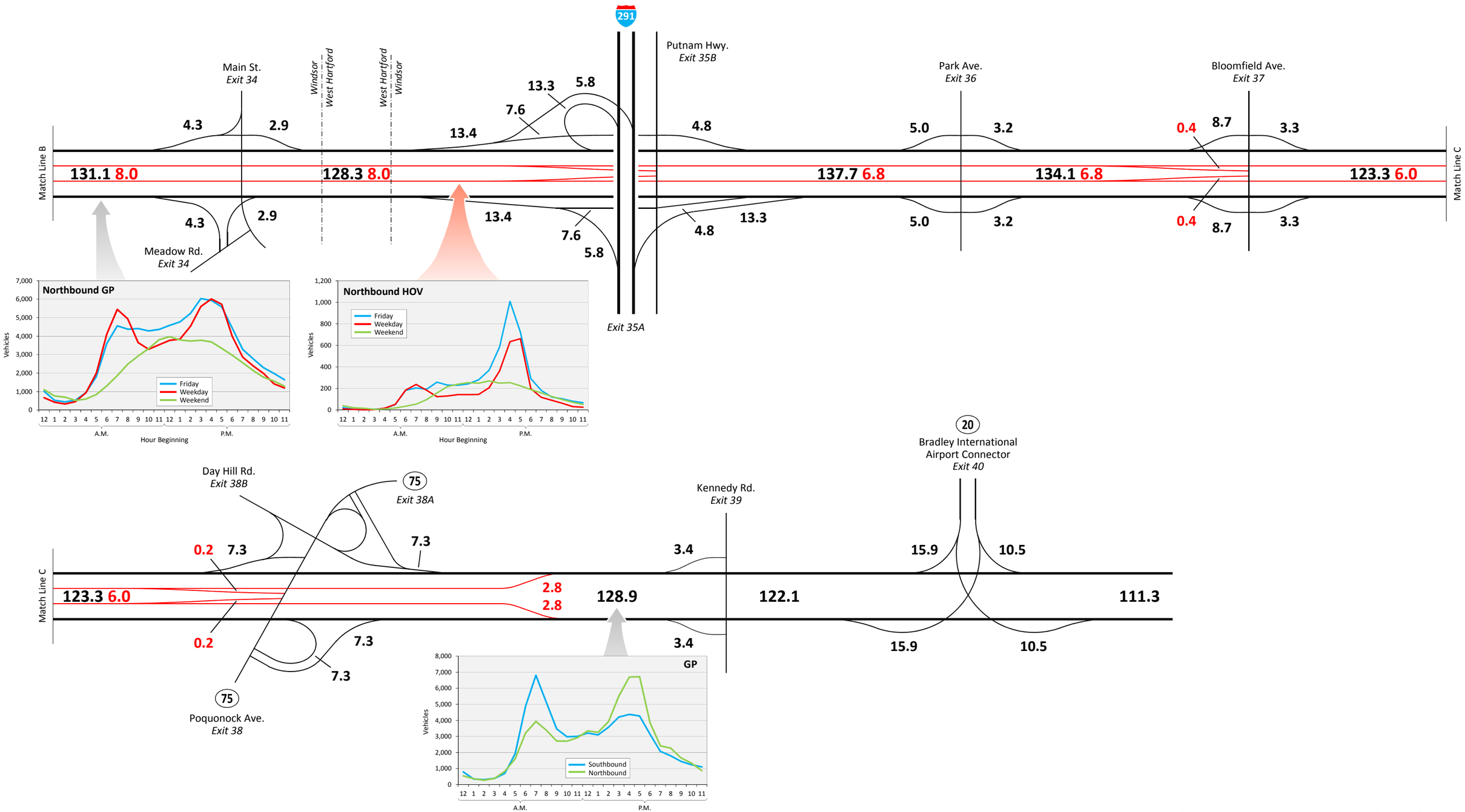
I-91 WEEKDAY TRAFFIC PROFILE

FIGURE 2-14



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I-91 WEEKDAY TRAFFIC PROFILE

FIGURE 2-15

HOV Lanes

In 1989, High-Occupancy Vehicle (HOV) lanes opened east of Hartford along I-84 and I-384 and were extended into Hartford in 2000. The HOV facility along I-84 and I-384 is approximately 22.1 lane-miles with one HOV lane provided in each direction of travel (10.1 miles eastbound and 12.0 miles westbound). The I-84 HOV lanes were initially opened with a 3+ occupancy requirement before being modified to a 2+ vehicle occupancy requirement in 1993.

In 1993, HOV lanes were opened on I-91 north of Hartford. The HOV facility along I-91 is approximately 14.7 lane-miles with one HOV lane provided in each direction of travel (7.5 miles northbound and 7.2 miles southbound).

I-91 HOV Lanes

Three general purpose lanes in each direction parallel the I-91 HOV lanes. Access to and egress from the I-91 HOV lane is provided at the following locations:

- **Southbound access:**
  - General purpose lanes in Windsor (less than a mile south of the Bradley International Airport access road);
  - Direct on-ramp from Route 75;
  - Direct on-ramp from Bloomfield Avenue; and
  - Direct on-ramp from I-291/Route 218.
- **Southbound egress:**
  - General purpose lanes near Jennings Road; and
  - Direct off-ramp to Leibert Road.
- **Northbound access:**
  - General purpose lanes near Jennings Road; and
  - Direct on-ramp from Leibert Road.
- **Northbound egress:**
  - Direct off-ramp to I-291/Route 218;
  - Direct off-ramp to Bloomfield Avenue;
  - Direct off-ramp to Route 75; and
  - General purpose lanes in Windsor (less than a mile south of the Bradley International Airport access road).

I-84 HOV Lanes

Three general purpose lanes in each direction parallel the I-84 HOV lanes, except in the section between the I-384/I-84 merge and Wilbur Cross Parkway (Route 15) where five general purpose lanes are provided. Access to and egress from the I-84 HOV lane is provided at the following locations:

- **Westbound access:**
  - General purpose lanes in Vernon;
  - Direct on-ramp from Route 30;
  - Direct on-ramp from Buckland Street; and
  - Direct on-ramp from I-384 HOV.
- **Westbound egress:**
  - General purpose lanes east of Forbes Street under pass;
  - Direct off-ramp to Silver Lane;
  - General purpose lanes near Route 2 interchange; and
  - General purpose lanes at Founders Bridge.
- **Eastbound access:**
  - General purpose lanes west of Route 15;
  - Direct on-ramp from Silver Lane; and
  - General purpose lanes west of Simmons Road underpass.
- **Eastbound egress:**
  - Direct off-ramp to I-384 HOV;
  - Direct off-ramp to Buckland Street;
  - Direct off-ramp to Route 30; and
  - General purpose lanes in Vernon.

Traffic volume on the I-84 Westbound and I-91 Southbound HOV lanes between the hours of 6a.m. and 9a.m. have been collected by the CT DOT since the opening of the HOV lanes. The Connecticut DOT assembles a report documenting the usage of the HOV lanes, with the latest report documenting HOV usage in 2010[1]. The HOV lane counts are taken at the maximum loading points on I-91 and I-84. For the I-91 southbound HOV lane count, the location is at the Interstate 291/Route 218 interchange on-ramp. For I-84 westbound, the count is taken at two locations which are then added together to obtain the peak loading volume. Traffic is counted on I-384 westbound and on I-84 westbound prior to the I-

[1] High Occupancy Vehicle Lane Report 2010

84/I-384 interchange. **Table 2-4** shows the historical growth in the HOV lanes during the morning peak period. The HOV lanes along I-84 opened in 1989 with an HOV 3+ eligibility requirement before changing to an HOV 2+ eligibility requirement when the I-91 HOV lanes opened in 1993. Volumes more than tripled on the I-84 HOV lanes when the eligibility definition was changed in 1993. Since opening, HOV traffic has increased by an average of 1.5 percent per year on I-84 and by 4.3 percent on I-91. However, over the last 10 years, HOV usage has remained fairly flat, with increases seen in the number of violators. Violators are shown to be significant, making up roughly 20 to 25 percent of the HOV lane usage in recent years.

Table 2-4
Historical HOV Lane Usage
6 a.m. to 9 a.m.

	I-84 Westbound HOV Lane Traffic				I-91 Southbound HOV Lane Traffic			
Year	Legal	Violators	Total	% Violators	Legal	Violators	Total	% Violators
1989	294	35	329	11%	0	0	0	
1990	301	58	359	16%	0	0	0	
1991	299	18	317	6%	0	0	0	
1992	249	66	315	21%	0	0	0	
1993	853	60	913	7%	603	81	684	12%
1994	880	104	984	11%	923	145	1,068	14%
1995	751	68	819	8%	835	96	931	10%
1996	757	142	899	16%	937	225	1,162	19%
1997	746	72	818	9%	944	71	1,015	7%
1998	788	163	951	17%	1,072	120	1,192	10%
1999	832	118	950	12%	1,181	189	1,370	14%
2000	881	124	1,005	12%	1,267	185	1,452	13%
2001	1,178	152	1,330	11%	1,296	145	1,441	10%
2002	1,095	202	1,297	16%	1,257	152	1,409	11%
2003	969	100	1,069	9%	1,280	127	1,407	9%
2004	1,224	277	1,501	18%	1,330	336	1,666	20%
2005	1,378	204	1,582	13%	1,603	225	1,828	12%
2006	1,134	365	1,499	24%	1,324	423	1,747	24%
2007	1,151	377	1,528	25%	1,311	423	1,734	24%
2008	1,257	390	1,647	24%	1,247	280	1,527	18%
2009	1,054	240	1,294	19%	1,188	197	1,385	14%
2010	1,098	420	1,518	28%	1,243	271	1,514	18%
Average Annual Percent Change								
93-10	1.5%	12.1%	3.0%		4.3%	7.4%	4.8%	

Notes: In 1993, the eligibility to use the HOV lanes was changed from HOV3+ to HOV2+

Travel Speeds

Data on travel speeds on I-84, I-91, and all major arterials in the study area was collected through the purchase of 2012 historical data from INRIX, which included data at 5 minute intervals for all of 2012. Travel speed data for internal weekdays were averaged, 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.

Figures 2-16 and 2-17 display travel speeds on the I-84 schematic between South Main Street and just east of the Roberts Street interchange (Exit 58). Both the eastbound and westbound directions are shown, covering the time periods of 6AM-9AM and 3PM-6PM. West of I-91, the AM eastbound direction shows slowdowns beginning around 7:00AM with the most severe delay around 8:00AM. Average speeds are reduced to about 40 mph between 8:00AM and 8:30AM before beginning to recover. East of Sigourney Street, reductions in travel speeds do occur, but not substantially as they hover near the posted speed limit of 50 mph. In the westbound direction during the AM peak, delay occurs east of the Capitol Avenue interchange beginning around 7:30AM with the worst delay occurring during the 8:00 to 8:30 time frame. West of Capitol Avenue, the westbound direction sees no slowdown during the AM period. East of the I-91 interchange, speeds in the eastbound direction are free flow in the AM period. In the westbound direction between I-91 and the Governor Street Exit, speeds drop significantly before 7:30AM and continue to average below 30mph until recovering after 9:00AM.

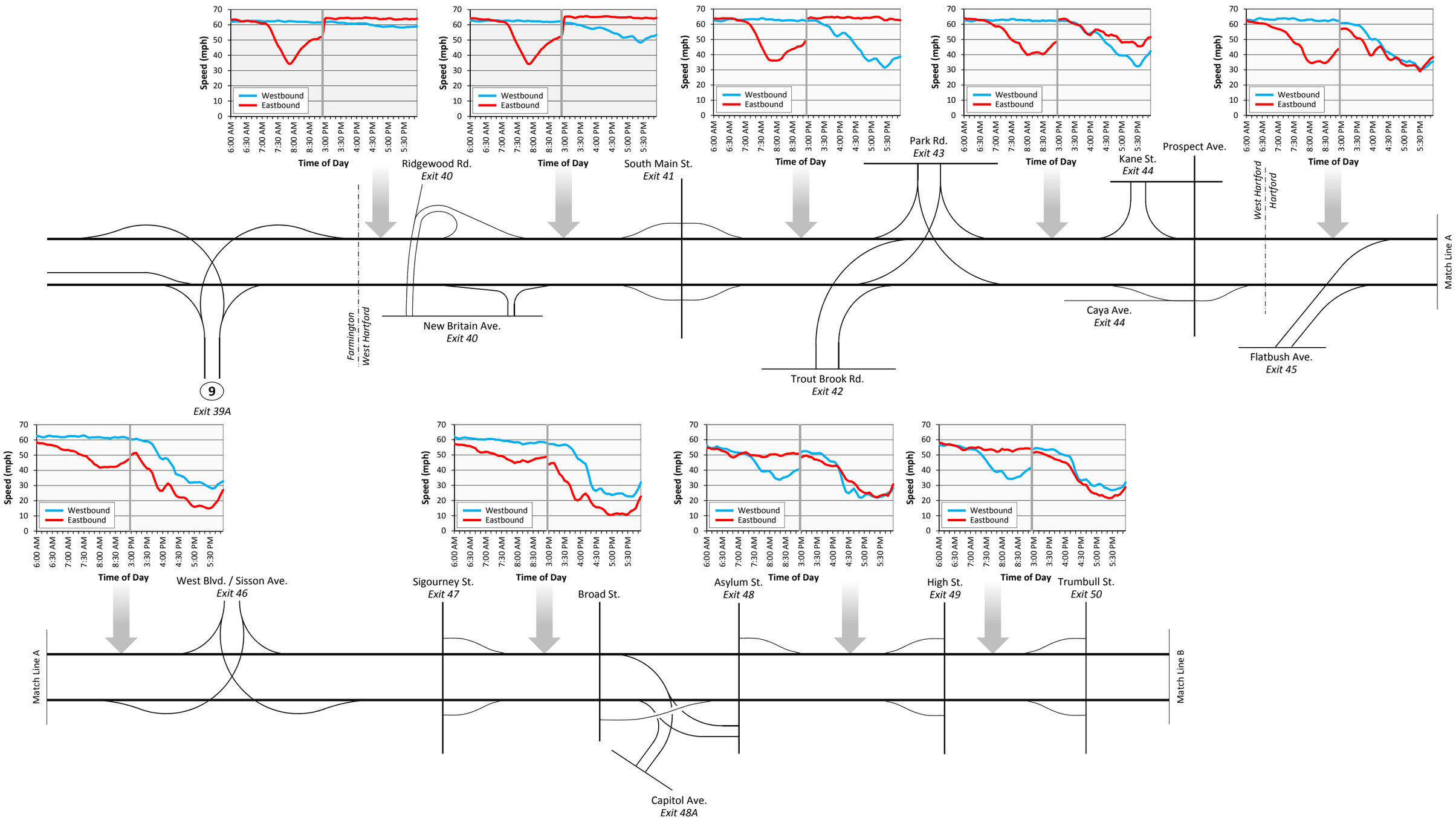
During the PM peak period, delay in the eastbound direction begins east of the Trout Brook Road interchange and continues to degrade where it reaches it most severe condition within the Viaduct section of I-84 east of Sigourney Street. Delay is already occurring by 3PM, increasing to its maximum severity during the 5PM rush hour, where average speeds are near 10 mph on the Viaduct segment. Peak hour speeds average about 20mph between Asylum Street and I-91 and the delay extends further eastward over the Buckeley Bridge before fully recovering east of the Route 2 interchange. In the westbound direction, delay is experienced from east of the South Main Street interchange to the I-91 interchange, and continues back to the Route 2 interchange. Delay is most severe during the PM rush hour, with speeds averaging around 25mph along the Viaduct segment and 30mph east of Asylum Street and west of Sisson Avenue.

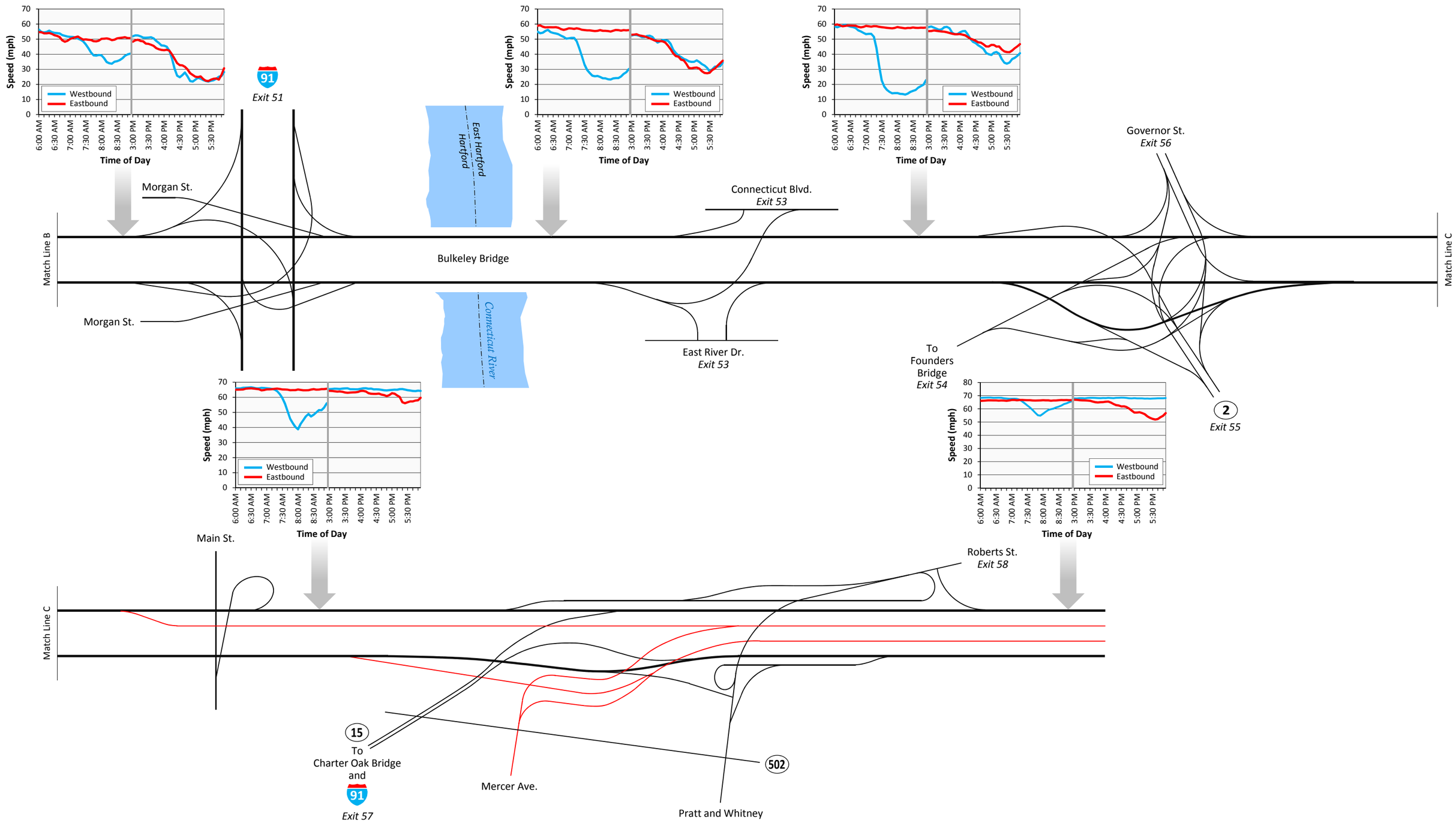
Travel Patterns and Characteristics

A series of data collection activities were conducted to provide information on travel patterns along I-84 in Hartford, vehicle occupancy levels, out of state traffic percentages, and characteristics of truck travel.

Local Travel Patterns (Skycomp)

As part of the overall I-84 Corridor Improvement Project in Hartford, Skycomp Inc. collected an aerial survey of I-84 traffic movements. The survey area was bounded by Prospect Avenue (Interchange 44) to the west and Roberts Street (Interchange 58) to the east. A total of seven cameras were mounted on three helicopters hovering approximately one mile above the ground in downtown Hartford. The survey was conducted for three hours on Wednesday, November 14th, 2012 between 7:30AM and 9:00AM and between 3:00PM and 4:30PM. The purpose of the survey was to collect information on origin-destination (ramp to ramp) data and queue lengths. Photographs were taken at a one second frame rate, and then were tightly aligned to create a permanent “video” record of conditions.


Speed (mph)
Time of Day
Westbound
Eastbound
Exit 39A
Farmington
West Hartford
Ridgewood Rd.
Exit 40
New Britain Ave.
Exit 40
South Main St.
Exit 41
Park Rd.
Exit 43
Trout Brook Rd.
Exit 42
Kane St.
Exit 44
Prospect Ave.
Caya Ave.
Exit 44
West Hartford
Hartford
Flatbush Ave.
Exit 45
Match Line A
West Blvd. / Sisson Ave.
Exit 46
Sigourney St.
Exit 47
Broad St.
Asylum St.
Exit 48
Capitol Ave.
Exit 48A
High St.
Exit 49
Trumbull St.
Exit 50
Match Line B


Speed (mph)
Time of Day
Westbound
Eastbound
6:00 AM
6:30 AM
7:00 AM
7:30 AM
8:00 AM
8:30 AM
3:00 PM
3:30 PM
4:00 PM
4:30 PM
5:00 PM
5:30 PM
91
Exit 51
Morgan St.
East Hartford
Hartford
Connecticut Blvd.
Exit 53
Governor St.
Exit 56
Match Line B
Bulkeley Bridge
Match Line C
Morgan St.
Connecticut River
East River Dr.
Exit 53
To
Founders
Bridge
Exit 54
2
Exit 55
Main St.
Roberts St.
Exit 58
Match Line C
15
To
Charter Oak Bridge
and
91
Exit 57
Mercer Ave.
502
Pratt and Whitney

Skycomp summarized the origin-destination data into a matrix format for the AM and PM periods in the westbound and eastbound directions. **Table 2-5 through 2-8** presents the ramp to ramp distribution of traffic for the corridor. **Table 2-5** presents the AM period distribution in the eastbound direction. The left column of the table represents entry ramps while the top row represents exit ramps. The top portion of the table displays the percentage of entry traffic exiting at each ramp destination. For example, 25 percent of the I-84 traffic west of the Prospect Avenue interchange is exiting at the Capitol Avenue/Asylum Street exit, 22 percent is exiting at I-91, and 16 percent is headed east of the Roberts Street interchange on I-84. 40 percent of the traffic on I-84 west of the Prospect Avenue interchange is traveling beyond the I-91 interchange and crossing the Connecticut River. 21 percent of the traffic entering at West Boulevard is exiting at Capitol Avenue. The bottom portion displays the percentage of exit ramp traffic from each entry ramp. For example, 46 percent of the traffic exiting at I-91 originates west of the Prospect Avenue interchange.

Table 2-6 presents the AM period in the westbound direction. Of the traffic entering from I-91, 59 percent is destined for the Capitol Avenue (29%), Sigourney Street (21%), and West Boulevard (9%) interchanges. 47 percent of the traffic entering from High Street/Pleasant Street/Trumbull Street is exiting at Capitol Avenue (16%), Sigourney Street (20%), and West Boulevard (11%) interchanges. 33 percent of the traffic entering from I-91 is headed west of the Prospect Avenue interchange.

Table 2-7 presents the PM period in the eastbound direction. It should be noted that the data collection was performed prior to the PM peak due to daylight savings and the constraint of daylight hours. Nearly 60 percent of the I-84 traffic west of the Prospect Avenue interchange is crossing the Connecticut River. 49 percent of the Capitol Avenue demand is exiting at I-91, with 33 percent heading east on I-84 beyond the Roberts Street interchange. Of the total traffic exiting at Capitol Avenue, 16 percent is entering from the West Boulevard/Sisson Avenue interchange.

Table 2-8 presents the PM period in the westbound direction. 82 percent of the traffic entering from Capitol Avenue is headed west of the Prospect Avenue interchange. Nearly 40 percent of the High Street/Pleasant Street/Trumbull Street traffic is exiting at Capitol Avenue (11%), Sigourney Street (14%), and West Boulevard (14%) interchanges. About 33 percent of the traffic that exits at Sigourney Street and the West Boulevard interchanges enters from I-91. 34 percent of the I-84 traffic west of the Prospect Avenue interchange originates east of the Connecticut River.

CDM Smith also summarized the traffic on I-84 east of the Sigourney Street ramps. **Figure 2-18** displays the results of the AM period. "Through" trips (25.6%) are classified as eastbound traffic that begins west of the Prospect Avenue interchange and crosses the Connecticut River. "Local" trips have one or both ends of the trip using the interchanges shown. The figure demonstrates that about 33 percent (24.1%/74.4%) of the "local" trips have destinations at the Capitol Avenue interchange, another 13 percent (9.9%/74.4%) have destinations at the High Street/Trumbull Street interchange, while the remaining 54 percent of the "local" trips exit to I-91 or cross the Connecticut River. In the westbound direction, 27.7 percent of trips are "Through". 79 percent of the "Local" trips enter from I-91 or east of the Connecticut River. 32 percent of the "Local" trip exit to the Sigourney Street ramps. **Figure 2-19** displays the PM period summary. "Through" trips are estimated at 34.2 and 25.6 percent of the demand on I-84 east of Sigourney Street in the eastbound and westbound directions, respectively. Nearly 25 percent 18.4%/74.4%) of the "Local" trips in the westbound direction

Table 2-5
AM Period (7:30AM - 9:00AM)
EB Direction

% of Trips by Entry Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West				4%		25%	9%	22%	21%		3%	16%	**100%**
Prospect Ave./ Caya Ave/ Kane St.				3%		20%	9%	34%	18%		3%	14%	**100%**
Flatbush				8%		24%	12%	22%	19%		5%	10%	**100%**
West Blvd./Sisson Ave.						21%	9%	34%	20%		3%	14%	**100%**
Sigourney St.						12%	12%	45%	18%		3%	10%	**100%**
Capital Ave./ Asylum St./ Broad St.							10%	51%	22%		5%	12%	**100%**
High St./ Turmbull St.									58%		9%	33%	**100%**
I-91									83%		7%	10%	**100%**
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.									2%		16%	82%	**100%**
CT-15 Wilbur Cross Hwy.												100%	**100%**
Silver Ln./ Roberts St.												100%	**100%**
I-84 Mainline East													
Total													

% of Trips by Exit Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West				73%		68%	56%	46%	34%		26%	19%	
Prospect Ave./ Caya Ave/ Kane St.				4%		4%	4%	6%	2%		2%	1%	
Flatbush				23%		10%	10%	7%	5%		7%	2%	
West Blvd./Sisson Ave.						15%	15%	19%	9%		6%	4%	
Sigourney St.						3%	7%	10%	3%		3%	1%	
Capitol Ave./ Asylum St./ Broad St.							8%	13%	5%		5%	2%	
High St./ Turmbull St.									12%		10%	5%	
I-91									30%		14%	3%	
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.									0%		26%	18%	
CT-15 Wilbur Cross Hwy.												41%	
Silver Ln./ Roberts St.												4%	
I-84 Mainline East													
Total				**100%**		**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	

Data Source: SkyComp

Table 2-6
AM Period (7:30AM - 9:00AM)
WB Direction

% of Trips by Entry Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West													
Prospect Ave./ Caya Ave/ Kane St.													
Flatbush													
West Blvd./Sisson Ave.	88%	2%	10%										**100%**
Sigourney St.													
Capitol Ave./ Asylum St./ Broad St.	79%	2%	13%	6%	1%								**100%**
High St./ Trumbull St.	34%	4%	16%	11%	20%	16%							**100%**
I-91	33%	1%	7%	9%	21%	29%							**100%**
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	20%	1%	4%	5%	10%	10%	18%	31%	1%				**100%**
CT-15 Wilbur Cross Hwy.													
Silver Ln./ Roberts St.	12%	1%	5%	4%	4%	6%	10%	12%	47%				**100%**
I-84 Mainline East	13%		2%	1%	4%	3%	2%	2%	34%	38%	1%		**100%**
Total													

% of Trips by Exit Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West													
Prospect Ave./ Caya Ave/ Kane St.													
Flatbush													
West Blvd./Sisson Ave.	7%	6%	4%										
Sigourney St.													
Capitol Ave./ Asylum St./ Broad St.	10%	8%	8%	4%	0%								
High St./ Trumbull St.	6%	22%	13%	10%	8%	6%							
I-91	29%	40%	31%	44%	46%	60%							
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	16%	21%	16%	23%	20%	18%	71%	80%	1%				
CT-15 Wilbur Cross Hwy.													
Silver Ln./ Roberts St.	2%	3%	4%	3%	2%	2%	7%	5%	8%				
I-84 Mainline East	30%		25%	15%	24%	14%	22%	15%	91%	100%	100%		
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**		

Data Source: SkyComp

Table 2-7
PM Period (3:00PM - 4:30PM)
EB Direction

% of Trips by Entry Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush Ave.	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West				5%		11%	3%	21%	16%		2%	41%	**100%**
Prospect Ave./ Caya Ave/ Kane St.				4%		19%	3%	34%	18%		4%	18%	**100%**
Flatbush Ave.				4%		10%	6%	36%	21%		1%	21%	**100%**
West Blvd./Sisson Ave.						13%	2%	33%	22%		3%	27%	**100%**
Sigourney St.						7%	4%	37%	19%		4%	30%	**100%**
Capitol Ave./ Asylum St./ Broad St.							1%	49%	15%		3%	33%	**100%**
High St./ Trumbull St.									56%		7%	37%	**100%**
I-91									77%		8%	15%	**100%**
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.									2%		10%	88%	**100%**
CT-15 Wilbur Cross Hwy.												100%	**100%**
Silver Ln./ Roberts St.												100%	**100%**
I-84 Mainline East													
Total													

% of Trips by Exit Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush Ave.	West Blvd./Sisson Ave.	Sigourney St.	Capitol Ave./ Asylum St./ Broad St.	High St./ Trumbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West				81%		57%	52%	32%	20%		11%	17%	
Prospect Ave./ Caya Ave/ Kane St.				4%		6%	2%	3%	1%		2%	0%	
Flatbush Ave.				14%		10%	19%	10%	5%		1%	2%	
West Blvd./Sisson Ave.						16%	7%	12%	7%		4%	3%	
Sigourney St.						10%	17%	16%	7%		6%	4%	
Capitol Ave./ Asylum St./ Broad St.							3%	26%	7%		5%	5%	
High St./ Trumbull St.									22%		13%	5%	
I-91									30%		15%	2%	
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.									1%		42%	27%	
CT-15 Wilbur Cross Hwy.												28%	
Silver Ln./ Roberts St.												7%	
I-84 Mainline East													
Total				**100%**		**100%**	**100%**	**100%**	**100%**		**100%**	**100%**	

Data Source: SkyComp

Table 2-8
PM Period (3:00PM - 4:30PM)
WB Direction

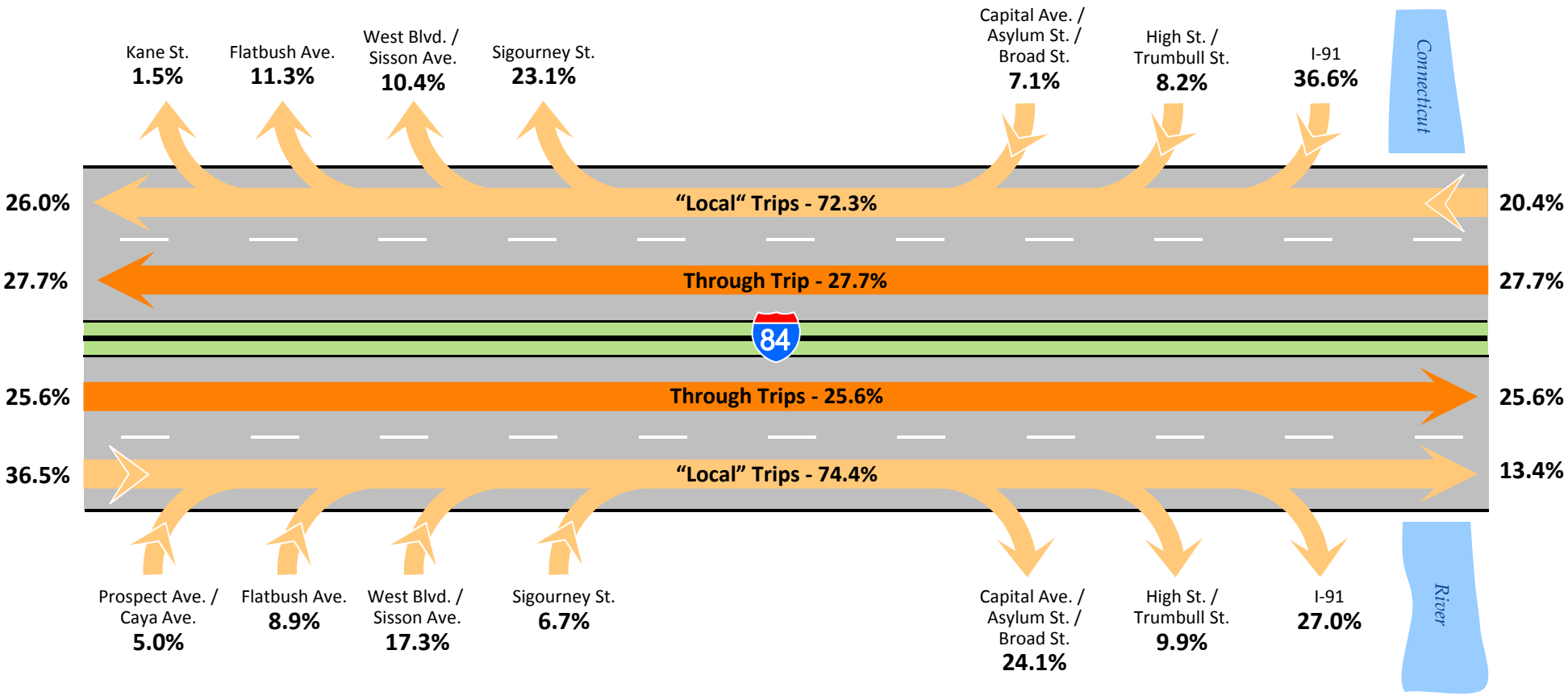
% of Trips by Entry Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush Ave.	West Blvd./Sisson Ave.	Sigorney St.	Capital Ave./ Asylum St./ Broad St.	High St./ Turmbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West													
Prospect Ave./ Caya Ave/ Kane St.													
Flatbush Ave.													
West Blvd./Sisson Ave.	93%	2%	5%										100%
Sigorney St.													
Capital Ave./ Asylum St./ Broad St.	82%	1%	11%	4%	1%								100%
High St./ Turmbull St.	48%	3%	10%	14%	14%	11%							100%
I-91	56%	2%	8%	10%	8%	16%							100%
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	20%	1%	5%	6%	4%	5%	15%	43%	0%				100%
CT-15 Wilbur Cross Hwy.													
Silver Ln./ Roberts St.	22%	0%	4%	1%	4%	5%	13%	24%	27%				100%
I-84 Mainline East	22%		3%	3%	2%	3%	3%	2%	19%	44%	0%		100%
Total													

% of Trips by Exit Location

Entry/Exit Points	I-84 Mainline West	Prospect Ave./ Caya Ave/ Kane St.	Flatbush Ave.	West Blvd./Sisson Ave.	Sigorney St.	Capital Ave./ Asylum St./ Broad St.	High St./ Turmbull St.	I-91	E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	CT-15 Wilbur Cross Hwy.	Silver Ln./ Roberts St.	I-84 Mainline East	Total
I-84 Mainline West													
Prospect Ave./ Caya Ave/ Kane St.													
Flatbush Ave.													
West Blvd./Sisson Ave.	11%	8%	4%										
Sigorney St.													
Capital Ave./ Asylum St./ Broad St.	20%	12%	18%	7%	3%								
High St./ Turmbull St.	9%	18%	13%	19%	23%	14%							
I-91	26%	34%	25%	33%	34%	48%							
E River Dr./ Conn. Blvd./ Rt2 Int./ Gov. St./ Main St.	11%	26%	19%	22%	19%	18%	68%	83%	1%				
CT-15 Wilbur Cross Hwy.													
Silver Ln./ Roberts St.	3%	2%	3%	1%	4%	4%	12%	10%	15%				
I-84 Mainline East	20%		18%	18%	18%	17%	21%	7%	84%	100%	100%		
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		

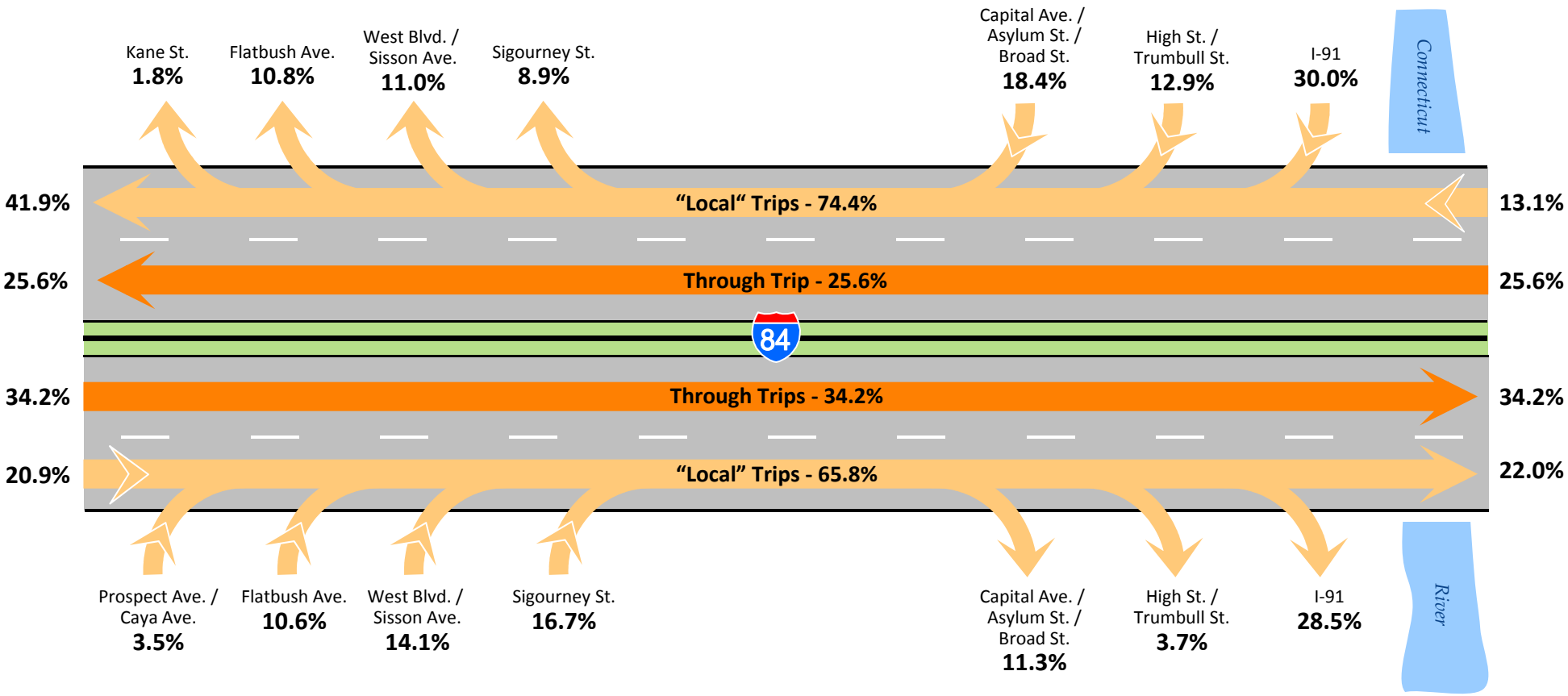
Data Source: SkyComp



SKYCOMP TRAFFIC DISTRIBUTION DATA
EAST OF SIGOURNEY ST. - AM PEAK PERIOD (7:30 TO 9:00 AM)

CDM Smith

FIGURE 2-18



SKYCOMP TRAFFIC DISTRIBUTION DATA
EAST OF SIGOURNEY ST. - PM PEAK PERIOD (3:00 TO 4:30 PM)

CDM Smith

FIGURE 2-19

originate from the Capitol Avenue interchange. This is the reciprocal of the eastbound AM direction. Nearly 77 percent (50.5%/65.8%) of the "Local" trips in the eastbound direction are headed to I-91 or east of the Connecticut River. In the westbound direction, 56 percent (41.9%/74.4%) of the "Local" traffic travels west of the Prospect Avenue Interchange.

The ramp to ramp patterns discussed above are used to calibrate the travel demand model for the corridor, identify travelers that might use a collector-distributor system parallel to the proposed Viaduct, and identify travelers that might use a tolled system to the east of the Sigourney Street ramps.

License Plate and Occupancy Survey

A visual license plate survey was conducted in May 2013 at two locations on I-84. The surveys were performed at the South Quaker Lane overpass between Exits 43 and 44, and at the Pleasant Street overpass east of Exit 50. License plate vehicle registrations were identified for the States of Connecticut, New York, New Jersey, Massachusetts, New Hampshire, Rhode Island, and all others.

Table 2-9 shows the breakdown for both locations, by direction, time period, and for the total day. Over the survey time period, 83 percent of traffic at the Pleasant Street overpass consisted of Connecticut vehicles. The next highest was Massachusetts at 6 percent, followed by other states not specifically classified at 4.5 percent. The next highest was New York at 2.5 percent. Each of the remaining states included in the survey accounted for less than 2 percent of the total passing traffic.

Table 2-9
Vehicle Registration Percentages

		Percentage of I-84 Traffic in Hartford							
Location	Period	CT	NY	NJ	MA	NH	RI	Other	Total
I-84 EB at Pleasant Street	7AM-9AM	85.9	3.5	2.0	3.6	0.6	0.7	3.7	100.0
	9AM-3PM	81.8	3.0	2.5	6.1	0.7	1.1	4.9	100.0
	3PM-6PM	82.1	1.1	1.9	8.7	1.0	1.8	3.5	100.0
	Average	82.8	2.3	2.1	6.6	0.8	1.3	4.0	100.0
I-84 WB at Pleasant Street	7AM-9AM	88.4	1.3	0.9	7.3	0.6	1.1	0.6	100.0
	9AM-3PM	80.6	2.4	2.5	6.8	1.2	1.7	5.0	100.0
	3PM-6PM	86.0	3.1	1.1	3.3	0.3	0.6	5.6	100.0
	Average	83.5	2.6	1.7	5.3	0.7	1.2	4.9	100.0
Both Directions Combined	7AM-9AM	86.5	2.9	1.7	4.5	0.6	0.8	2.9	100.0
	9AM-3PM	81.1	2.6	2.5	6.5	0.9	1.4	4.9	100.0
	3PM-6PM	84.0	2.1	1.5	6.0	0.6	1.2	4.5	100.0
	Average	83.1	2.5	1.9	6.0	0.8	1.2	4.5	100.0
I-84 EB at South Quaker Lane	7AM-9AM	92.0	3.0	0.9	1.2	0.3	0.3	2.4	100.0
	9AM-3PM	83.9	3.1	1.5	3.8	0.5	0.8	6.4	100.0
	3PM-6PM	80.2	2.2	1.3	7.9	0.7	1.1	6.7	100.0
	Average	84.7	2.8	1.3	4.5	0.5	0.8	5.5	100.0
I-84 WB at South Quaker Lane	7AM-9AM	80.3	1.0	2.0	9.2	1.2	2.4	4.0	100.0
	9AM-3PM	72.6	2.8	3.9	8.7	2.0	3.8	6.2	100.0
	3PM-6PM	80.6	2.8	3.3	4.0	1.0	2.3	6.0	100.0
	Average	77.6	2.5	3.3	6.7	1.4	2.8	5.7	100.0
Both Directions Combined	7AM-9AM	87.2	2.2	1.3	4.5	0.7	1.2	3.0	100.0
	9AM-3PM	78.5	3.0	2.7	6.2	1.2	2.2	6.3	100.0
	3PM-6PM	80.4	2.5	2.5	5.6	0.9	1.8	6.3	100.0
	Average	81.2	2.6	2.3	5.6	1.0	1.8	5.6	100.0

At the Quaker Street overpass location, 81 percent of traffic consisted of Connecticut vehicles. The next highest registrations identified were Massachusetts and Other at 5.6 percent, followed by New York at 2.6 percent.

Vehicle occupancy surveys were also performed at these same two locations. 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 2-10** reflects only the breakdown of single and two or more occupant vehicles.

Table 2-10
Vehicle Occupancy Percentages

		Occupancy Percents on I-84 in Hartford		
Location	**Period**	Single	HOV 2+	Total
I-84 EB at Pleasant Street	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.83	0.17	1.00
	3PM-6PM	0.84	0.16	1.00
	Average	0.84	0.16	1.00
I-84 WB at Pleasant Street	7AM-9AM	0.94	0.06	1.00
	9AM-3PM	0.88	0.12	1.00
	3PM-6PM	0.81	0.19	1.00
	Average	0.88	0.12	1.00
Both Directions Combined	7AM-9AM	0.92	0.08	1.00
	9AM-3PM	0.85	0.15	1.00
	3PM-6PM	0.82	0.18	1.00
	Average	0.86	0.14	1.00
I-84 EB at South Quaker Lane	7AM-9AM	0.89	0.11	1.00
	9AM-3PM	0.81	0.19	1.00
	3PM-6PM	0.81	0.19	1.00
	Average	0.83	0.17	1.00
I-84 WB at South Quaker Lane	7AM-9AM	0.94	0.06	1.00
	9AM-3PM	0.82	0.18	1.00
	3PM-6PM	0.87	0.13	1.00
	Average	0.87	0.13	1.00
Both Directions Combined	7AM-9AM	0.92	0.08	1.00
	9AM-3PM	0.82	0.18	1.00
	3PM-6PM	0.85	0.15	1.00
	Average	0.85	0.15	1.00

As would be expected, the highest concentration of single occupant vehicles occurs during the AM period, as commuting to work would be the major trip purpose. For the total survey period, single occupant vehicles account for 86 percent of the vehicles on I-84 at the Pleasant Street survey location and 85 percent of the vehicles on I-84 at the South Quaker survey location.

A second source of occupancy percentages was summarized 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 that occurred on state maintained roadways within the Capitol planning area. **Table 2-11** shows the daily variation of single, HOV2, and HOV3+ occupants for weekdays. For the total day, single occupant vehicles made up 80 percent of the vehicle composition involved in crashes, while HOV2 and HOV3+ made up 14 percent and 6 percent respectively. The AM peak accounted for the highest concentration of single occupant vehicles at 90 percent while the midday and night time accounted for the highest concentration of HOV vehicles. This variation throughout the day is consistent with the visual survey and is expected. When isolating the percentages to coincide with the visual survey (7AM-6PM), the results are similar, with single occupant vehicles from the crash data accounting for 82 percent of total traffic and 85 to 86 percent from the visual survey. A higher occupancy level from crash statistics would be expected, as vehicles with more than one driver have a higher propensity for accidents.

Table 2-11
2008 Interstate Vehicle Occupancy Rates
Capital Planning Region

Hour Beginning	SOV	HOV2	HOV3+	Total	Hour Beginning	SOV	HOV2	HOV3+	Total
0	28	11	5	44	0	0.64	0.25	0.11	1.00
1	28	13	5	46	1	0.61	0.28	0.11	1.00
2	18	5	7	30	2	0.60	0.17	0.23	1.00
3	19	4	3	26	3	0.73	0.15	0.12	1.00
4	22	3	2	27	4	0.81	0.11	0.07	1.00
5	43	2	4	49	5	0.88	0.04	0.08	1.00
6	135	13	4	152	6	0.89	0.09	0.03	1.00
7	394	29	11	434	7	0.91	0.07	0.03	1.00
8	390	42	8	440	8	0.89	0.10	0.02	1.00
9	178	23	13	214	9	0.83	0.11	0.06	1.00
10	80	18	7	105	10	0.76	0.17	0.07	1.00
11	119	31	12	162	11	0.73	0.19	0.07	1.00
12	119	30	15	164	12	0.73	0.18	0.09	1.00
13	147	33	12	192	13	0.77	0.17	0.06	1.00
14	161	49	11	221	14	0.73	0.22	0.05	1.00
15	291	48	31	370	15	0.79	0.13	0.08	1.00
16	403	60	28	491	16	0.82	0.12	0.06	1.00
17	583	88	49	720	17	0.81	0.12	0.07	1.00
18	227	30	21	278	18	0.82	0.11	0.08	1.00
19	92	26	9	127	19	0.72	0.20	0.07	1.00
20	75	24	10	109	20	0.69	0.22	0.09	1.00
21	88	23	10	121	21	0.73	0.19	0.08	1.00
22	70	21	14	105	22	0.67	0.20	0.13	1.00
23	75	25	8	108	23	0.69	0.23	0.07	1.00
	3,785	651	299	4,735	Total	0.80	0.14	0.06	1.00
7AM-9AM	784	71	19	874	7AM-9AM	0.90	0.08	0.02	1.00
9AM-3PM	804	184	70	1,058	9AM-3PM	0.76	0.17	0.07	1.00
3PM-6PM	1,277	196	108	1,581	3PM-6PM	0.81	0.12	0.07	1.00
7AM-6PM	2,865	451	197	3,513	7AM-6PM	0.82	0.13	0.06	1.00

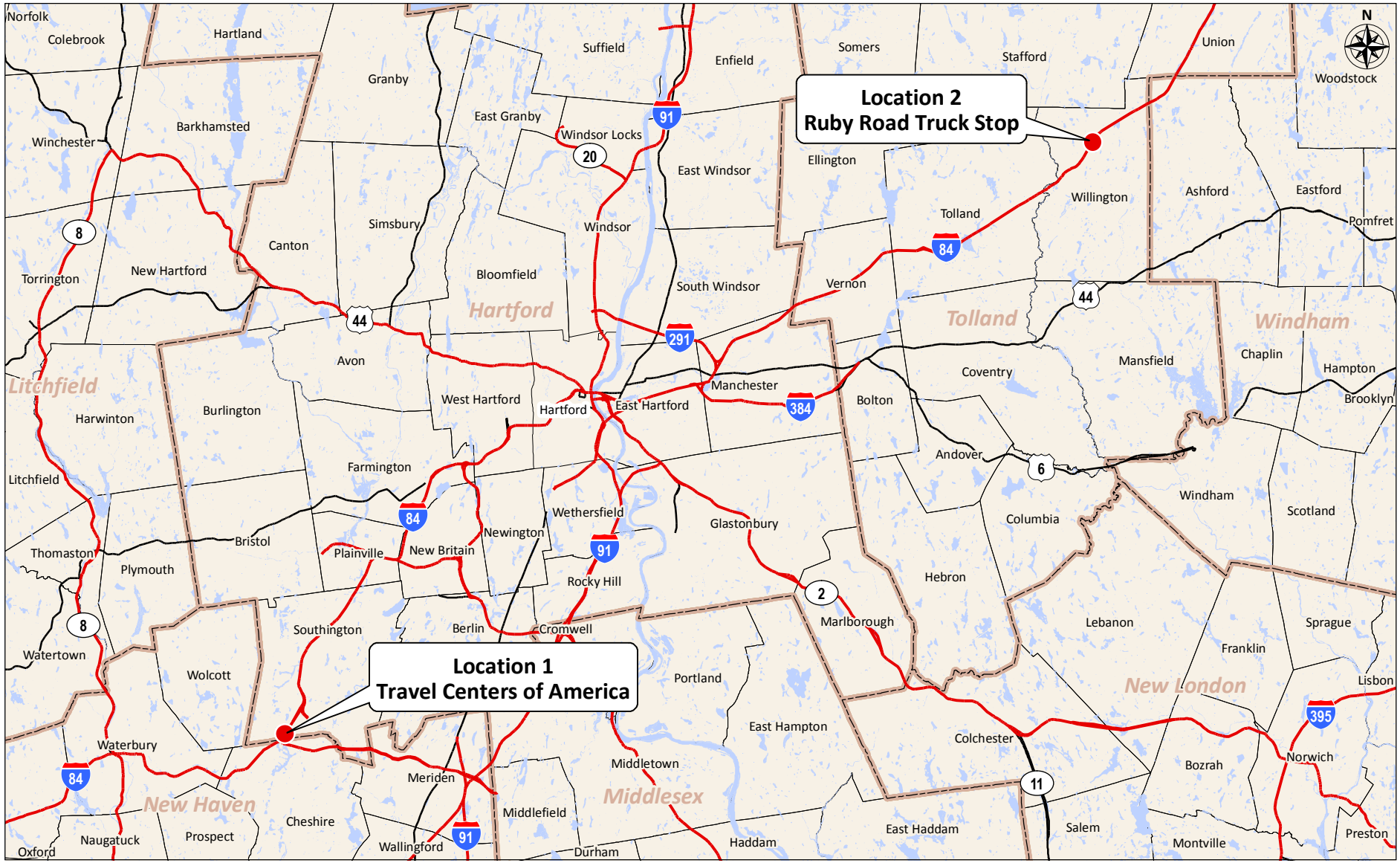
Source: CTDOT Bureau of Policy and Planning

Truck Origin and Destination Survey

A commercial vehicle origin and destination survey was conducted at two locations (**Figure 2-20**). These locations are major truck rest areas operated by TravelCenters of America (TCA). TCA is the largest full-service travel center company in the United States. Travel surveys were conducted on May 7, 2013 at Location 1 and on May 8, 2013 at Location 2. A direct interview was conducted of commercial vehicle drivers utilizing the survey instrument shown in **Figure 2-21**. Almost all of the truck traffic at these locations is comprised of multi-unit trucks of 5 or more axles.

Figure 2-22 displays summaries of trip purpose, EZ-Pass ownership, and trip frequency. As expected, significant percentages (91% at Station 1 and 87% at Station 2) of commercial vehicle drivers surveyed are on company business. Trip Frequency showed that 30 percent of those surveyed at Station 1 complete this trip 4 or more times per week, while this dropped to 18 percent at Station 2. Approximately 50 to 65 percent of those surveyed indicated a trip frequency of one or more per week, while about a quarter of those surveyed make the trip less than once a month. EZ-Pass ownership was found to be 64 and 69 percent at Station 1 and 2, respectively. Only a very small percentage indicated they plan to acquire an EZ-Pass transponder, indicating that the market penetration of transponders has reached a near ceiling level. This is not surprising given the amount of toll facilities in the northeast, the movement to open road tolling, and the vehicle registrations of those interviewed.

A tremendous spread of vehicle registrations and home states were identified by those surveyed (**Figure 2-23**). The highest percentage for vehicle registration was Illinois (11%) at Station 1 and Connecticut and Pennsylvania (11%) for Station 2. At Station1, 38 percent of the trips are made by trucks registered outside of the list shown, while this number is even higher at 45 percent at Station 2, indicating a wide geographic area of origins and destinations.



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I-84 TRUCK SURVEY LOCATIONS

FIGURE 2-20

Commercial Vehicle Origin-Destination Survey

Station No. 0 1 Station Name TCA Truck Stop #154, Route 322, Southington, CT Surveyor _____ Page No. _____ Date 0 7 (Day) 0 5 (Month) 1 3 (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-84 for this trip?	Where do you plan to exit I-84?	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 (A)	Company business (B)	Personal business (C)	Code		4 or more per week (A)	2-3 per week (B)	1 per week (C)	1-3 per month (D)	Less than one per month (E)	Code	(Interchange Number, Route Number or Nearest Town & State)	(Interchange Number, Route Number or Nearest Town & State)	If you did not use I-84 for the trip today, which road did you use?			Number of axles	Single unit (A)	Single trailer (B)	Multi-trailer (C)	Code	
1	2	3	4				5	6						7	8	9	10	11	12	13				14	15

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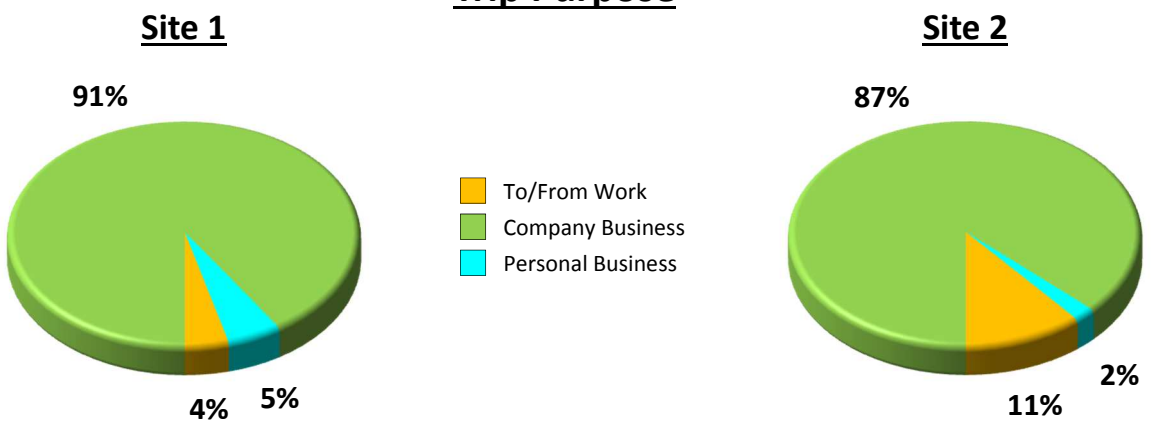
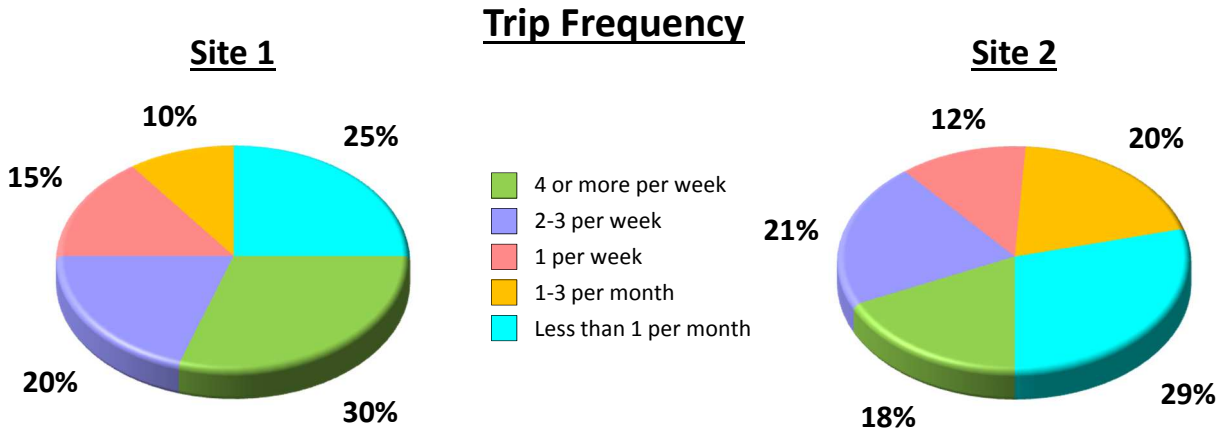
SAMPLE SURVEY CARD

FIGURE 2-21

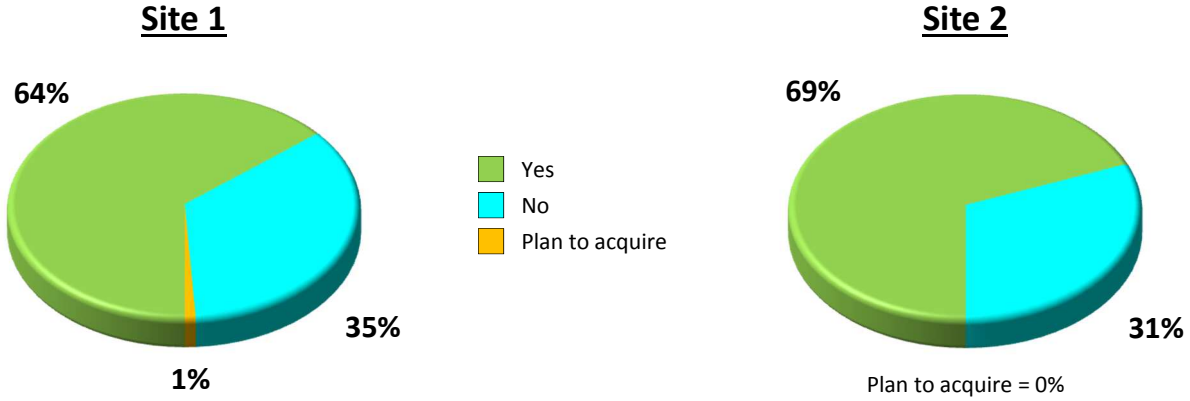
Trip Purpose



Trip Frequency



E-ZPass Ownership

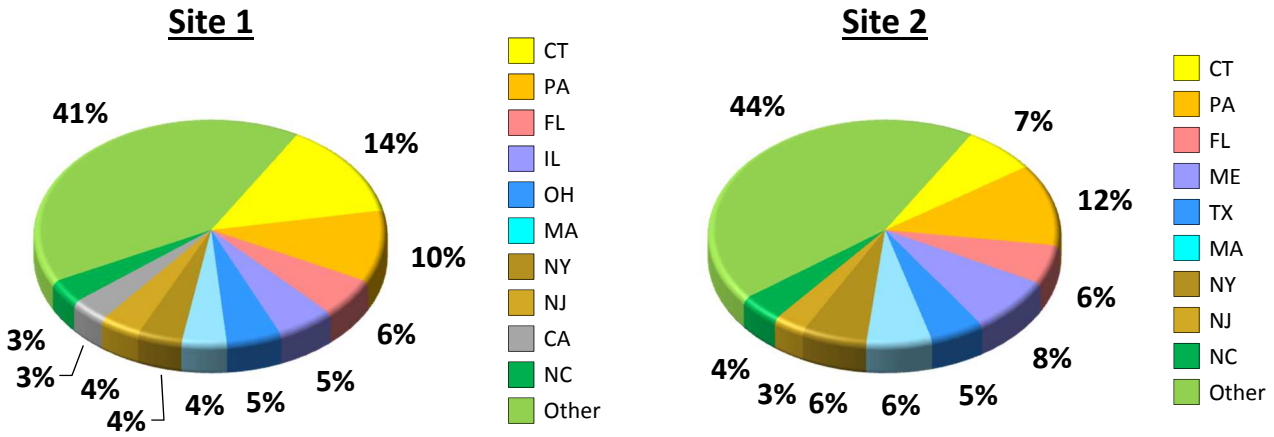


CDM Smith

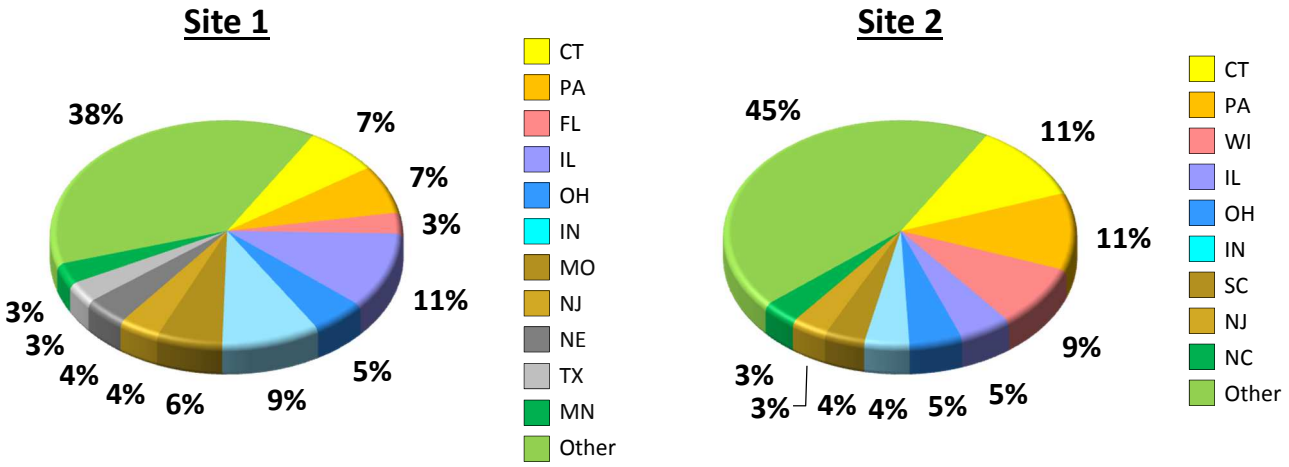
TRUCK SURVEY RESULTS

FIGURE 2-22

Home State



State of Vehicle Registration



Chapter 3

Model Development and Calibration

This chapter provides documentation on the implementation of the time of day component of the CRCOG Model and the calibration of the traffic assignment model to study area traffic volumes and travel speeds. The chapter provides information on the following:

- Overview of Model Structure;
- Time of Day Parameters;
- Truck Model Enhancements;
- Implementation of Tolling in Mode Choice;
- Calibration; and
- Future Year Assumptions.

Overall Model Structure

The current CRCOG Model is a traditional daily four step travel demand model with trip generation, trip distribution, mode choice, and traffic assignment with no feedback between traffic assignment and trip distribution. Instead it attempts to simulate a feedback condition by using a Level of Service (LOS) C speed on all links for trip distribution and mode choice. The speeds are approximately 75% of free flow.

Time of Day Structure

CDM Smith updated the CRCOG Daily Model with a time of day module in order to provide a more robust assignment model to recognize the different levels of congestion experienced within the peak periods versus the off peak periods in the study area. This is particularly important for this study as a key part of the analysis is evaluating the impact of tolling and how diversion may impact the local network during congested periods.

The intent of the time of day implementation was to provide period level traffic forecasts while maintaining as much of the basic CRCOG model structure as possible. CDM Smith chose 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 the directionality of travel. The result 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 to estimate period 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 starting point for both sets of parameters was the work done previously by Cambridge Systematics for CRCOG.

Trip Purpose Factors

The initial time of day factors used in the model were based on an existing set of factors previously developed for implementation of a time of day CRCOG model as shown in **Table 3-1**.

Table 3-1
Time of Day Trip Purpose Factors

	Home based work		Home based non-work		Non-home based/BIA	
	Origins	Destinations	Origins	Destinations	Origins	Destinations
AM Peak 7:00 AM-9:00 AM	0.185	0.008	0.060	0.014	0.030	0.030
Midday 9:00 AM-3:00PM	0.137	0.099	0.153	0.154	0.235	0.235
PM Peak 3:00 PM-6:00 PM	0.063	0.202	0.144	0.155	0.114	0.114
Night 6:00 PM-7:00 AM	0.183	0.123	0.120	0.200	0.121	0.121

Source: CRCOG Time of Day Model Documentation, Cambridge Systematics

During the model calibration for study area, the time of day factors were refined to improve the distribution of traffic by period and also expanded to include the external and truck purposes. Adjustments to the factors were based on comparing the period traffic flows to counts. In addition, the distribution of trips was balanced to ensure equal trips in the P to A and A to P direction. The applied factors are shown in **Table 3-2**.

Table 3-2
Applied Time of Day Factors

Purpose	AM Peak (7AM-9AM)	Midday (9AM-3PM)	PM Peak (3PM-6PM)	Night (6PM-7AM)
HBW_PA	0.2488	0.1476	0.0529	0.1576
HBW_AP	0.0108	0.1067	0.1696	0.1060
HBO_PA	0.0843	0.1722	0.1263	0.1080
HBO_AP	0.0197	0.1734	0.1360	0.1801

NHB_PA	0.0409	0.2565	0.0970	0.1056
NHB_AP	0.0409	0.2565	0.0970	0.1056
TRUCK_PA	0.0592	0.2033	0.0741	0.1634
TRUCK_AP	0.0592	0.2033	0.0741	0.1634
EXTERNAL_PA	0.0748	0.1603	0.1183	0.1466
EXTERNAL_AP	0.0748	0.1603	0.1183	0.1466

Period Capacity Factors

Because the time of day model developed by CDM Smith shared the same period definitions as those defined by previous time of day efforts by Cambridge Systematics, the development of the period capacities was based on using previous developed period factors. Those factors are as follows:

- AM peak period (7AM-9AM) to AM peak hour, multiply by 0.52;
- Midday period (9AM-3PM) to midday average hour, multiply by 0.19;
- PM peak period (3PM-6PM) to PM peak hour, multiply by 0.35; and
- Night period (6PM-7AM) to night time average hour, multiply by 0.16.

The values were verified by analyzing the count data taken for the study area and calculating associated period factors as shown in **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.

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

Hour	Total of Counts	Percent of Daily	Period Capacity Factor
7AM – 8AM	692,001	0.150	0.508
8AM – 9AM	671,040		
9AM – 10AM	490,029	0.321	0.192
10AM – 11AM	431,688		
11AM - 12PM	452,600		
12PM – 1PM	492,745		
1PM – 2PM	495,394		
2PM-3PM	559,881		
3PM – 4PM	688,433	0.237	0.348
4PM-5PM	749,804		
5PM-6PM	718,844		
6PM – 7PM	521,551	0.293	0.195
7PM-8PM	370,015		

8PM-9PM	309,247		
9PM-10PM	254,930		
10PM-11PM	184,930		
11PM-12AM	131,108		
12AM-1AM	77,991		
1AM-2AM	47,199		
2AM-3AM	35,825		
3AM-4AM	40,577		
4AM-5AM	70,862		
5AM-6AM	179,850		
6AM-7AM	449,344		

Truck Model

The CRCOG Model as provided to CDM Smith included a truck trip table. In the original application, the truck flows were assigned as part of the single occupant purpose. As part of the time of day implementation, the truck trips were disaggregated to the periods using a unique set of time of day factors. Further enhancement made as part of the time of day model was to separate the truck trip table as a separate flow in the assignment. Because of the separate flow in the assignment, a passenger car equivalent value of 2.0 was used in the assignment process to more accurately capture the impact of trucks on congestion.

Mode Choice Toll Implementation

Because of the urban nature of the corridor and the soon to be opened CTfastrak project, implementation of a toll cost impedance into the existing mode choice model was undertaken. The elements of the CRCOG auto cost function in the mode choice component include:

- Time (minutes)
- Distance (miles)
- Terminal Time (Origin)
- Terminal Time (Destination)
- Parking Cost ($)
- Value of Time (VOT) ($ / Minute)
  - Used in transit path building only, not specific to mode

Based on the review, a method was used that skims the associated toll cost based on the minimized time skim between each origin and destination. The resulting toll cost was then converted to time via the value of time and added to the time skim for the relevant origin and destination pairs.

Results of Tolls in Mode Choice

The future year scenario, with the CTfastrak busway project in place was tested with several auto toll rates ($0.00 up to $1.00) on the I-84 viaduct and compared against results of the non-tolled scenario. Using select link analysis on the toll collection point, the origin and destination pairs which were eligible to use transit were identified. At those selected origin and destination pairs, about 6.5 percent of the trips chose transit as the preferred mode under toll free conditions. Under the $0.50 toll, the transit share of eligible transit trips increased to 7.2 percent, which is an increase of more than 11 percent indicating the mode choice model is sensitive to tolls. However, the overall share of transit trips as compared to the overall traffic at the I-84 viaduct location is about 1 percent of total traffic. The shift to transit due to a "spot" toll at this location is relatively insignificant to the overall trip making levels in the corridor.

CRCOG Time of Day Model Calibration

A set of screenlines were identified for purposes of model calibration for the study area by time period. The locations of the screenlines are shown in **Figure 3-1**.

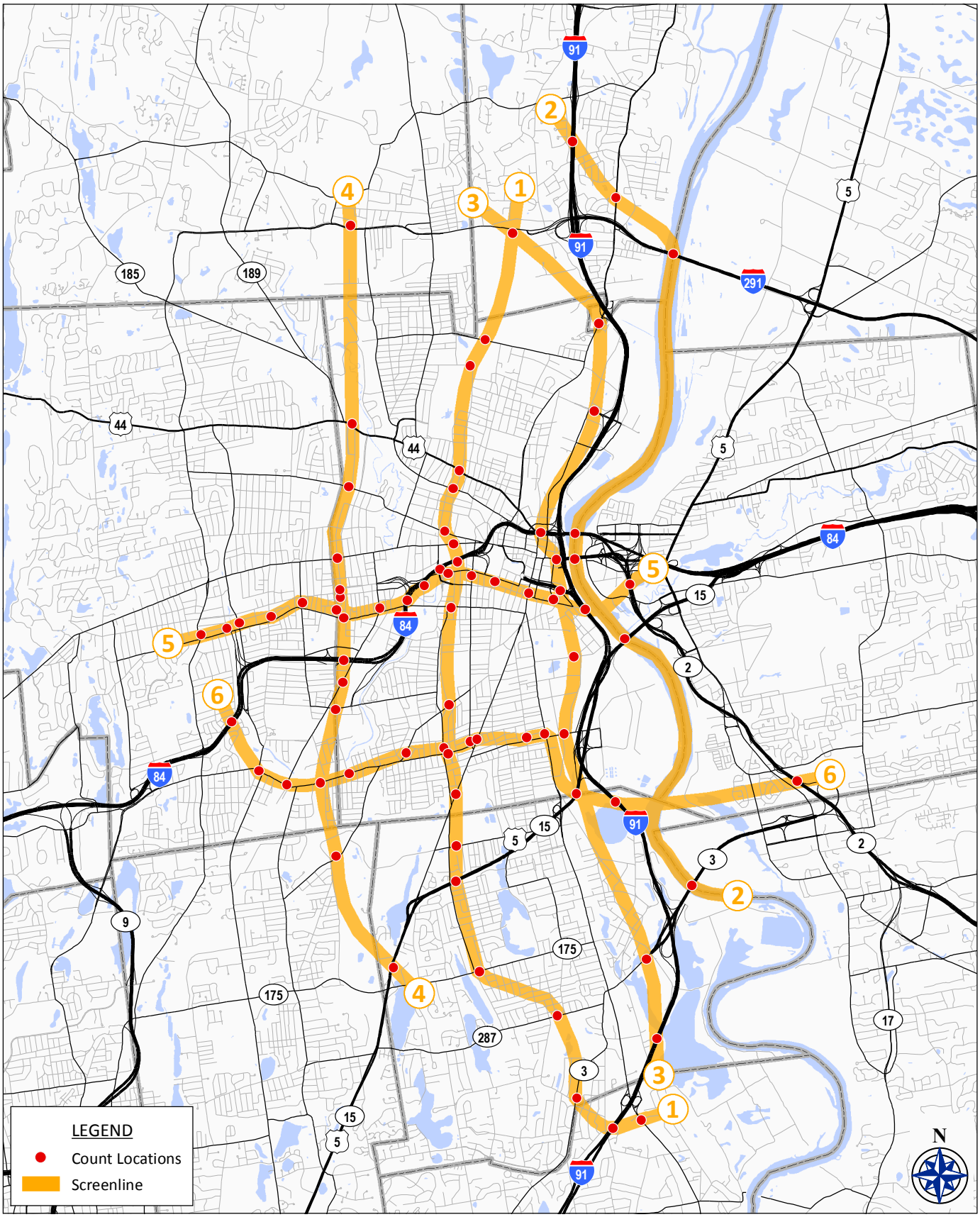
During the model calibration, the following adjustments were made to the model:

- Time of Day Factors: based on comparison of the total flows by period, the time of day factors by purpose were adjusted to better replicate period flows.
- Truck Flows: by separating the truck trip table, it was possible to adjust the passenger car equivalent value for trucks to improve the loadings on the corridor and congestion sensitivity to truck flows.
- Bridge Time Penalties: as done in previous versions of the CRCOG Model, time penalties were added to the river crossings.
- 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-84 corridor on the western side of the river, localized adjustments were made to the link speeds and capacities to reflect the unique design constraints and impacts on operations.
- Arterial Adjustments: Adjustments were made to the speed assumptions on some competing arterials to the I-84 corridor based on results of the screenline analysis.

Screenline Volumes

For the six "screenlines", a corresponding list of count locations was identified. 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.

Screenline 1 crosses the I-84 Viaduct east of Sigourney Street. Screenline 2 runs along the Connecticut River, covering the Putnam Bridge at the south to the Bissell Bridge at the north before turning west to



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CDM Smith

TRAFFIC COUNT AND PROJECT SCREENLINE LOCATION MAP

FIGURE 3-1

cross Route 159 and I-91. Screenline 3 runs north to south, just west of I-91. Screenline 4 is the last of the screenlines that run north to south and cuts through I-84 east of Prospect Avenue. Screenline 5 runs east to west, traversing through north-south routes in Hartford, and passing through I-84 just west of the Sisson Avenue interchange. Screenline 6 runs north of New Britain Avenue and White Street before turning northward to cross I-84 west of the Trout Brook Drive interchange.

Table 3-4 displays the total average weekday counts across the individual 6 screenlines versus the 2012 base year modeled 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. The detailed screenline information displaying each roadway is included in the Appendix.

Table 3-4
Screenline Comparison for CRCOG Time of Day Model Enhancement
Comparison of 2012 Traffic Counts and Model Assignment Value

Time of Day		Model Screenlines 1	2	3	4	5	6
AM	Count	86,900	80,900	89,000	44,400	73,700	70,000
	Volume	84,800	80,000	85,000	49,700	67,700	68,600
	Difference	(2,100)	(900)	(4,000)	5,300	(6,000)	(1,400)
	% Difference	-2.4%	-1.1%	-4.5%	11.9%	-8.1%	-2.0%
MD	Count	191,100	159,100	179,600	106,700	174,500	160,200
	Volume	203,600	182,200	196,500	121,200	169,600	160,600
	Difference	12,500	23,100	16,900	14,500	(4,900)	400
	% Difference	6.5%	14.5%	9.4%	13.6%	-2.8%	0.2%
PM	Count	137,400	128,700	134,100	70,100	117,700	112,800
	Volume	129,100	117,100	124,100	76,900	105,400	103,700
	Difference	(8,300)	(11,600)	(10,000)	6,800	(12,300)	(9,100)
	% Difference	-6.0%	-9.0%	-7.5%	9.7%	-10.5%	-8.1%
NT	Count	169,900	150,400	155,900	88,900	150,900	144,600
	Volume	159,600	144,400	158,500	93,500	135,400	128,200
	Difference	(10,300)	(6,000)	2,600	4,600	(15,500)	(16,400)
	% Difference	-6.1%	-4.0%	1.7%	5.2%	-10.3%	-11.3%
Total Day	Count	585,300	519,200	558,600	310,100	516,800	487,600
	Volume	577,000	523,700	564,100	341,200	478,100	461,100
	Difference	(8,300)	4,500	5,500	31,100	(38,700)	(26,500)
	% Difference	-1.4%	0.9%	1.0%	10.0%	-7.5%	-5.4%

Note:
Screenline Number/Location Name
1: East of Sigourney Street
2: Connecticut River
3: West of I-91
4: East of Prospect Avenue
5: North of Park Road/ Capitol Avenue
6: North of New Britain Avenue / White Street

I-84 Mainline Volumes

Significant effort was focused on I-84 volumes between Route 4 in the west and the Connecticut River on the east. **Table 3-5** compares the average weekday mainline traffic count between interchanges against the 2012 base year modeled assignment. Calibration efforts resulted in all time periods performing well within acceptable levels of variance. The AM and PM peak periods performed exceptionally well, while the night period was the least performing of the four time periods. On a total daily basis, the model is within 5 percent for most of the mainline segments. To demonstrate how well these segments are calibrated, scatter plots by time period were developed and are shown in **Figure 3-2.**

I-84 Speeds

In addition to traffic volumes, significant modeling effort was also placed on travel speeds on I-84 between Route 4 in the west and the Connecticut River on the east. **Table 3-6** displays the 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 model is performing reasonably well in estimating actual travel speeds and on segments of I-84 that experience significant congestion.

Future Year Socioeconomic Model Assumptions

The CRCOG model includes population and employment forecasts for a 2040 horizon year. The population and employment for 2005, 2010, and the forecast year of 2040 for the CRCOG model area are displayed in **Table 3-7**, along with corresponding average annual growth rates. The year 2040 CRCOG model was run and traffic volumes were summarized for the same screenline and I-84 mainline locations prepared for calibration. These results are included in the Appendix. In general, traffic volume growth across the screenlines is modest and consistent with the underlying population and employment forecast for 2040. For example, population and employment between 2010 and 2040 in Hartford is forecasted to grow by 0.4 percent per year. Traffic growth in the model is forecasted to growth at roughly the same percent and at an even lower rate on the I-84 Viaduct. Under a no-build scenario, traffic on the I-84 Viaduct is forecasted to grow by 0.2 percent per year.

Future Year Network Improvements

The CRCOG model includes a 2040 horizon year network. The network was reviewed and compared against CRCOG's Transportation Plan 2040 and CT DOT's Air Quality and Conformity Determination Document which incorporates FY 2010-13 STIP and LRTP 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 3-8** lists the projects included in the modeled study area.

Table 3-5
I-84 Corridor Traffic Comparison for CRCOG Time of Day Model Enhancement
Comparison of 2012 Traffic Counts and Model Assignment Value

I-84 Mainline	AM			MD			PM			NT			Total Day		
Location East of	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.	Count	Volume	% Diff.
Buckeley Bridge	21,200	21,400	0.9%	44,500	49,700	11.7%	33,200	32,100	-3.3%	40,300	39,200	-2.7%	139,100	142,400	2.4%
Under I-91 Int.	14,200	13,400	-5.6%	29,600	31,000	4.7%	21,500	20,500	-4.7%	25,800	23,900	-7.4%	91,100	88,800	-2.5%
Trumbull St.	23,600	22,300	-5.5%	53,900	54,100	0.4%	35,700	34,100	-4.5%	48,200	47,800	-0.8%	161,400	158,200	-2.0%
High St.	24,700	24,400	-1.2%	56,000	60,000	7.1%	37,100	37,300	0.5%	49,800	52,400	5.2%	167,600	174,200	3.9%
Asylum St.	25,700	25,400	-1.2%	58,300	62,700	7.5%	38,700	38,900	0.5%	51,900	54,800	5.6%	174,600	181,800	4.1%
Sigourney St.	24,900	24,400	-2.0%	57,700	60,800	5.4%	37,600	37,900	0.8%	48,900	52,000	6.3%	169,200	175,100	3.5%
West Blvd.	21,800	21,500	-1.4%	52,700	53,200	0.9%	32,800	33,500	2.1%	45,000	44,800	-0.4%	152,400	152,900	0.3%
Flatbush Ave.	19,400	18,600	-4.1%	49,900	46,400	-7.0%	29,900	29,600	-1.0%	43,900	37,400	-14.8%	143,100	132,000	-7.8%
Kane St.	16,800	16,100	-4.2%	43,400	39,700	-8.5%	26,100	25,700	-1.5%	39,000	32,200	-17.4%	125,300	113,700	-9.3%
Park Rd.	16,900	17,500	3.6%	45,000	43,200	-4.0%	26,900	28,100	4.5%	41,000	34,700	-15.4%	129,700	123,300	-4.9%
Main St.	16,700	17,200	3.0%	42,500	41,000	-3.5%	27,400	27,300	-0.4%	39,100	33,200	-15.1%	125,800	118,600	-5.7%
Ridgewood Rd.	18,200	19,300	6.0%	44,200	46,100	4.3%	29,500	30,400	3.1%	40,400	37,600	-6.9%	132,300	133,400	0.8%
Rt-9	18,600	19,500	4.8%	42,600	46,600	9.4%	29,400	30,200	2.7%	38,900	38,900	0.0%	129,500	135,200	4.4%
Rt-4	18,200	16,500	-9.3%	37,900	39,500	4.2%	27,900	25,700	-7.9%	33,200	33,100	-0.3%	117,200	114,900	-2.0%
Total	280,900	277,500	-1.2%	658,200	674,000	2.4%	433,700	431,300	-0.6%	585,400	562,000	-4.0%	1,958,300	1,944,500	-0.7%

Figure 3-2
I-84 Corridor Traffic Comparison for CRCOG Time of Day Model Enhancement
Scatter Plot Comparison of 2012 Traffic Counts and Model Assignment Volume

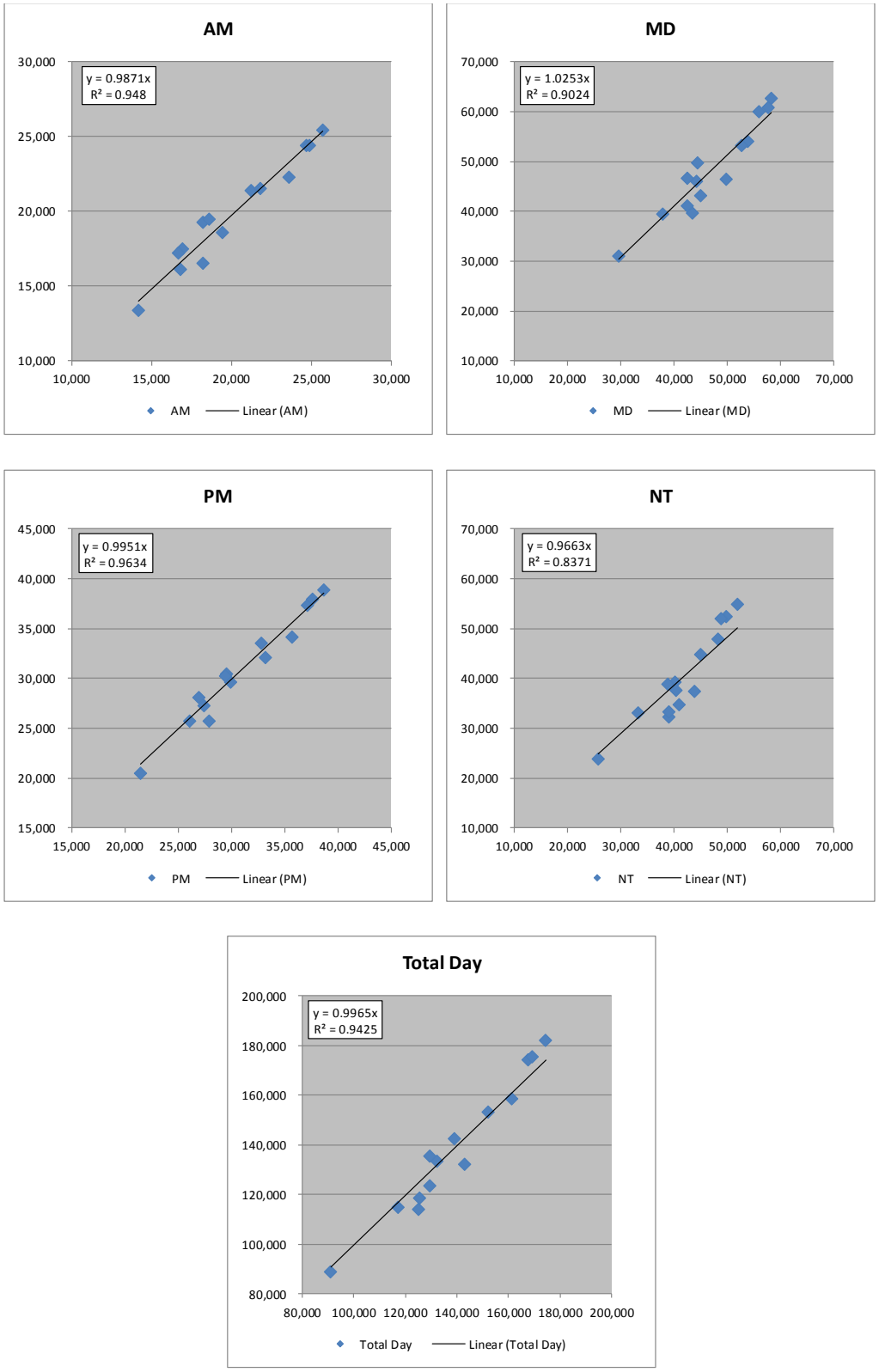


Table 3-6
I-84 Corridor Congested Speed Comparison for CRCOG's Time of Day Model Enhancement
Comparison of 2012 Observed Speed and Model Assignment Speed

	I-84 Westbound					
I-84 Mainline	Observed Speed			Model Speed		
Location East of	AM	MD	PM	AM	MD	PM
Buckeley Bridge	30	53	43	36	46	46
Under I-91 Int	41	53	42	27	41	38
Trumbull St.	43	53	41	39	47	45
High St.	43	52	38	37	43	40
Asylum St.	44	53	39	46	50	47
Sigourney St.	55	57	38	47	50	46
West Blvd.	59	59	42	49	47	39
Flatbush	62	61	45	53	52	52
Kane St.	63	61	47	52	52	51
Park Rd.	62	62	51	52	52	50
Main	64	63	50	52	52	50
Ridgewood Rd.	62	62	56	52	51	48
Rt-9	62	62	60	52	52	49
Rt-4	64	64	64	57	55	46

	I-84 Eestbound					
I-84 Mainline	Observed Speed			Model Speed		
Location East of	AM	MD	PM	AM	MD	PM
Rt-4	53	65	66	53	62	61
Rt-9	47	63	64	29	38	37
Ridgewood Rd.	48	64	64	31	40	39
Main	42	63	63	34	42	41
Park Rd.	36	61	57	35	41	41
Kane St.	44	58	45	37	43	43
Flatbush	44	58	40	42	45	45
West Blvd.	48	54	29	44	51	50
Sigourney St.	47	51	32	49	53	53
Asylum St.	47	51	36	41	43	40
High St.	50	52	38	42	44	41
Trumbull St.	53	53	38	49	49	45
Under I-91 Int	55	54	39	44	44	32
Buckeley Bridge	55	54	43	47	46	40

Table 3-7
CRCOG Region's Population and Employment Trends Assumed in CRCOG Model

	Population				Employment		
County	2005	2010	2040	County	2005	2010	2040
Hartford	868,382	893,924	1,003,157	Hartford	496,459	481,951	547,083
Litchfield	79,857	81,852	92,248	Litchfield	27,469	25,377	26,368
Middlesex	107,953	113,414	136,452	Middlesex	49,197	43,099	48,946
New Haven	265,395	271,714	300,577	New Haven	117,968	105,419	117,920
New London	26,850	27,527	38,666	New London	5,626	5,429	7,503
Tolland	140,443	152,691	185,989	Tolland	39,983	39,990	50,160
Windham	29,805	31,890	37,003	Windham	11,266	11,365	12,420
Total	1,518,685	1,573,012	1,794,092	Total	747,968	712,629	810,400

	% Change Per Year				% Change Per Year		
County	2005-2010	2010-2040	2005-2040	County	2005-2010	2010-2040	2005-2040
Hartford	0.6%	0.4%	0.4%	Hartford	-0.6%	0.4%	0.3%
Litchfield	0.5%	0.4%	0.4%	Litchfield	-1.6%	0.1%	-0.1%
Middlesex	1.0%	0.6%	0.7%	Middlesex	-2.6%	0.4%	0.0%
New Haven	0.5%	0.3%	0.4%	New Haven	-2.2%	0.4%	0.0%
New London	0.5%	1.1%	1.0%	New London	-0.7%	1.1%	0.8%
Tolland	1.7%	0.7%	0.8%	Tolland	0.0%	0.8%	0.7%
Windham	1.4%	0.5%	0.6%	Windham	0.2%	0.3%	0.3%
Total	0.7%	0.4%	0.5%	Total	-1.0%	0.4%	0.2%

Source:
CRCOG Daily Model

Table 3-8
I-84 Model Area Future Year Model/Network Assumptions
List of Regionally Significant Projects from Conformity Document March 2011 and CRCOG RTP Document 2011

No.	Year	Town	Road Name	Description	Project Name	Lanes From	Lanes To	Improvement Type
1	2015	Farmington	Rt 4	Add Lane	Add EB Lane in Farmington Center	1 / 1	1 / 2	Highway
2	2015	New Britain	Busway	New Britain Hartford Busway	From New Britain to Hartford, District 1 Funding	N/A	N/A	Transit
3	2015	New Britain	Hart Street	New Road	Extension from South Main Street to Arch Street	0 / 0	2 / 2	Highway
4	2015	Waterbury	Homer St	Widening	Homer St. / Chase Ave Waterville St. to Nottingham	1 / 1	2 / 2	Highway
5	2015	Waterbury	Chase Ave.	Widening	Chase Ave. Nottingham Terrace to North Main Street	1 / 1	2 / 2	Highway
6	2015	Mansfield	Hillside Road	New Road	Extension of Existing Hillside Road to Route 44	N/A	1 / 1	Highway
7	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	Highway
8	2030	Plainville	New Britain Ave	Add Lane	New Britain Ave Cooke St to Hooker St	1 / 1	2 / 2	Highway
9	2030	Waterbury	I-84	Upgrade Expressway	Reconstruct Expressway and Operational Improvements including interchanges. Hamilton Ave to opposite Pierpoint.	2 / 2	3 / 3	Highway
10	2030	Meriden	Route 5	Widening	Wallingford TL to Olive Street (Route 71)	1 / 1	2 / 2	Highway
11	2030	Wallingford	US 5	Widening	From South Orchard St. to Ward St. and Christian Rd. to Meriden TL	1 / 1	2 / 2	Highway

Chapter 4

Stated Preference Survey

In June and July 2013, Resource Systems Group, Inc. (RSG) conducted a stated preference (SP) survey on trips that use I-84 through downtown Hartford, Connecticut. The survey included both, passenger cars and commercial vehicle drivers.

The SP survey aimed at determining the propensity to use the I-84 replacement and willingness of travelers to pay for travel time savings, or value of time (VOT), in the study region. CDM Smith incorporated the VOT estimates into the project travel demand model that was used to forecast traffic and toll revenue for the proposed I-84 tolling.

This chapter summarizes the results of the stated preference survey report, the full text of which is included in **Appendix A** of this document.

Survey Approach and Administration

RSG designed two separate SP survey questionnaires for participating passenger car and commercial vehicles travelers who recently made a trip through downtown Hartford using I-84. The questionnaire asked for information on current travel behaviors, presented respondents with information about the proposed changes to I-84 and used stated preference experiments to estimate travelers' VOT under a range of conditions. The survey approach employed a computer-assisted self-interview technique for survey participants developed by RSG. The stated preference survey instrument was customized for each respondent by presenting questions and modifying wording based on respondents' previous answers. These dynamic survey features provided an accurate and efficient means of data collection and allowed presentation of realistic future conditions that corresponded with respondents' reported experiences. The customized, proprietary software was programmed by RSG for and administered entirely online to specific target audiences in the study corridor through RSG's proprietary online survey platform. The survey was administrated in the months of June and July 2013.

RSG worked closely with the project team to develop an efficient, timely, and cost-effective sampling plan to ensure representation from all key travel markets served by the I-84. The passenger vehicle survey was administered to respondents (i) through in-person intercepts at selected locations in and around downtown Hartford, (ii) through a local employer outreach effort to organizations and businesses located in downtown Hartford, and (iii) to a panel of respondents residing in and around the Hartford region through coordination with an online market research firm. The commercial survey was administered entirely through in-person intercepts at two truck stops east and west of Hartford on I-84. In total, 2,900 valid passenger vehicle surveys and 244 valid commercial vehicle surveys were obtained. The three strategies used for the passenger survey were employed as part of the sampling plan so as to include sufficient representation from different trip purposes, household incomes, travel times, and geographies to accurately reflect any behavioral differences in the resulting discrete choice models.

Survey Questionnaire

As mentioned previously, two separate stated preference questionnaires were developed for this SP effort, one for passenger vehicle drivers and one for commercial vehicle drivers. The survey questionnaires were designed to collect the information necessary to estimate travelers' sensitivities to travel time and toll cost across different market segments of interest.

The survey questionnaire was designed to collect information about a recent trip that a respondent made in the region served by the I-84. The survey questions were grouped into five main sections: (1) introduction and screening, (2) trip detail, (3) stated preference, (4) debrief and opinion, and (5) demographic (for passenger car) and company background (for commercial vehicle).

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

Introduction and Screening

After being presented with basic instructions and an introduction to the purpose of the study, respondents were asked if they had made a qualifying trip to continue the survey.

For the passenger car survey respondents, the respondents must have traveled (1) on I-84 through downtown Hartford within the last month, (2) in a personal vehicle, and (3) on a weekday (Mon-Fri). Respondents who indicated that they had not made a trip that met all of these criteria were terminated from the survey. Qualifying respondents were promoted to the next section of the survey asking specific questions about their trip details.

Commercial vehicle respondents were first asked if they made a recent trip in a commercial vehicle within the past 30 days that traveled on I-84 in downtown Hartford. Qualifying respondents were then asked to think of their most recent I-84 trip through downtown Hartford that met the following criteria:

1) Took at least 10 minutes;
2) Made within the last 30 days; and
3) Included travel from the last commercial stop (for pickup or delivery) before using I-84 in downtown Hartford to the first commercial stop after using I-84 in downtown Hartford in one direction only.

Respondents who qualified for all criteria mentioned above were then presented the following section of the SP survey. Further, the above-referenced trip formed the basis for the next set of questions in the survey.

Trip Detail Questions

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

- Travel date;
- Trip purpose;

- Origin and destination locations;
- Trip departure time;
- Preferred departure time;
- Travel time;
- Travel delay due to traffic congestion;
- Flexibility in arrival time;
- Parking cost and parking egress mode;
- Vehicle occupancy;
- Alternate routes to I-84;
- Trip frequency;
- Transit familiarity and ridership frequency; and
- Ownership of electronic toll collection (ETC) transponders.

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

Similar to the passenger car drivers' survey, qualifying commercial vehicle users were asked following set of questions:

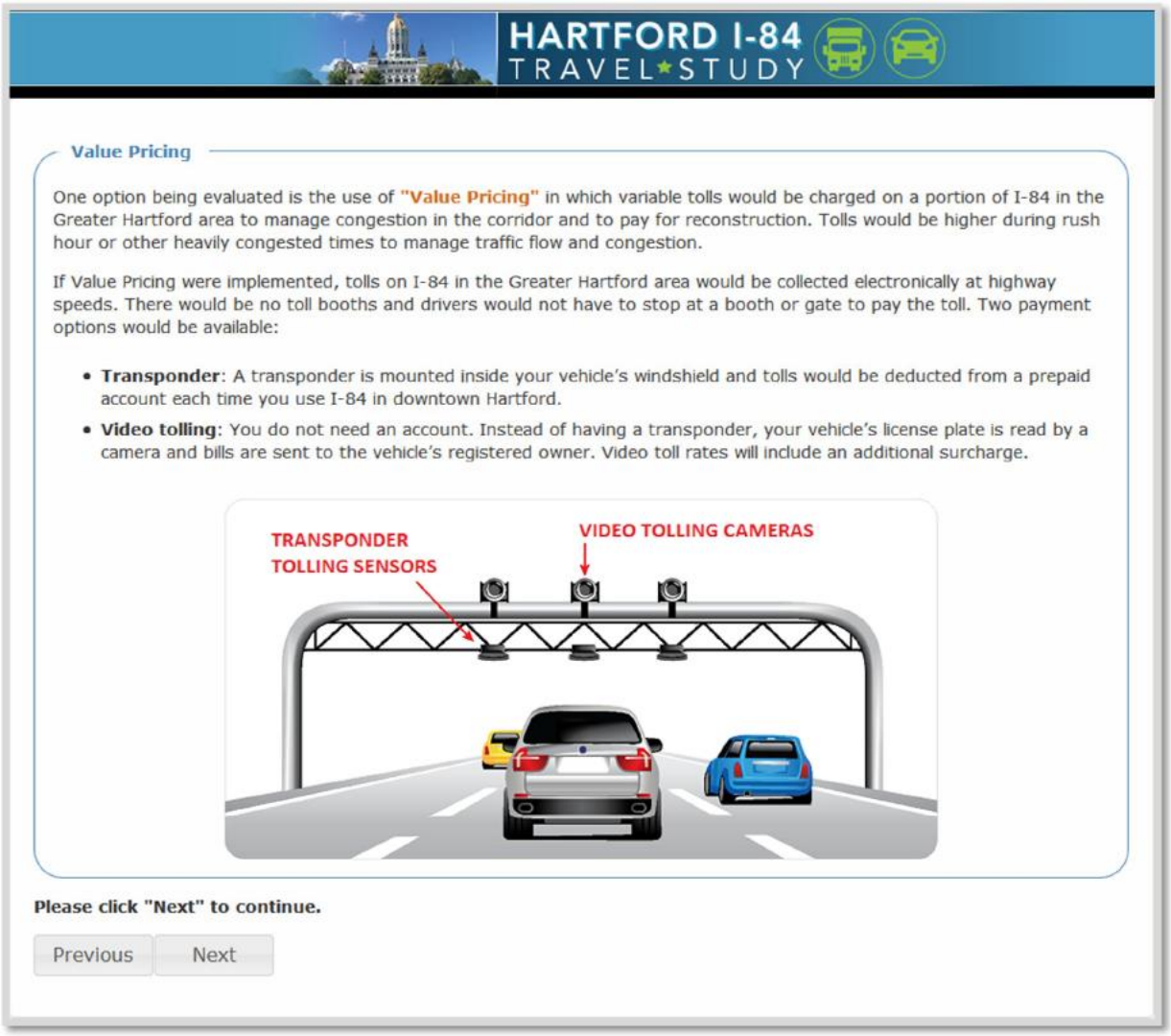
- Single or multi-day trip;
- Travel date;
- Origin and destination (city and state);
- Trip distance;
- Arrival time in downtown Hartford;
- Travel time;
- Travel delay due to traffic congestion;
- Tolls paid and toll amount;
- Vehicle size (number of axles);
- Trip frequency;
- Alternate routes to I-84; and
- Ownership of ETC transponders.

The respondents were asked to enter the city and state of their last commercial stop, using a map interface, before traveling on I-84 in downtown Hartford and the city and state of their next commercial stop after traveling on I-84 in downtown Hartford.

Stated Preference Questions

The stated preference questions were designed to collect quantitative information in order to estimate travelers' preferences and potential behavioral response under hypothetical future travel conditions on I-84 in downtown Hartford. The stated preference questions were introduced with a description of the proposed I-84 improvements and the concept of Value Pricing, as shown in **Figure 4-1**. Passenger car respondents whose trip origin locations were within a reasonably close proximity of the proposed CTfastrak light rail system were shown an additional slide that provided a brief introduction the CTfastrak rail service.

Figure 4-1
Sample Survey Screen with Value Pricing Description

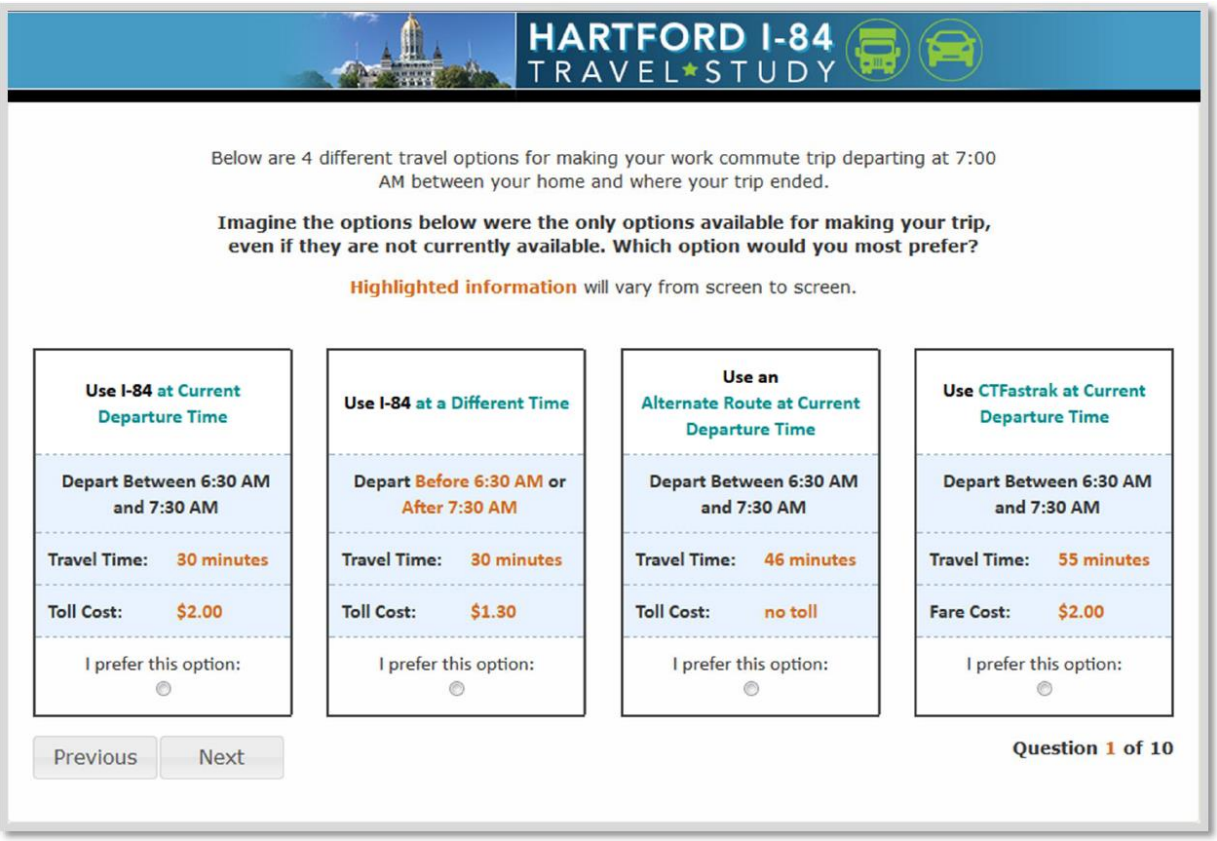


Following this question, the passenger car drivers were then presented ten hypothetical stated preference experiments based on their reported travel times, departure times, and origin and destination location coordinates. The experiments contained between two to four possible choice alternatives based on the following:

- Trip using I-84 at current departure time;
- Trip using I-84 at different departure time;
- Trip using an alternate route (toll-free) at current departure time; and
- Trip using CTfastrak or a local bus at current departure time.

The attribute values presented in each experiment varied around a set of base values according to an experimental design. To make the scenarios as realistic as possible to respondents, the 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 or adding one of several factors to give the level required by the experimental design for that particular scenario. By varying the travel time and toll cost shown in each experiment, the respondent was faced with different time savings for different costs, allowing them to demonstrate their sensitivities to travel time and toll cost across a range of values. **Figure 4-2** shows an example of a four alternative scenario presented in the passenger car questionnaire.

Figure 4-2
Sample Passenger Car SP Survey Screen with Four Alternatives

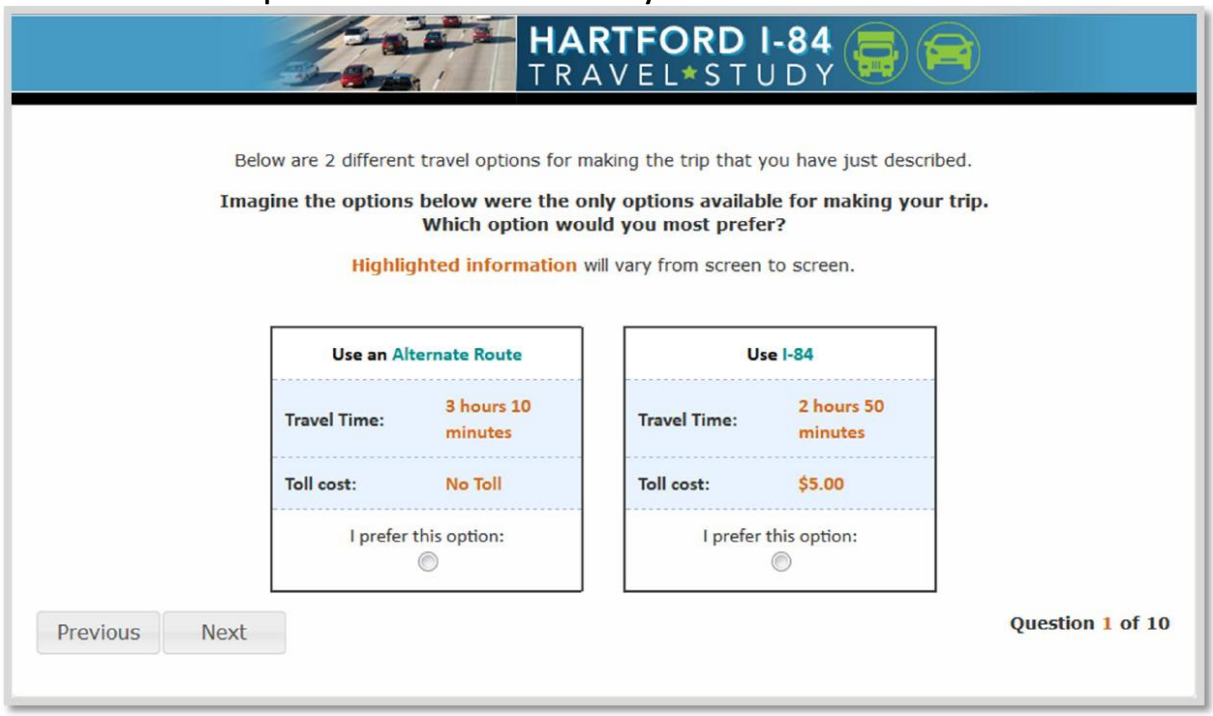


Similar to the passenger vehicle survey, the purpose of the stated preference section in the commercial vehicle questionnaire was to estimate respondents' travel preferences and behavioral response under hypothetical future travel conditions on I-84 in downtown Hartford. The commercial vehicle respondents were initially presented with a similar introduction to the I-84 project and the concept of Value Pricing. Following this, their reported travel times from their reference trip were used to generate a custom set of ten hypothetical stated preference experiments that included two travel alternatives:

- Trip using tolled I-84; and
- Trip using an alternative toll-free route.

In the two alternatives presented, the tolled I-84 alternative was described using both travel time and toll cost attributes, whereas the toll-free alternative was described using travel time attribute only. **Figure 4-3** shows an example of alternatives presented to the commercial vehicle respondents.

Figure 4-3
Sample Commercial Vehicle SP Survey Screen with Two Alternatives



Debrief and Opinion Questions

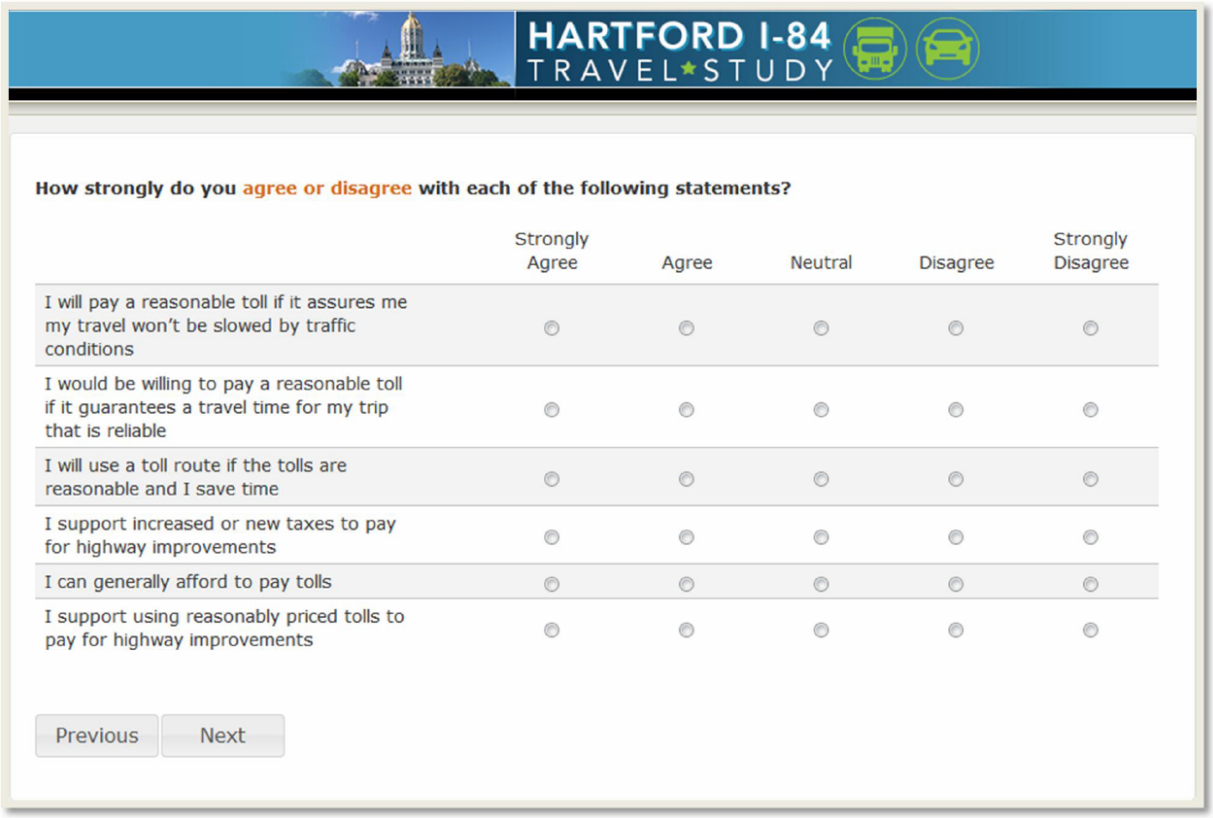
After completing the ten stated preference experiments, respondents answered a series of questions to assess possible underlying rationale for their choices and to identify possible strategic bias in their responses. Based on their responses in respective passenger car or commercial vehicle surveys, the respondents were shown a number of debrief questions depending on their answers in the stated preference scenarios. More details and examples have been included in the report attached as **Appendix A**.

To better understand preferred payment methods and ETC acquisition if all electronic tolling were implemented in the corridor, respondents who stated they did not own an ETC device, but selected at

least one I-84 alternative in the stated preference questions were asked how likely they would be to acquire an ETC device to pay the toll instead of video license plate tolling with an additional surcharge. If the respondent indicated that they were unlikely to use an ETC device they were asked a follow-up question to better understand their preferences.

Respondents were then asked whether they favor or oppose the use of Value Pricing on I-84 in downtown Hartford. Those with a non-neutral opinion were asked a follow-up question to identify why they favored or opposed Value Pricing. Finally, respondents were asked to indicate the degree to which they agree or disagree with a set of statements about tolling and value pricing. The alternatives presented in this question are shown in **Figure 4-4**.

Figure 4-4
Sample Survey Screen with Toll Attitude Questions



Demographic Questions

In the final section of the survey, demographic information was collected from the passenger vehicle respondents in order to classify respondents, identify differences in responses among traveler segments, and confirm that the sample contained a diverse group of drivers that travel in the study region. Demographic questions were related to home ZIP code, gender, age, employment status, household size, vehicle ownership, annual household income, and origin.

The commercial vehicle respondents were presented with a series of questions in order to determine their company characteristics that may have an impact on travel preferences and willingness to pay tolls. The final section of the survey included a set of questions related to company policies and details. Specific questions included location of company headquarters, fleet size, average trip length, flexibility

in delivery schedule, timeframe structure in terms of penalty or incentive, toll costs responsibility and charging mechanism, and routing decision sources.

Finally, respondents were given the opportunity to leave comments about the survey and/or the proposed Value Pricing plan in Hartford along I-84.

Survey Results

A total of 2,995 passenger vehicle travelers completed the stated preference survey during the administration period in June and July of 2013. The number of records was reduced to 2,900 after completing data checks and outlier analysis during the model estimation process implemented by RSG. Several variables were used for these 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.

As for commercial vehicles, a total of 290 respondents completed the commercial vehicle survey. The number of records was reduced to 244 after completing data checks and outlier analysis during the model estimation process.

A separate descriptive analysis for passenger cars and commercial vehicle driver responses from the validated data is presented in this section. The descriptive analysis of the data presented in subsequent text is provided for four sub-sections: screening and trip detail, stated preference, debrief and opinion, and demographic information questions. The following four market segments were used for the choice model estimation.

- Peak work trips;
- Peak non-work trips;
- Off-peak work trips; and
- Off-peak non-work trips.

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 time periods.

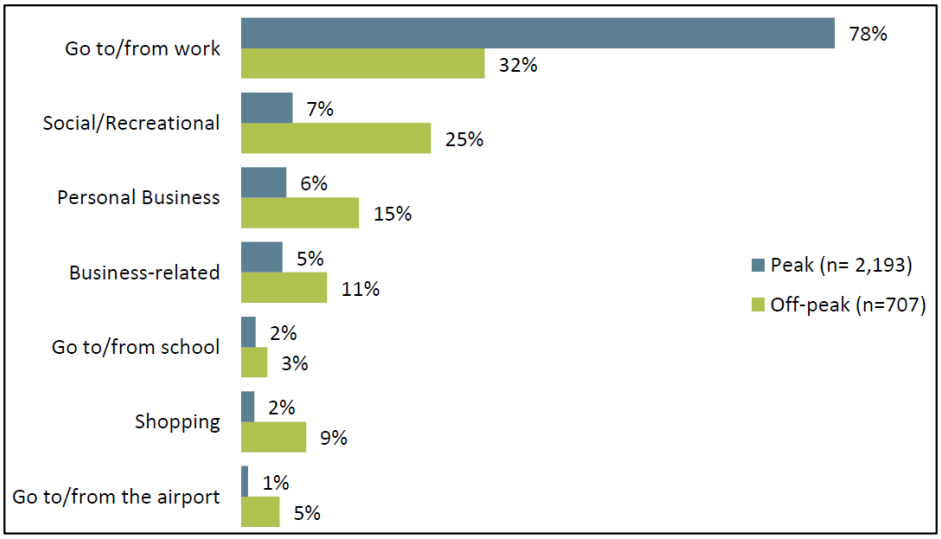
Passenger Car Survey Results

Screening and Trip Detail

Of the 2,900 reported trips in the survey sample, the majority of respondents to the passenger car survey reported a peak work trip (62.7 percent). Off-peak work trips were reported by another 10.5 percent.

Respondents were asked about the purpose of their most recent trip in the study area. The distribution of trip purposes by time period is shown in **Figure 4-5**. Overall, 78 percent of the peak period trips were reported as to/from work trips, while another 5 percent were business related trips. The to/from work trip was also reported to be the most commonly reported trip in the off-peak period responses. Also, about a quarter of respondents traveling in the off-peak period reported a social/recreational trip.

Figure 4-5
Passenger Car Survey Trip Purpose by Trip Departure Time



The latitude and longitude coordinates for each trip's origin-destination pair were used to calculate the trip distance and expected trip travel times. Mean and median trip distances, as well as respondent-reported travel times, are provided in the attached report in **Appendix A**. Both off-peak work and non-work trips were found to be longer, in terms of time and distance, then the respective peak period trips. Overall, passenger car median trip time for the entire sample was 21 minutes and median trip distance was 15 miles.

Trip origins and destinations, stratified by distance, are displayed in **Figure 4-6** and **Figure 4-7**, respectively. Trip origins can be seen spread throughout the Hartford region with many trips originating in East Hartford, West Hartford and New Britain, reflecting the fact that many respondents were commuters traveling from surrounding communities to their regular jobs in downtown Hartford. Trip destinations were found to be mostly concentrated within downtown Hartford.

After being asked to report the time their trip began, respondents were then asked if they started their trip at a certain time to minimize the impact of congestion. Forty-five percent of respondents indicated they change their departure time to avoid delays on the road. Further, respondents were asked to report the amount of traffic congestion they experienced on I-84 through downtown Hartford on their reference trip. The amount of delay due to traffic congestion is presented by market segment in **Figure 4-8**. Overall, about 46 percent of respondents did not experience any delay during their trip; however, a majority of respondents who traveled during peak periods reported at least some delay.

Figure 4-6
Passenger Car Trip Origins by Trip Distance

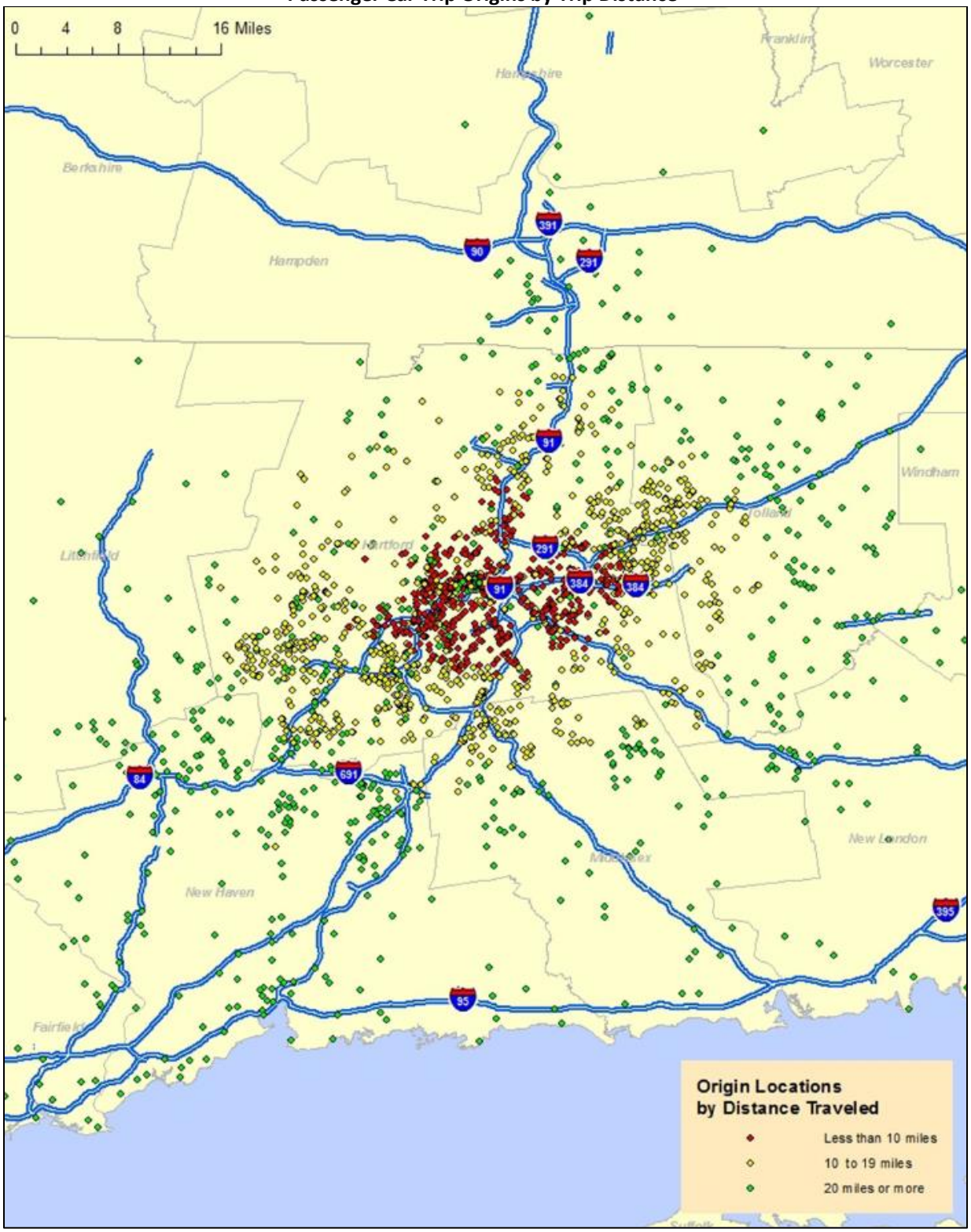


Figure 4-7
Passenger Car Trip Destinations by Trip Distance

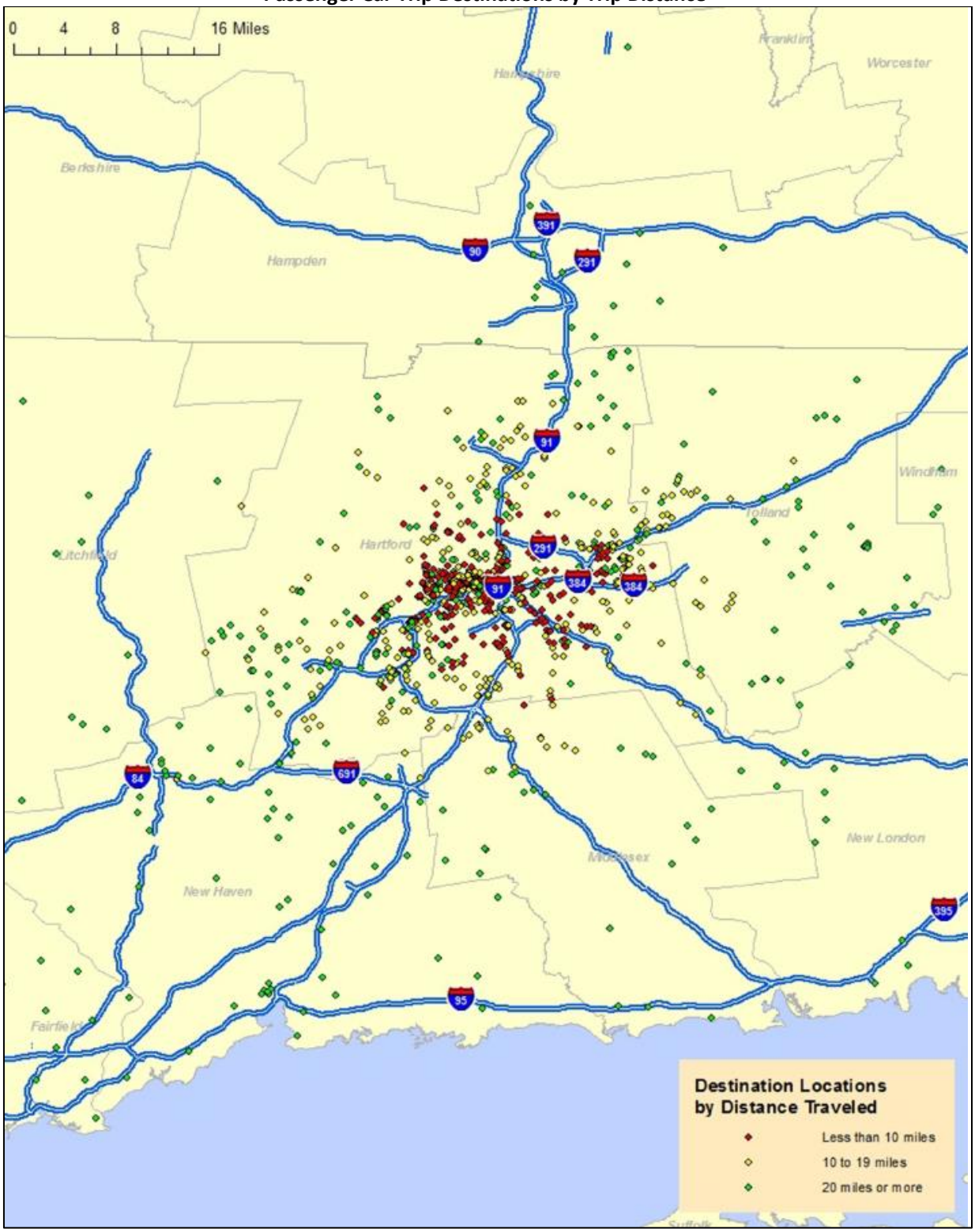
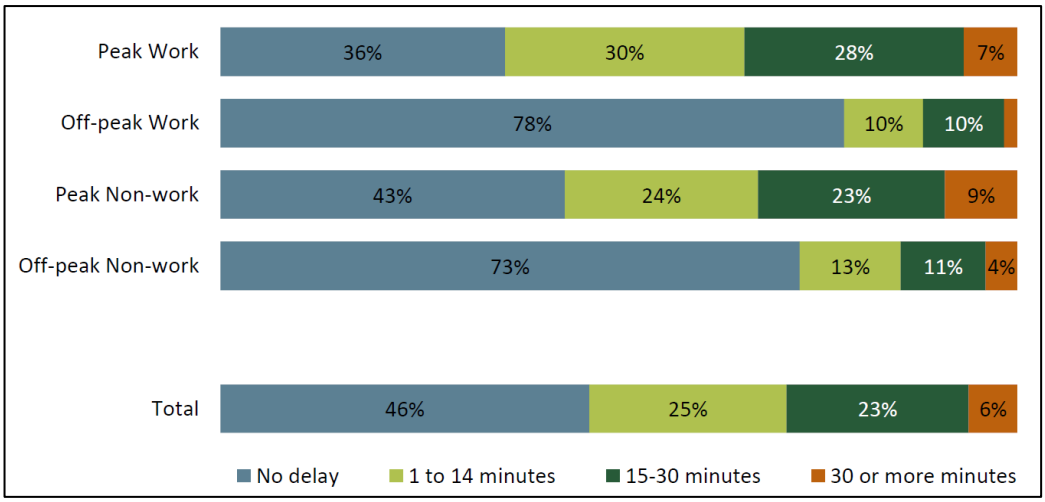


Figure 4-8
Passenger Car Amount of Reported Delay Due to Traffic Congestion by Market Segment



When asked if they used any alternate routes to I-84 to make their reference trip, more than one-half of all respondents indicated they used at least one alternate route. Between 15 percent to 22 percent respondents selected I-91 and I-691 as their alternative route options for different market segments. As for the questions relating to the E-ZPass ownership, about 46 percent reported owning an E-ZPass from the peak work segment and 44 percent from all respondents combined.

Stated Preference Scenarios

Each of the 2,900 respondents were asked 10 choice questions resulting in a total of 29,000 choice experiments. Out of the 29,000 total choice experiments administered in the passenger car survey, **Table 4-1** shows stated preference choices by different alternatives presented to the respondents. Overall, respondents were more likely to choose the toll free alternative, which consisted of 66 percent of the total 29,000 choices made. Further, respondents' likelihood to choose the tolled I-84 option at their current travel time (Alternative 1) decreased as the toll cost increased.

Table 4-1
Passenger Car Stated Preference Choices by Alternative

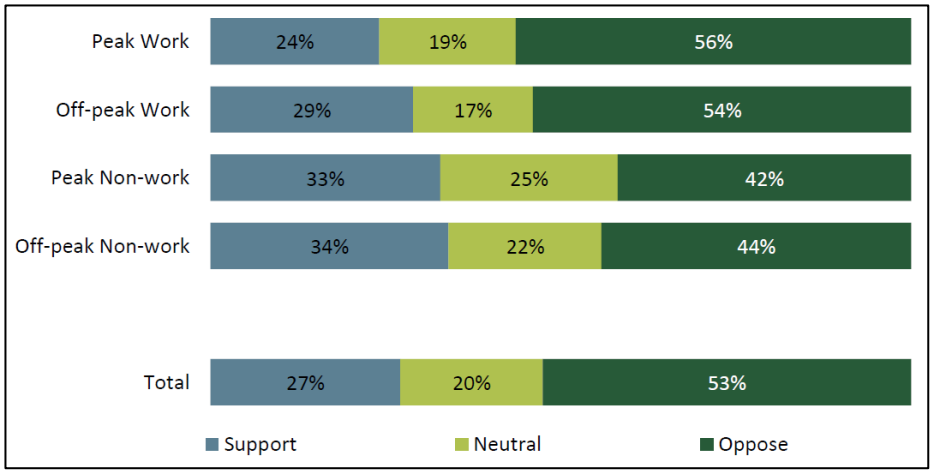
Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1: I-84 at Current Time	29,000	6,713	23%
Alternative 2: I-84 at Different Time	20,080	2,526	13%
Alternative 3: Alternate Toll-Free Route	29,000	19,24	66%
Alternative 4: Transit	18,320	514	3%

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. For example, respondents who traveled in the peak period, but chose not to shift their departure time by not selecting Alternative 2 (traveling on I-84 at a different time) in any of the SP experiments were asked to select the main reason for their choices. As a response to this, 26 percent indicated departure times were fixed by obligations and 22 percent indicated they preferred their current departure time.

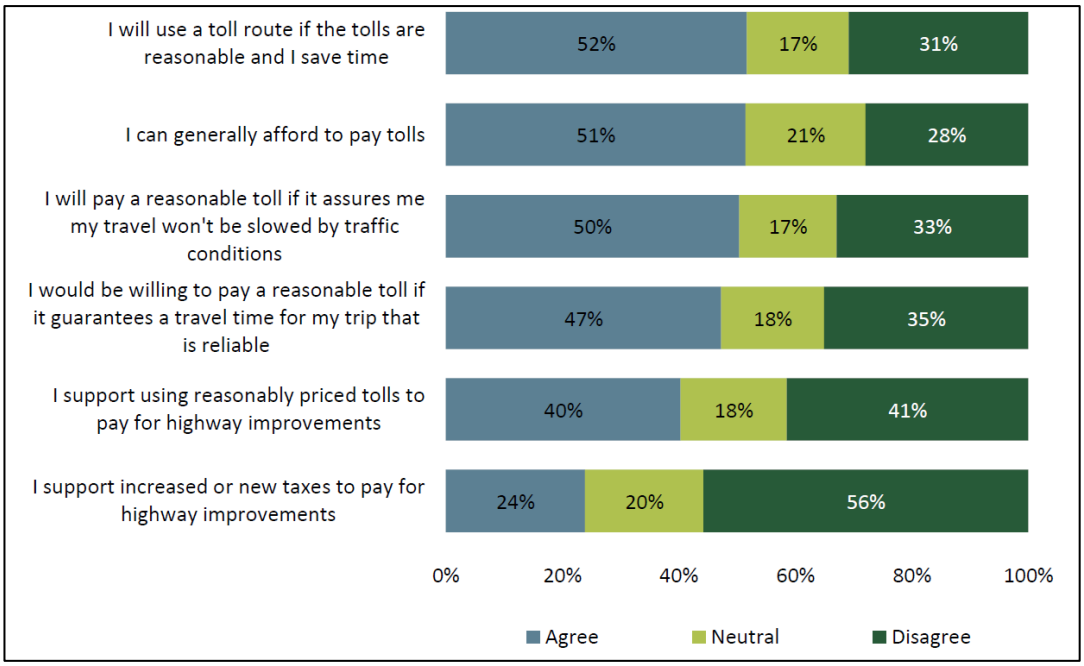
Next, respondents provided their opinion of the proposed Value Pricing on I-84. Responses have been tallied in **Figure 4-9**. As noted, overall 53 percent oppose the tolling plan, while 27 percent supported it. A majority of these 53 percent respondents were found to be opposed to tolling in general or on I-84 in a follow-up question.

Figure 4-9
Passenger Car Opinion of Value Pricing on I-84 by Market Segment



The debrief section concluded with a series of statements related to respondents' attitudes toward highway tolling. Respondents were asked to indicate the level with which they agree or disagree with the statements on a five-point scale. **Figure 4-10** shows their attitudes related to highway tolling and their willingness to pay reasonable tolls for reduced travel time or improved travel time reliability. About half of the respondents indicated, in various scenarios, that they would use a toll route if the tolls were reasonable and they saved time.

Figure 4-10
Passenger Car Toll Attitude by Market Segment



Demographic Questions

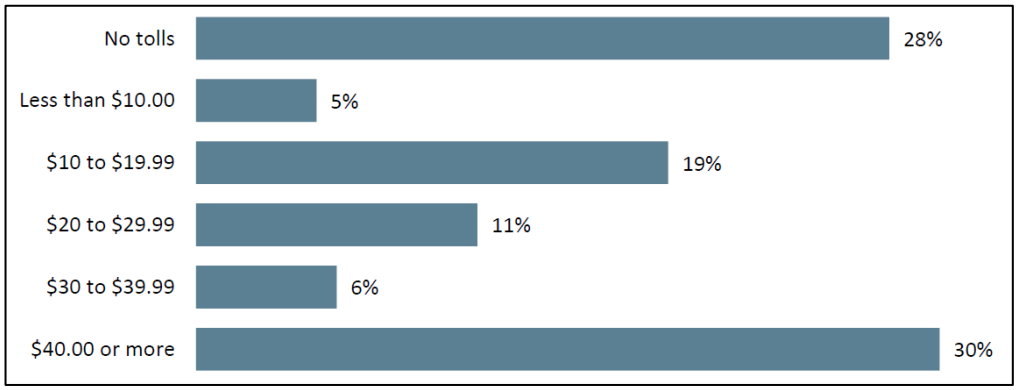
Passenger Car respondents were asked a series of demographic questions at the survey's conclusion. The dataset covers a wide range of ages, with most respondents in the 45-54 year-old group. Fifty-six percent of survey takers were females. About 79 percent of respondents were employed full time while another 6 percent were employed part time. The median household income falls into the $100,000-124,999 range.

Commercial Vehicle Survey Results

Screening and Trip Detail

Of the 244 reported trips in the survey sample, after validation, 71 percent of respondents indicated they were fleet drivers and did not own their own truck, while owner-operators constituted the second largest group of respondents. As for routing decisions, 68 percent reported making their own routing decisions, while 23 percent made some, but not all routing decisions. In terms of trip origins and destination, about two-thirds of trips reported having origins or destination outside the state of Connecticut. Further, just under half (44 percent) of respondents reported crossing through Downtown Hartford during the midday hours between 10:00 AM and 2:59 PM. Most of the truck drivers reported paying a toll on their trip. A break-down of responses in presented in **Figure 4-11**. About 30 percent reported paying as much as $40.00 or more on their reference trip. In terms of distance, respondents reported mostly medium and long-distance trips of more than 100 miles. The median reported trip was approximately 450 miles in distance.

Figure 4-11
Commercial Vehicle Amount Paid in Tolls



A large majority of respondents reported driving a 5-axle vehicle (85 percent). Respondents were asked how often they make this particular trip; 42 percent 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-84 when making the same trip 65 percent reported using I-91 and I-691. E-ZPass ownership came out high amongst the commercial vehicle operators as 68 percent indicated having an electronic transponder to pay tolls.

Stated Preference Scenarios

Each of the 244 respondents were asked 10 choice questions resulting in a total of 2,440 choice experiments. Out of the 2,440 total choice experiments administered in the commercial vehicle survey, about 75 percent of response selections were made in favor of choosing a toll free alternative. Thirty-five percent of respondents chose both the toll free and the tolled option at least once during

the ten exercises presented to them. Fifty-four percent always chose the toll free route and the final eleven percent always chose the tolled option.

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. The 53 percent of respondents who never chose to use I-84 with Value Pricing were asked to provide the main reason for their choices. One half of these respondents indicated they were opposed to tolls. When asked for providing an opinion of Value Pricing on I-84 given that the viaduct must be rebuilt and paid for, about 21 percent came supportive of the plan, a quarter remained neutral and the rest opposed the plan.

From the respondents who favored the Value Pricing on I-84, the most common response selection was 'improved road conditions', 58.8 percent. **Table 4-2** presents a full break-down of responses for favoring Value Pricing on I-84. From the respondents who opposed the idea of Value Pricing on I-84, about half (47.7 percent) oppose paying tolls in general.

Table 4-2
Commercial Vehicle Reasons* for Favoring Value Pricing on I-84

Reason	Count	Percent
Improved roadway conditions	30	58.8%
Less congestion	25	49.0%
Safer road conditions	21	41.2%
More reliable travel time	19	37.3%
Shorter travel time	18	35.3%
Generates revenue for transportation improvements and maintenance	16	31.4%
Reduced emissions and improved air quality	12	23.5%
Other, please specify:	2	3.9%
Total respondents	**51**	**N/A**

*Respondents were asked to select all options that apply to their reasoning

Company Background Questions

The commercial vehicle survey found 95 percent of the companies to be based in the U.S., but only 7 percent based out of Connecticut. More than one-third of the companies are large-scale owning a fleet of 500 or more vehicles. More details have been presented in **Appendix A** attached to this report.

Model Estimation

The objective of the stated preference surveys was to estimate reliable VOT for passenger and commercial vehicle travelers who may use the elevated portion of I-84 in downtown Hartford. The 10 responses from each of the stated preference experiments were combined into passenger and commercial vehicle datasets for the purpose of estimating discrete choice models. 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. The model coefficients provide information about respondents' sensitivities to the attributes that were tested in the stated preference experiments. These sensitivities are ultimately expressed as the value of time

savings for travelers in the study area and served as inputs into the travel demand model to forecast behavioral response, traffic, and toll revenue for the I-84 study alternatives.

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 I-84 compared to a toll-free route. The willingness to pay for travel-time savings, or VOT, can be calculated by dividing the travel-time coefficient by the toll cost coefficient after accounting for the income transformation that was applied in the model specification. A more detailed overview of the MNL analysis can be found in **Appendix A**.

The final model specification for the passenger car survey was chosen based on model fit, the intuitiveness and reasonableness of the model coefficients, and the expected application of the model results. In addition to the variables included in the stated preference scenarios, household income, trip distance, and Electronic Toll Collection (ETC) ownership were found to be statistically significant. A strategic bias variable was also included for respondents who opposed the proposed project or to paying tolls. The final model specification for the commercial vehicle survey includes a variable for travel time and separate cost coefficients for different vehicle sizes (medium and heavy trucks). **Table 4-3 and Table 4-4** show the VOT for various market segments at the average segment income and distance for passenger cars and commercial vehicles, respectively.

Table 4-3
Passenger Vehicle Value of Time by Market Segment

Time of day	Trip Purpose	Mean VOT ($/hr.)
Peak	Work	$10.30
Peak	Non-work	$9.14
Off-peak	Work	$10.96
Off-peak	Non-work	$9.45

Table 4-4
Commercial Vehicle Values of Time by Vehicle Size

Trip Purpose	Mean VOT ($/hr.)
2-4 axles	$10.99
5 or more axles	$31.36

Conclusions

A Stated Preference (SP) survey was developed and implemented that gathered information from 2,900 passenger-vehicle travelers and 244 commercial vehicle travelers who use I-84 in Hartford, CT. The questionnaires collected data on current travel behavior, presented respondents with information

about the proposed Value Pricing on I-84 in downtown Hartford, and engaged the travelers in a series of stated preference experiments.

Passenger car survey sample represented a wide range of different trip purposes, travel characteristics, and demographics. Most of the respondents were from the 45-54 year-old group. Fifty-six percent of survey takers were females. About 79 percent of respondents were employed full time and the median household income fell into the $100,000-124,999 range.

RSG developed choice models to produce estimates of values of time for travelers in the region. The magnitude and signs of the sensitivity estimates are reasonable and intuitively correct. For passenger vehicle travelers, average values of time varied by trip purpose and time of day, and generally fell within a range of $9.14/hr. to $10.96/hr. The peak period work trip models estimated a VOT of $10.30/hr. For commercial vehicles, the value of time for small trucks (2-4 axles) was estimated to be $10.99/hr., whereas the value of time for large trucks (5 or more axles) was estimated to be $31.36/hr.

The estimated VOTs presented here for passenger vehicle travelers are somewhat lower than the VOTs estimated on other tolled highway corridors in the United States, particularly with respect to the high household earnings reported by the respondents in this study. However, this is not unexpected for this region and there are several possible explanations why the estimated values of time for travelers who use the I-84 in downtown Hartford are somewhat lower than other regions of the United States. First of all, there are currently no tolls in the state of Connecticut, henceforth a somewhat limited familiarity among the travelers with paying tolls, especially all electronic tolls. Secondly, between 35 percent and 46 percent, depending upon the survey market segment, of the respondents perceived local or city streets as an alternative to the I-84 in downtown Hartford. Further, there is an overall high proportion of respondents who showed opposition to Value Pricing on I-84 in their responses. RSG reported that many respondents indicated in the open-ended comments portion of the survey that they considered Connecticut income taxes to be burdensome and the recent gas tax hike a sufficient new revenue source for future infrastructure repairs and expansion. In addition, for respondents who did chose to pay tolls on I-84, relatively low toll values were selected in the experiments presented to them. Among the choices where Value Pricing was selected, the average toll was $1.05.

Collectively, these factors likely explain why the willingness to pay for travel time savings on I-84 in downtown Hartford is somewhat lower than in other regions of the country. Ultimately, the VOT estimates were incorporated into the project travel demand model that was used to forecast traffic and toll revenue for the I-84. The traffic and revenue analysis is presented in Chapter 5.

Chapter 5

Traffic and Toll Revenue Analysis

This chapter provides a summary of the alternatives evaluated, description of assumed tolling locations and toll rates, and estimates of traffic and toll revenue.

Alternatives Description

The alternatives considered in this study assumed all electronic tolling (AET) across all lanes on I-84 within the Hartford Area. As the study developed, an additional scenario was evaluated that considered expanded tolling along I-84 between Hartford and Danbury and not just specific to the viaduct section of I-84 in Hartford. In addition, a potential conversion of the existing High Occupancy Vehicle (HOV) lanes on I-84 and I-91 to High Occupancy Toll (HOT) lanes was studied at a preliminary level to estimate the potential toll revenue and congestion relief benefits that could occur under such a conversion.

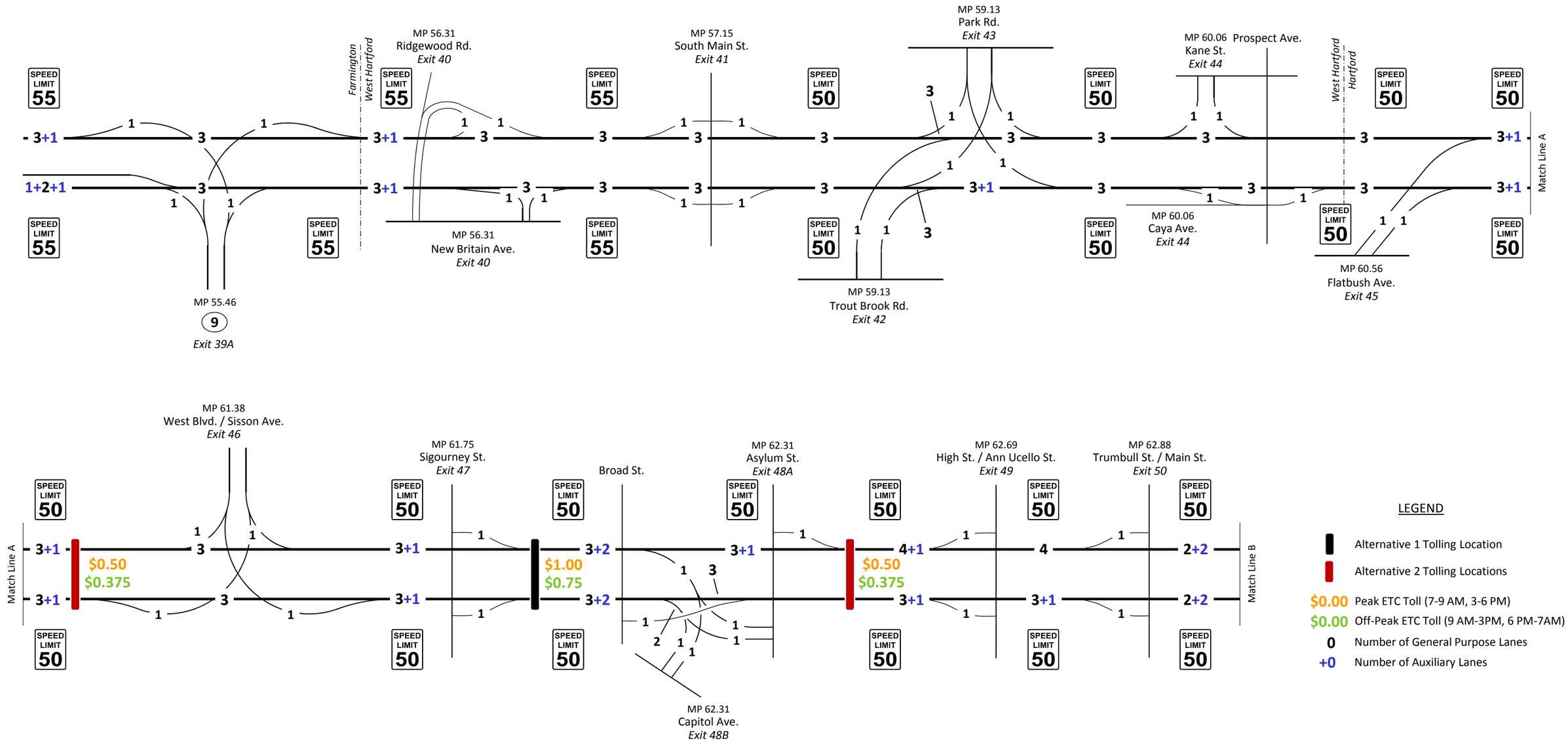
Parallel to this congestion pricing study, a major investment study of I-84 in Hartford was initiated by the CTDOT to develop a set of preliminary alternatives for replacing the existing I-84 viaduct. During this congestion relief study, two preliminary physical alternatives were developed by the I-84 Hartford Project team for use in this study.

The alternatives evaluated in this study are discussed below.

- **Alternative 1-** Assumes the current configuration ("No Build") of I-84 with a single point toll gantry located east of the Sigourney ramps **(Figure 5-1)**. The toll for a passenger vehicle equipped with a transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher. For all alternatives, commercial vehicles were assumed to pay a proportionately higher toll rate based on the number of axles as is typically done for most toll roads.

- **Alternative 2 -** Assumes the current configuration ("No Build") of I-84 with two tolling locations. The first gantry was assumed to be west of the Sisson Avenue Interchange and the second gantry east of the Asylum/Capitol Avenue interchange **(Figure 5-1)**. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher.

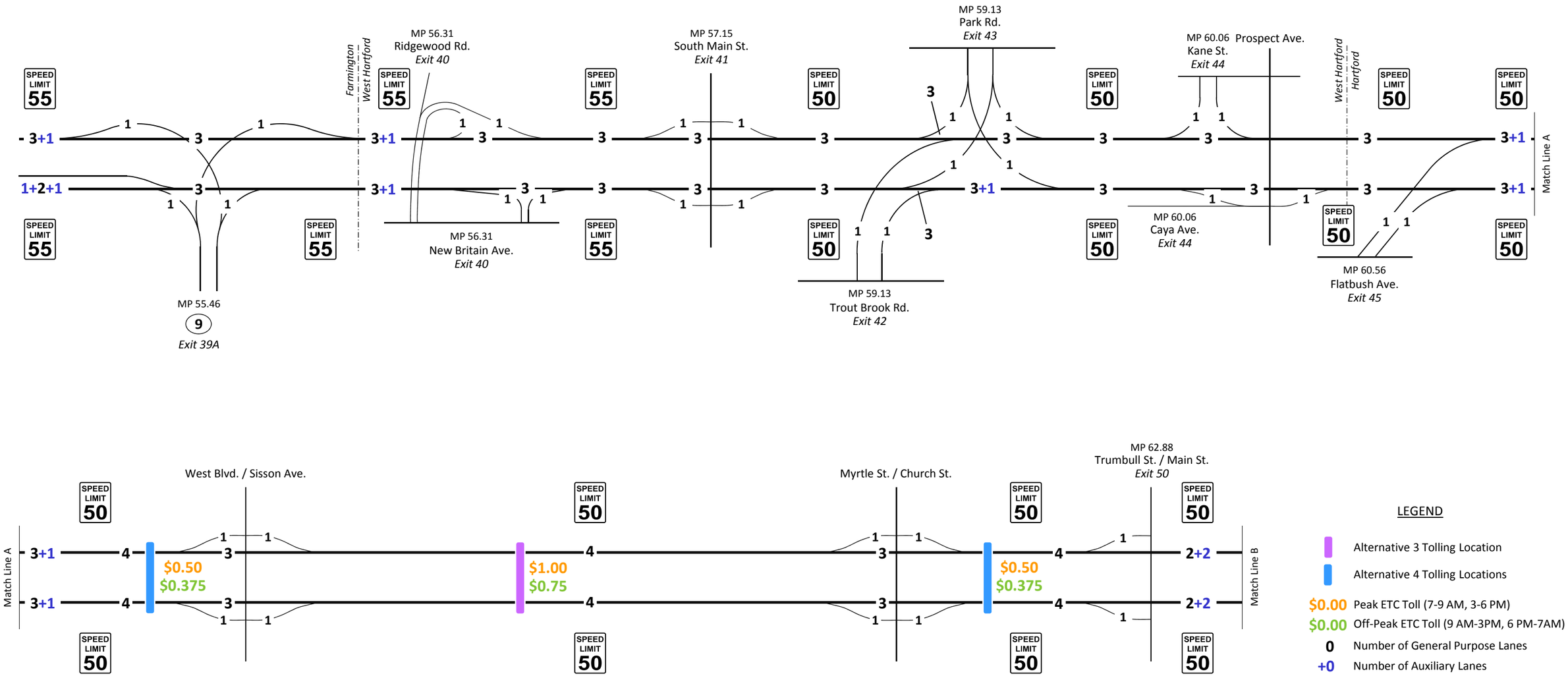
- **Alternative 3 –** Assumes a reconfigured I-84 through Hartford with major reconstruction and consolidation of the existing interchanges on the western and eastern edges of the Viaduct. The interchange with Sigourney Street is removed **(Figure 5-2)**. Alternative 3 assumes the same point toll location as used in Alternative 1. The toll for a passenger vehicle equipped with a transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher.



ALTERNATIVES 1 AND 2 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

CDM Smith

FIGURE 5-1



ALTERNATIVES 3 AND 4 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

CDM Smith

FIGURE 5-2

- **Alternative 4** – Same as Alterative 3, but with two tolling locations. The first tolling gantry is assumed to be west of a new West Boulevard/Sisson Avenue Interchange and the second tolling location east of a new Church Street interchange. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively **(Figure 5-2)**. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher.

- **Alternative 5 -** Assumes I-84 is reconfigured through Hartford with the addition of a collector-distributor (C-D) roadway **(Figure 5-3)**. This alternative assumes two tolling locations, strategically positioned just outside of the C-D and I-84 connections so as to prevent the C-D roadway from being used as a toll diversion alternative. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher.

- **Alternative 6 -** Assumes an expanded tolling configuration consisting of 11 AET locations spaced approximately 6 miles apart along I-84 from the New York border to Hartford **(Figure 5-4)**. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.35 for peak and off peak time periods, respectively. A toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50 percent higher.

- **Alternative 7 -** Assumes the conversion of the existing I-91 and I-84 HOV lanes to HOT lanes. Toll rates would vary dynamically in response to traffic conditions to ensure the HOT lanes operate near or at free flow at all times of the day. **Figures 5-5 through 5-8** show the current configuration of the HOV lanes and the access and egress locations between the general purpose lanes and the HOV lanes. The existing physical configuration of the HOV lanes is such that a single tolling location could be implemented on each of the corridors to manage single occupant demand through pricing.

These seven alternatives were run utilizing travel demand toll models specifically enhanced and refined for this study at 2012, 2020 and 2040 conditions. In addition, toll free runs were prepared to serve as the baseline to compare against the tolled alternatives

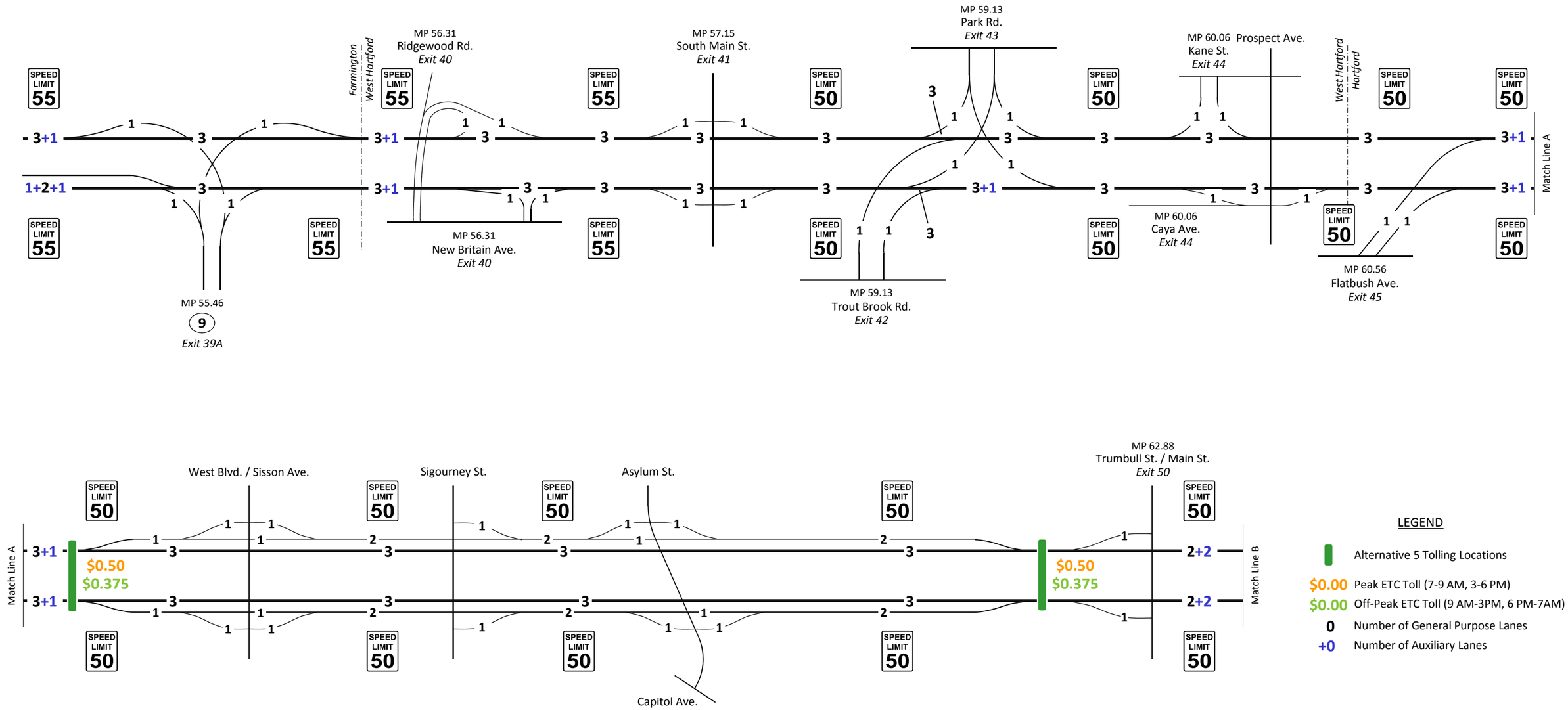
Traffic Estimates

Travel demand model runs were analyzed and summarized for each of the alternatives. The following traffic schematics display the estimated 2020 average weekday volumes along I-84.

Alternative 1

Figure 5-9 displays 2020 estimated average weekday volumes in thousands for I-84 under toll free and tolled conditions for Alternative 1. This alternative assumes the current configuration of I-84 with a single point tolling location on the Viaduct section east of Sigourney Street. Two sets of traffic volumes are shown; toll free estimates and tolled estimates (shown in parenthesis). In addition, on the mainline segments along I-84, a third set of additional numbers are shown displaying the percent retained (tolled volume/toll free volume).

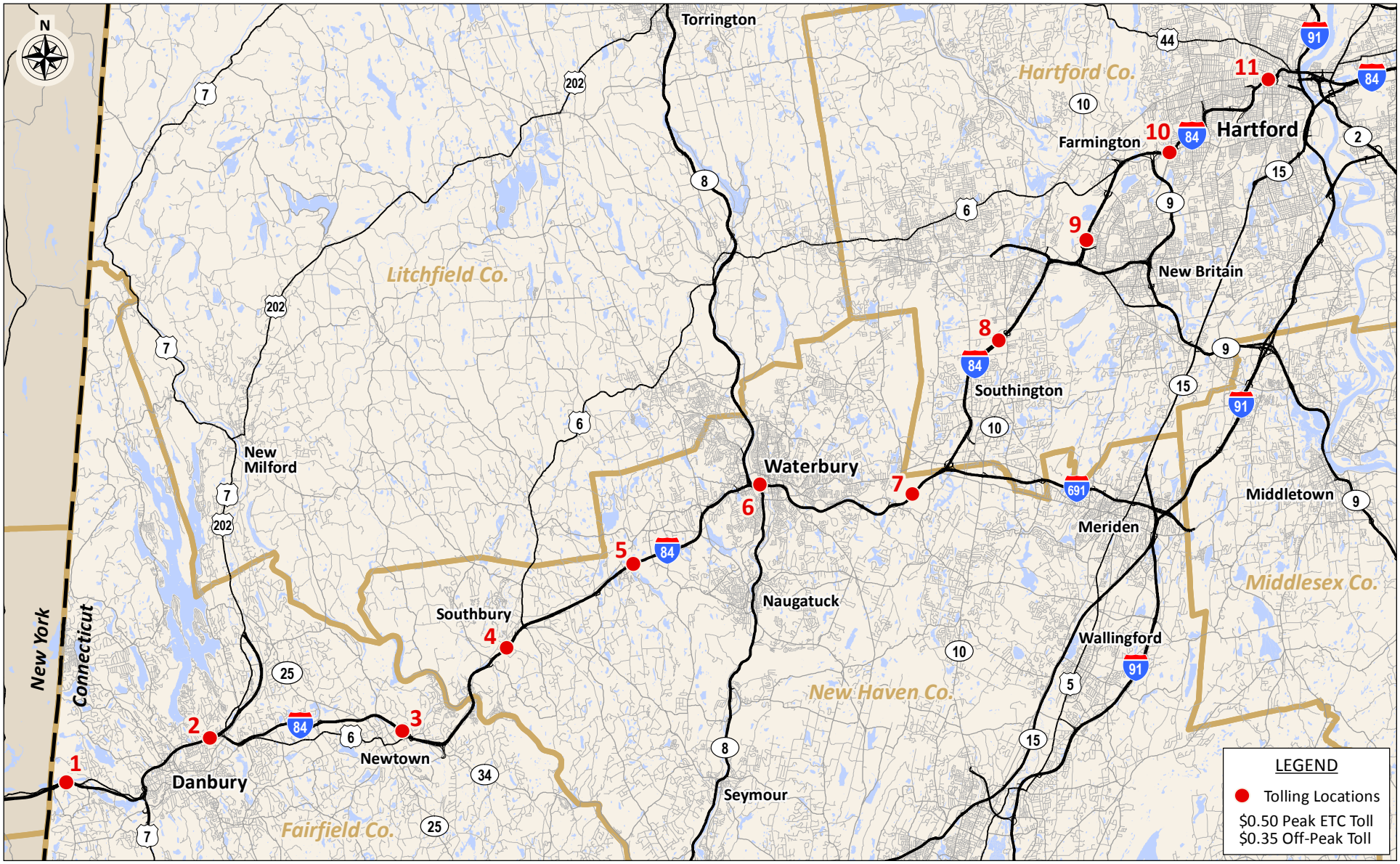
As would be expected, the largest reduction in traffic occurs at the tolling location, where a 30 percent reduction in average weekday traffic could be expected. The percentage of retained traffic increases



ALTERNATIVE 5 - I-84 NUMBER OF LANES, POSTED SPEED LIMITS AND ASSUMED TOLLING LOCATIONS

CDM Smith

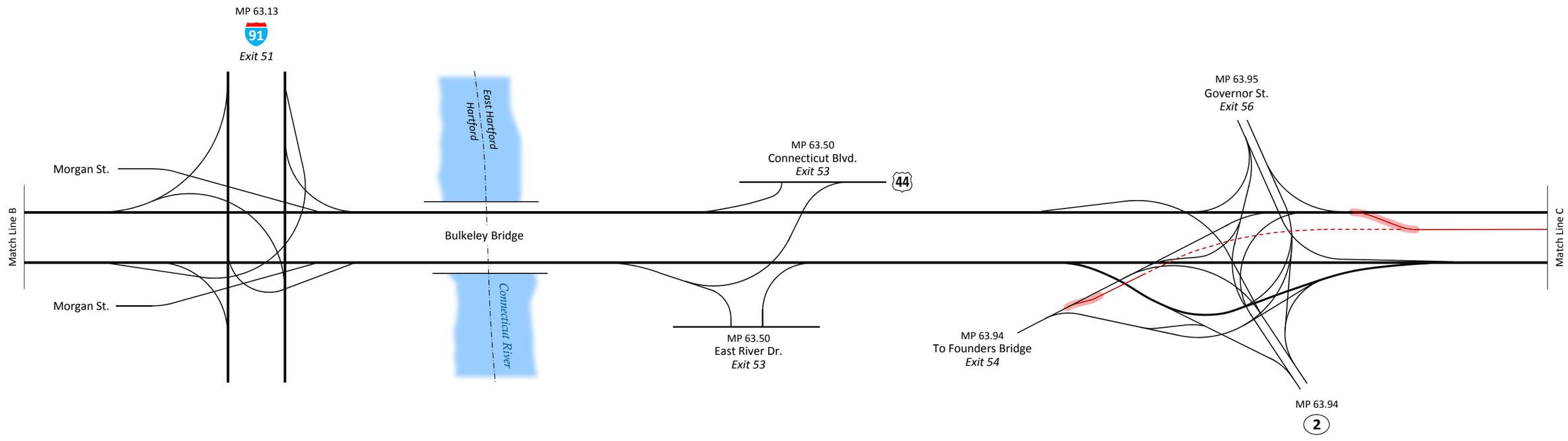
FIGURE 5-3



ALTERNATIVE 6 - EXPANDED I-84 TOLLING (NY-HARTFORD): GANTRY LOCATIONS

CDM Smith

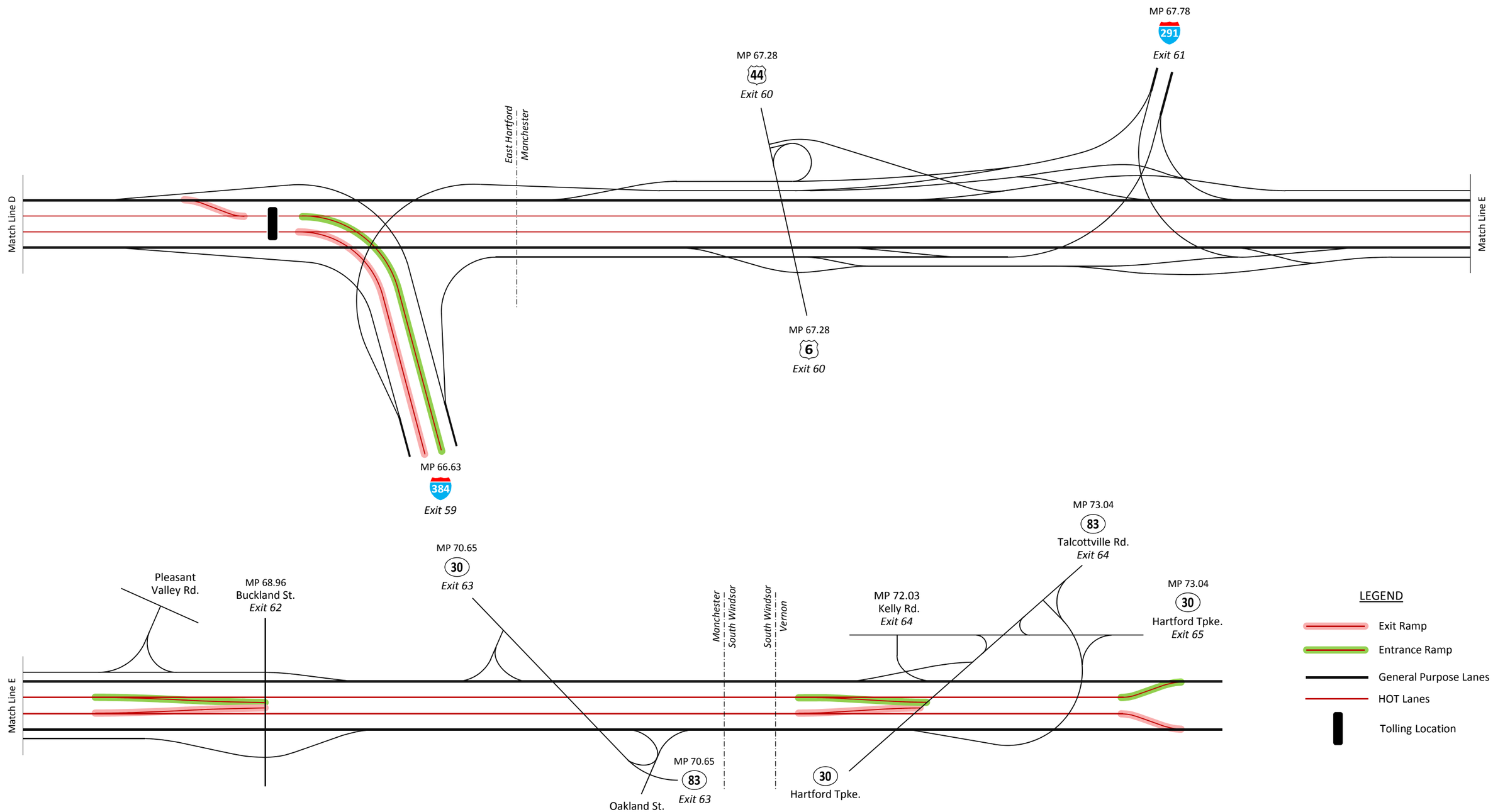
FIGURE 5-4



CDM Smith

ALTERNATIVE 7 - I-84 HOV TO HOT CONVERSION

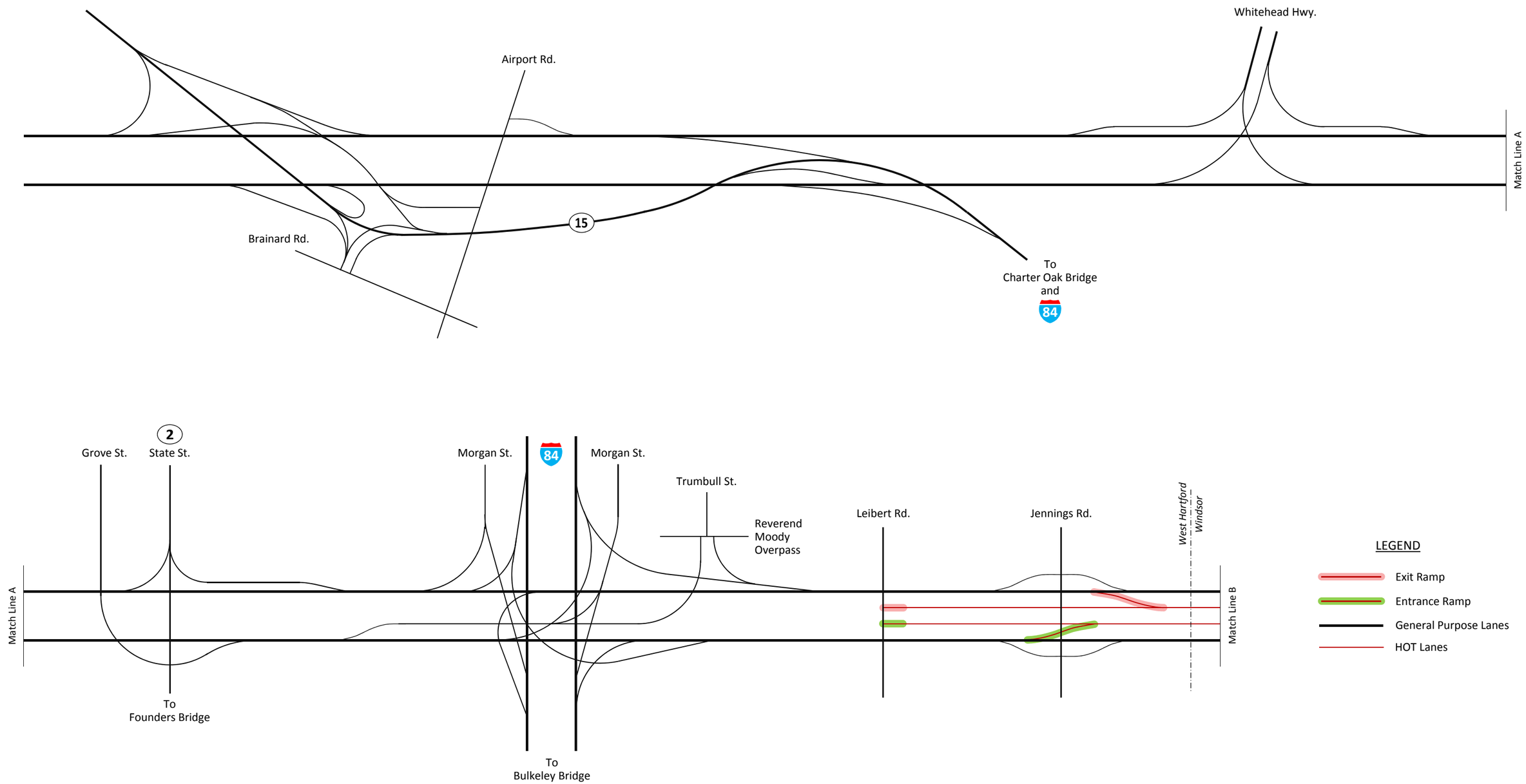
FIGURE 5-5



CDM Smith

ALTERNATIVE 7 - I-84 HOV TO HOT CONVERSION

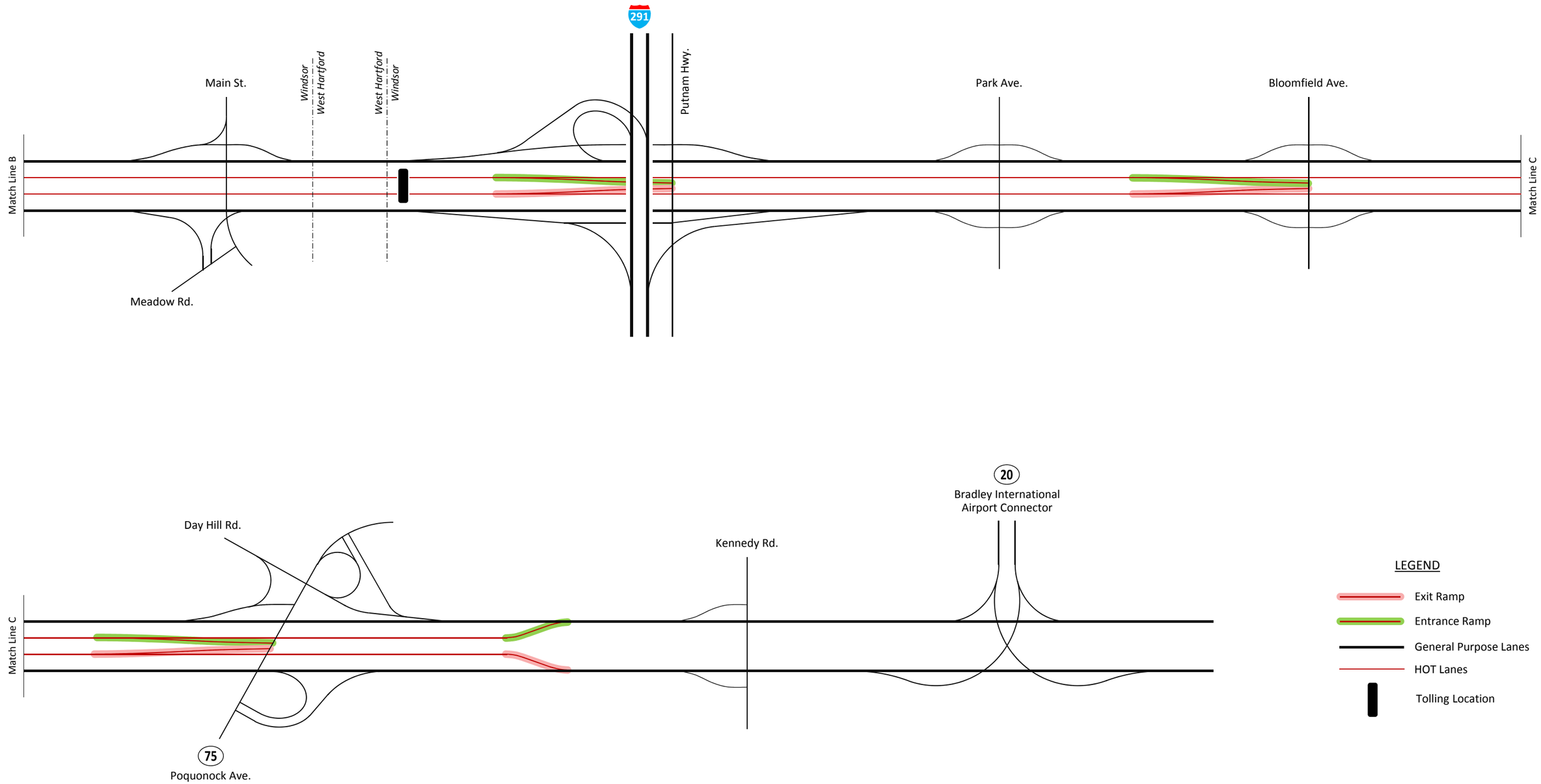
FIGURE 5-6



CDM Smith

ALTERNATIVE 7 - I-91 HOV TO HOT CONVERSION

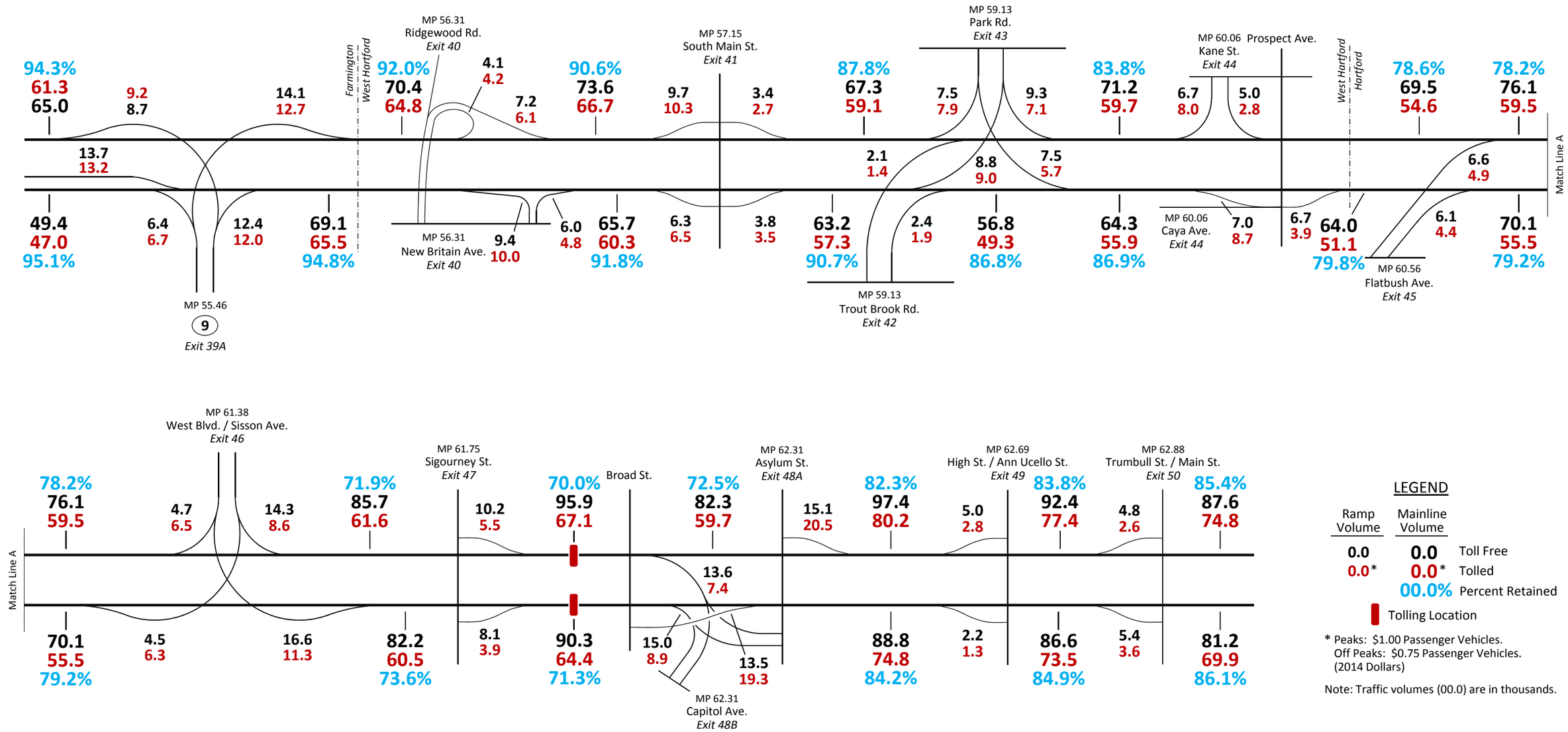
FIGURE 5-7



CDM Smith

ALTERNATIVE 7 - I-91 HOV TO HOT CONVERSION

FIGURE 5-8



2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
ALTERNATIVE 1: TOLL FREE AND TOLLED CONDITIONS

CDM Smith

FIGURE 5-9

the further away from the tolling location, with only a 5 percent reduction in traffic estimated west of the Route 9 interchange. Traffic is estimated to be 15 percent lower on the eastern end of the schematic shown. Not only is this location closer to the actual tolling location as compared to the western end shown displayed in the schematic, but traffic has the option of entering Hartford from the Founders Bridge and other roadways. The ramps to and from the east at the Sisson Avenue interchange, the Sigourney ramps, and the ramps to and from the west at the Asylum Street interchange show the largest reduction in traffic as any traffic utilizing these ramps would need to pass through the tolling location. The roadway network and the frequency of interchanges in Hartford allow for traffic to exit I-84 prior to the tolling location or enter I-84 beyond the tolling location. This is displayed by examining the ramps to and from the west at interchanges west of the tolling location and ramps to and from the east at interchanges east of the tolling location. For example, the ramps to and from the west at the Sisson Avenue interchange would be expected to increase significantly as additional traffic would exit and enter I-84 at this location, rather than travelling through the tolling location to exit at their preferred interchange. Because a significant amount of the traffic on I-84 in Hartford has origins or destinations in the local area, coupled with relatively dense network, a significant amount of toll avoidance would be possible (even at the relatively modest toll rate assumed). The other issue that was observed is that a significant uptick in volume on the ramps to and from the east at the Asylum interchange would occur to avoid passing through the tolling location. The existing demand at these ramps, particularly in the AM peak is already at levels that contribute to operational issues along I-84.

Alternative 2

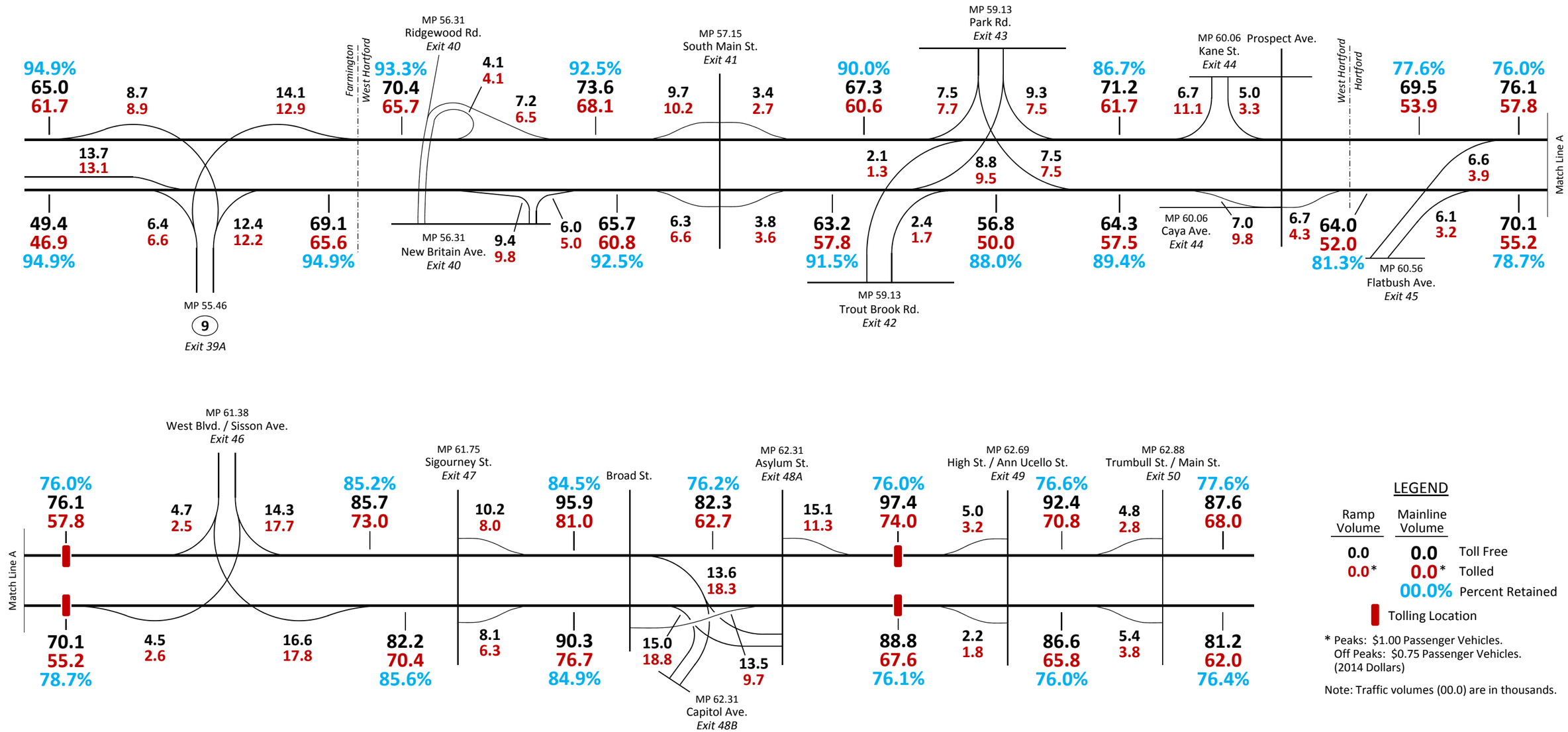
Figure 5-10 displays 2020 estimated average weekday volumes in thousands for I-84 under toll free and tolled conditions for Alternative 2. This assumes the current configuration of I-84 with two tolling locations; one located just west of the Sisson Avenue interchange and the second location located east of the Asylum Street interchange.

As expected, traffic reductions are highest at the two tolling locations, where a roughly 24 percent reduction in traffic is estimated under a tolled condition. Through the Viaduct section (just west and east of the Sigourney interchange), traffic is estimated to be about 85 percent of toll free volumes. Overall, percent retained levels tend to be higher under this alternative when compared to Alternative 1. The exception being on the eastern end, where the high volume of traffic to and from the east at the Asylum/Broad interchanges are now subject to a toll, whereas under Alternative 1, this movement is not tolled.

Alternative 3

Figure 5-11 displays 2020 estimated average weekday volumes in thousands for I-84 under toll free and tolled conditions for Alternative 3. This alternative assumes a major reconstruction of the I-84 Viaduct and the creation of two major interchanges with a single point tolling on I-84 between the new interchanges. Two sets of traffic volumes are shown; toll free estimates and tolled estimates. In addition, on the mainline segments along I-84, a third set of additional numbers are shown displaying the percent retained (tolled volume/toll free volume).

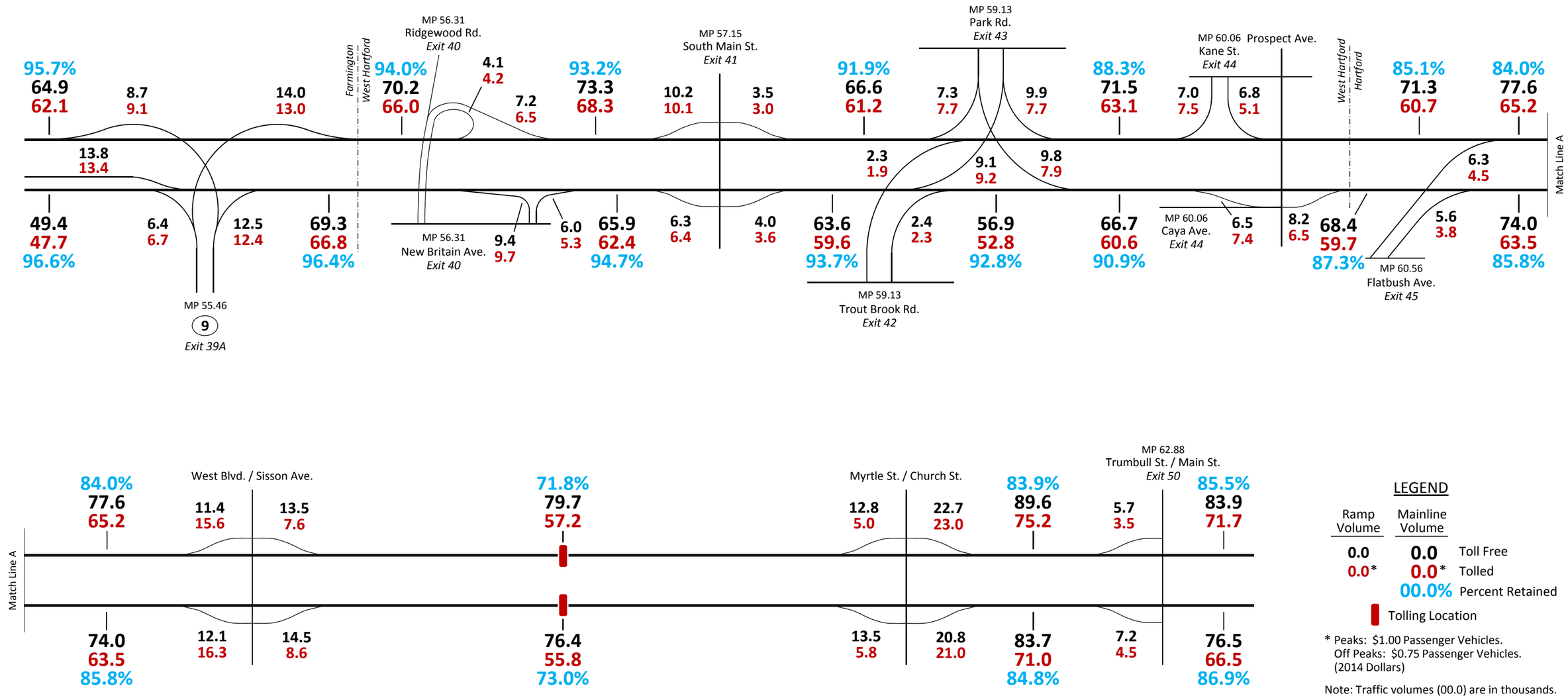
In general, the findings under this alternative are similar to Alternative 1, but with a slightly higher retention of toll free traffic. However, within the Viaduct section, this percent retained is off a lower estimate of toll free traffic, which is as a result of the physical changes assumed in Alternative 3.



2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
ALTERNATIVE 2: TOLL FREE AND TOLLED CONDITIONS

CDM Smith

FIGURE 5-10



2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
ALTERNATIVE 3: TOLL FREE AND TOLLED CONDITIONS

CDM Smith

FIGURE 5-11

Alternative 4

Figure 5-12 displays 2020 estimated average weekday volumes in thousands for I-84 under toll free and tolled conditions for Alternative 4. This assumes a major reconstruction of the I-84 Viaduct and the creation of two major interchanges with two tolling location on I-84. One tolling gantry located west of a new West Boulevard/Sisson Avenue interchange and one east of a new Myrtle Street/Church Street Interchange. Two sets of traffic volumes are shown; toll free estimates and tolled estimates. In addition, on the mainline segments along I-84, a third set of additional numbers are shown displaying the percent retained (tolled volume/toll free volume).

In general, the impacts from tolling under this alternative are similar to Alternative 2, but with a slightly higher retention of toll free traffic along the corridor. While the percent of traffic that is retained within the Viaduct segment is similar to Alternative 2, it is of a lower base of toll free traffic, which is as a result of the major physical network changes assumed in Alternative 4.

Alternative 5

Figure 5-13 displays 2020 estimated average weekday volumes in thousands for I-84 under toll free and tolled conditions for Alternative 5. This assumes a major reconstruction of the I-84 Viaduct corridor and the creation of a C-D roadway with two tolling locations located just west and east of the C-D roadway and I-84 connections. Two sets of traffic volumes are shown; toll free estimates and tolled estimates. In addition, on the mainline segments along I-84, a third set of additional numbers are shown displaying the percent retained (tolled volume/toll free volume).

Alternative 5 assumes two tolling points, locating just west and east of the I-84 mainline and collector-distributor system. Percent retained estimates are 76 to 78 percent at the tolling locations, which is similar to Alternative 2 and Alternative 4. Volumes through the Viaduct section, including the sum of volumes on both the I-84 mainline and the C-D road fall in between those estimated for Alterative 2 and Alternative 4, which is attributed to the physical difference among the alternatives.

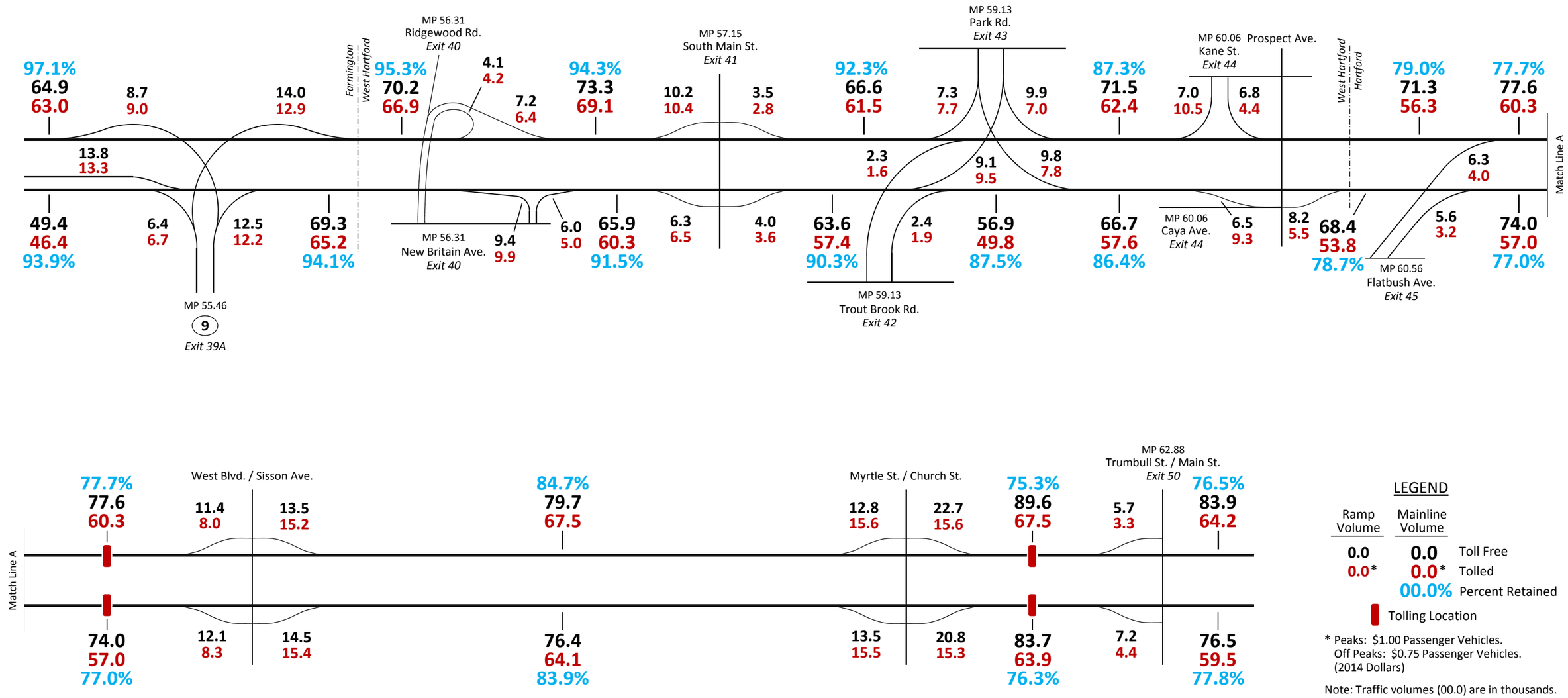
Alternative 6

Figure 5-14 through 5-17 displays 2020 and 2040 estimated volumes in thousands for a scenario that considers tolling I-84 between Hartford and NY along I-84. Both tolled and toll free traffic estimates are shown at each of the assumed 11 tolling locations for 2020 and 2040. Passenger vehicles equipped with a transponder would be charged $0.50 at each location during the peak periods and $0.35 during off peak periods. Passenger vehicles not equipped with a transponder would be assessed a toll that is 50 percent higher than the transponder toll rate. Trucks would be charged a proportionately higher toll rate depending on the number of axles.

In general, it is estimated that approximately 82 percent of the toll free traffic on average would be retained at the tolling locations. Some toll locations would tend to have higher diversion while others would have lower diversion depending on the relative attractiveness and ease of using an alternate route, travel patterns, and traffic composition.

Alternative 7

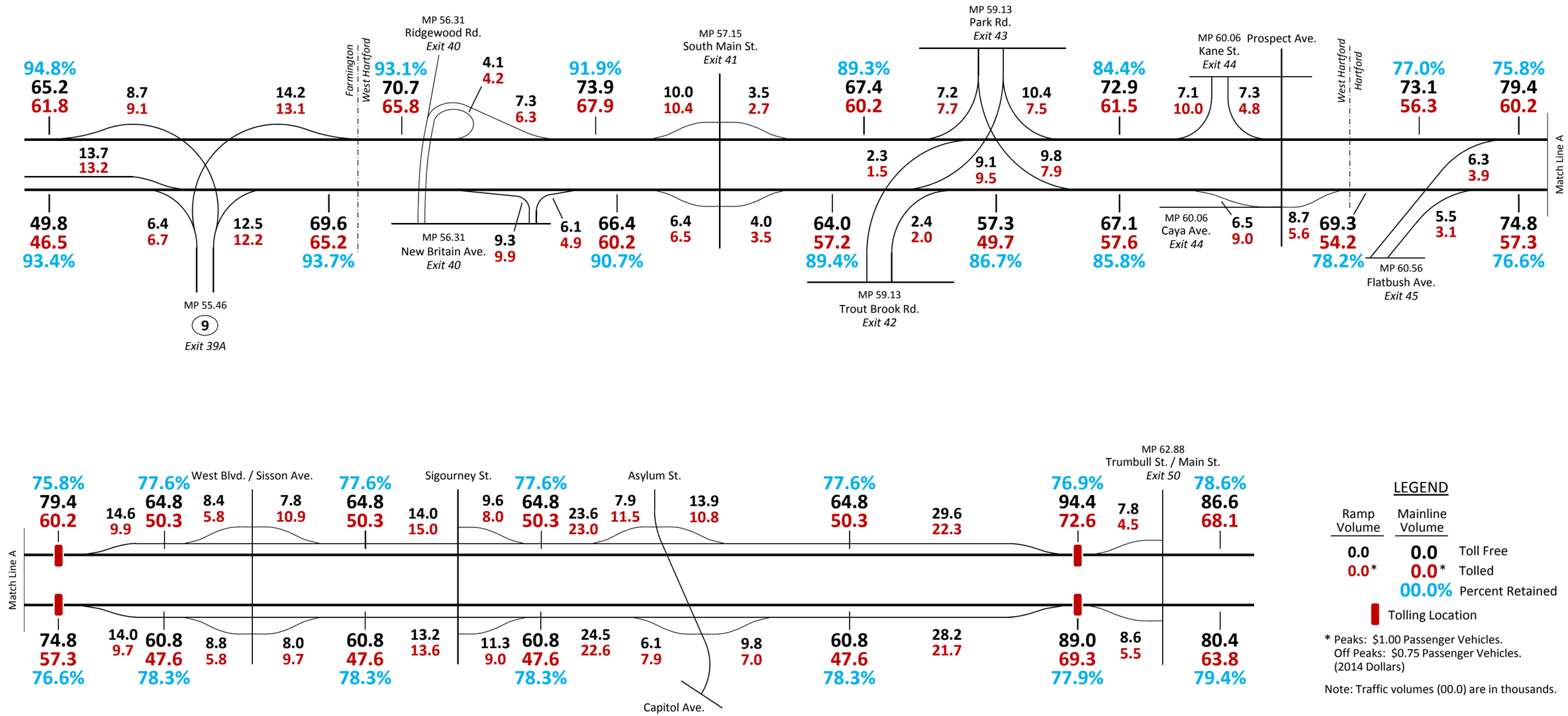
Figure 5-18 displays the 2020 estimated AM peak period volumes in thousands for the I-91 HOT lanes Alternative. Usage of HOT lanes and the toll rates to manage demand are highly sensitive to small changes in traffic demand and congestion levels on the parallel existing general purpose lanes. Because of this, a finer grain analysis of these projects is typical conducted. For this preliminary evaluation of a conversion of the existing HOV lanes to HOT lanes, a subarea of the travel demand



2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
ALTERNATIVE 4: TOLL FREE AND TOLLED CONDITIONS

CDM Smith

FIGURE 5-12



LEGEND

Ramp Volume	Mainline Volume	
0.0	0.0	Toll Free
0.0*	0.0*	Tolled
	00.0%	Percent Retained

Tolling Location

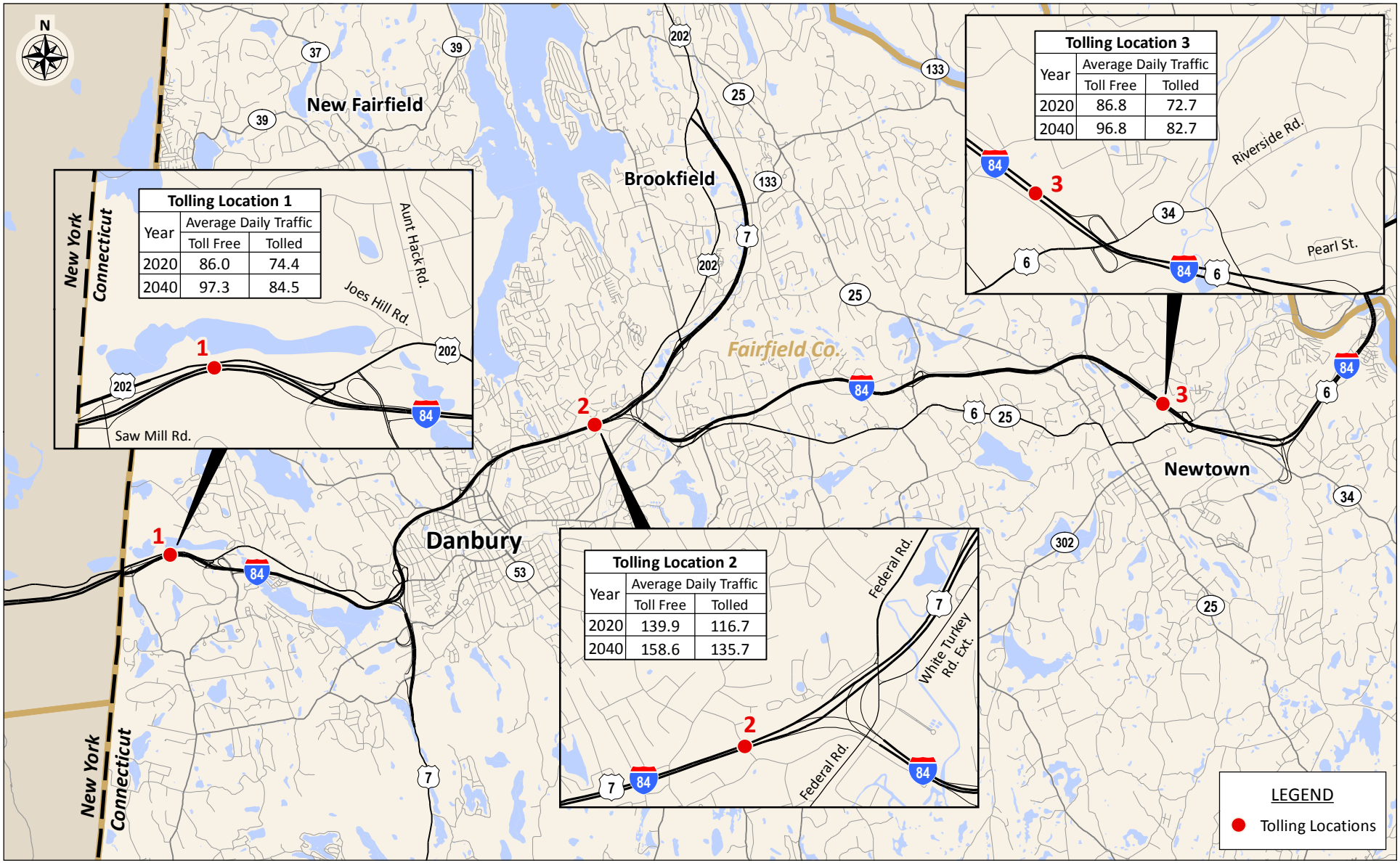
* Peaks: $1.00 Passenger Vehicles.
Off Peaks: $0.75 Passenger Vehicles.
(2014 Dollars)

Note: Traffic volumes (00.0) are in thousands.

2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC
ALTERNATIVE 5: TOLL FREE AND TOLLED CONDITIONS

CDM Smith

FIGURE 5-13

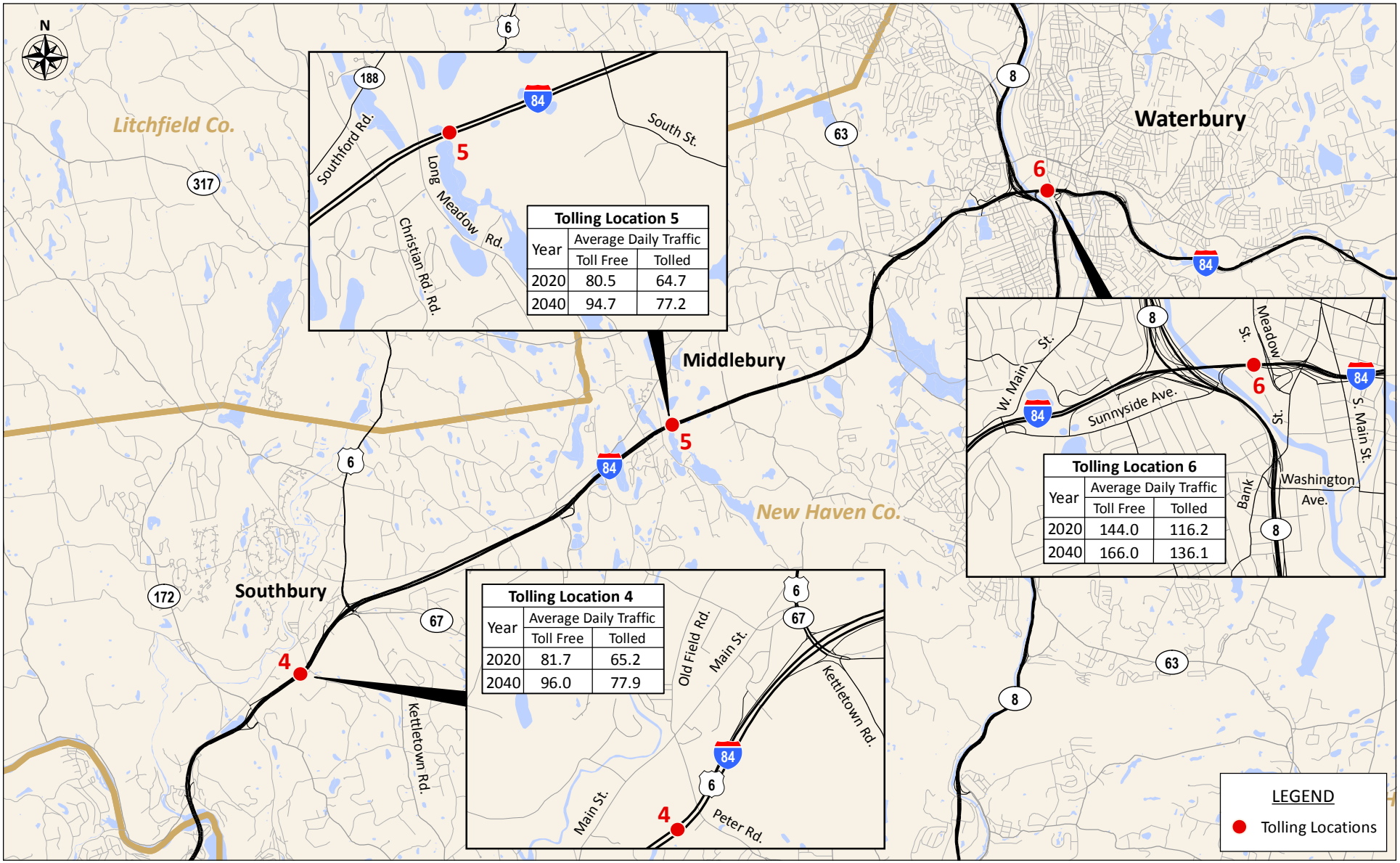


Note: Traffic volumes (00.0) represent thousands of vehicles.

ESTIMATED AVERAGE WEEKDAY TRAFFIC - ALTERNATIVE 6
TOLL FREE AND TOLLED CONDITIONS
TOLLING LOCATIONS 1, 2 AND 3

CDM Smith

FIGURE 5-14



Tolling Location 5

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	80.5	64.7
2040	94.7	77.2

Tolling Location 6

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	144.0	116.2
2040	166.0	136.1

Tolling Location 4

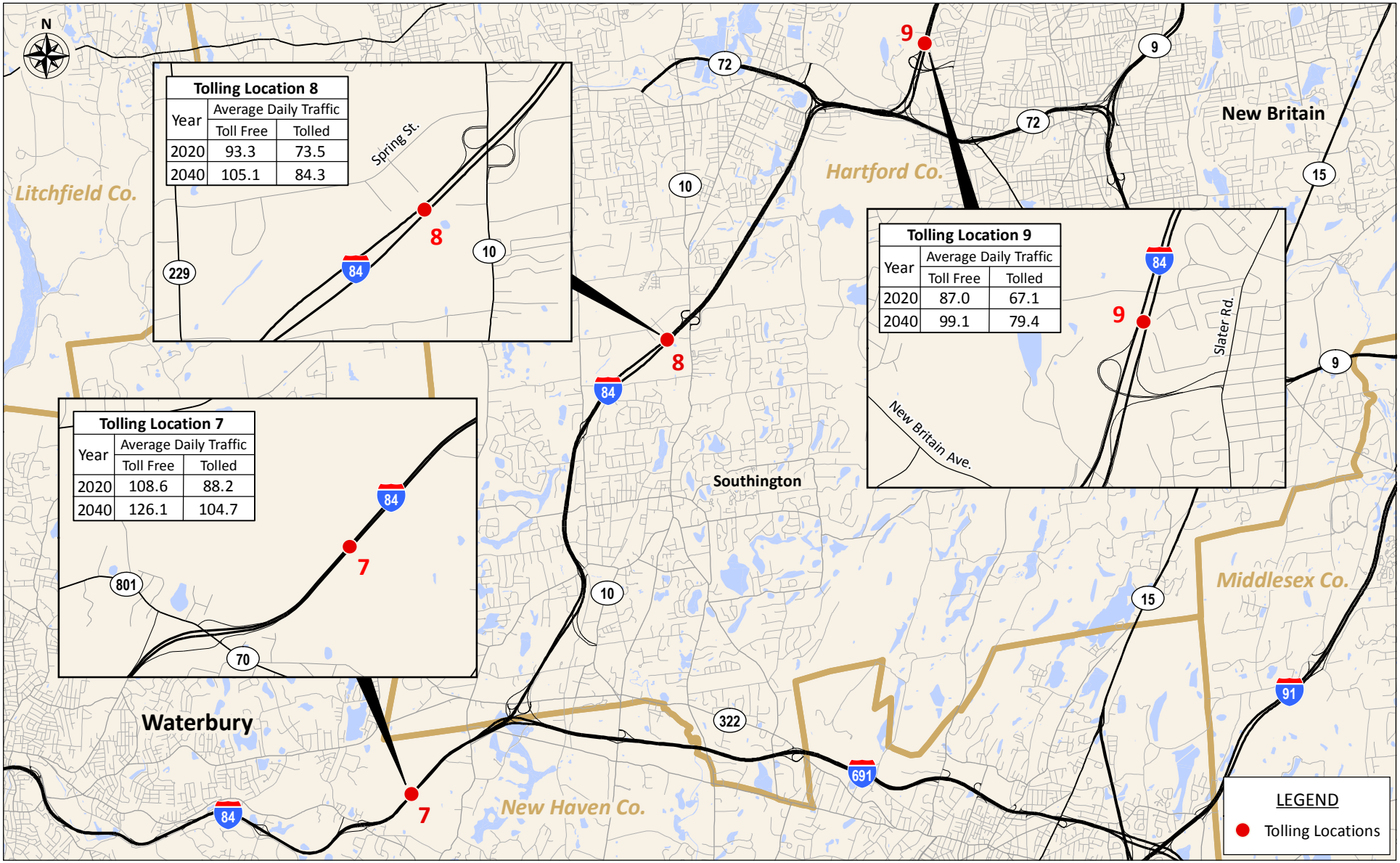
Year	Average Daily Traffic	
	Toll Free	Tolled
2020	81.7	65.2
2040	96.0	77.9

Note: Traffic volumes (00.0) represent thousands of vehicles.

ESTIMATED AVERAGE WEEKDAY TRAFFIC - ALTERNATIVE 6
TOLL FREE AND TOLLED CONDITIONS
TOLLING LOCATIONS 4, 5 AND 6

CDM Smith

FIGURE 5-15

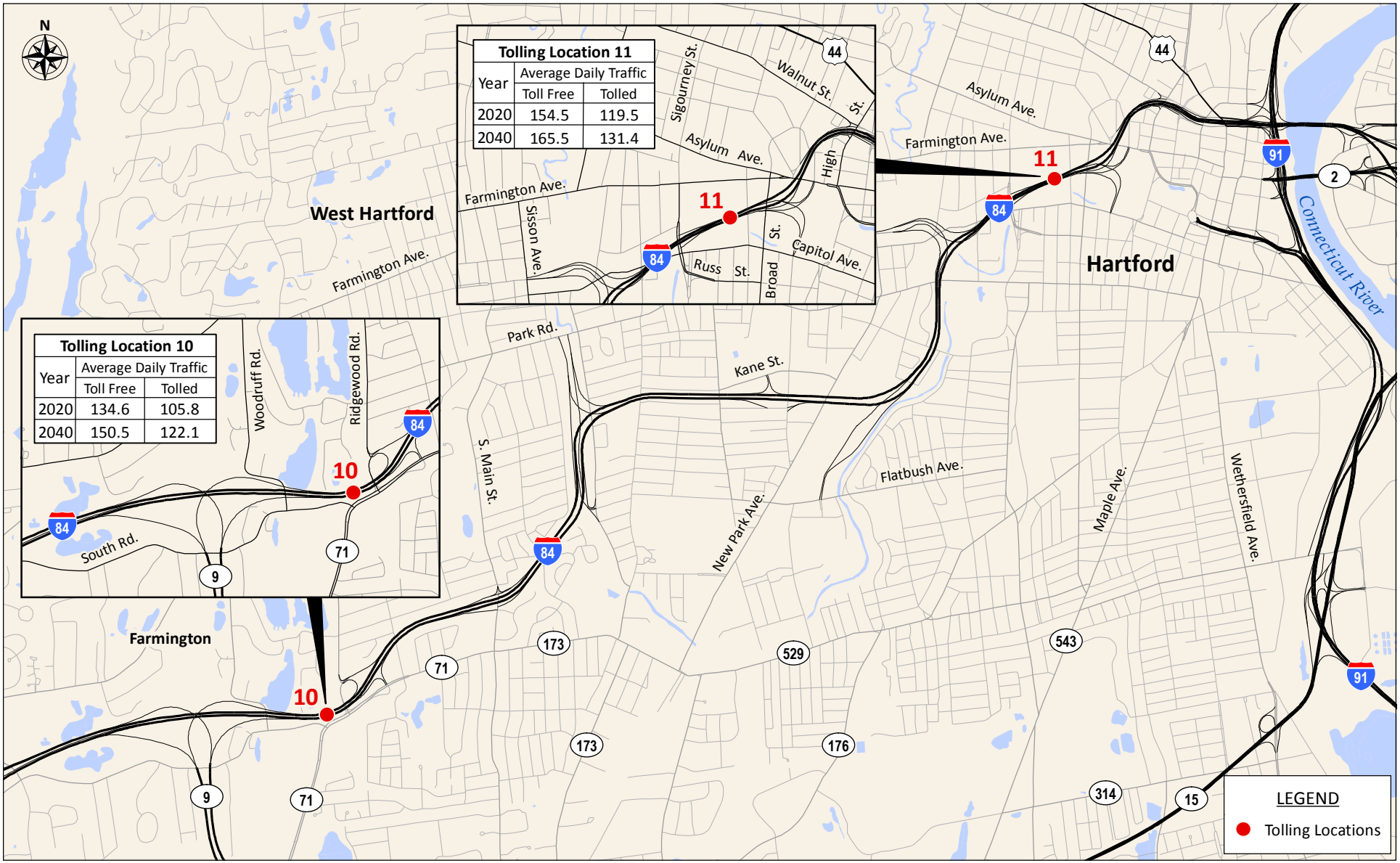


Note: Traffic volumes (00.0) represent thousands of vehicles.

ESTIMATED AVERAGE WEEKDAY TRAFFIC - ALTERNATIVE 6
TOLL FREE AND TOLLED CONDITIONS
TOLLING LOCATIONS 7, 8 AND 9

CDM Smith

FIGURE 5-16



Tolling Location 11

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	154.5	119.5
2040	165.5	131.4

Tolling Location 10

Year	Average Daily Traffic	
	Toll Free	Tolled
2020	134.6	105.8
2040	150.5	122.1

Note: Traffic volumes (00.0) represent thousands of vehicles.

ESTIMATED AVERAGE WEEKDAY TRAFFIC - ALTERNATIVE 6
TOLL FREE AND TOLLED CONDITIONS
TOLLING LOCATIONS 10 AND 11

CDM Smith

FIGURE 5-17

Southbound

	6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total			
		HOT Lane				HOT Lane				HOT Lane				HOT Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Kennedy Rd.	4.5	0.0	0.0	4.5	6.7	0.0	0.0	6.7	5.3	0.0	0.0	5.3	16.4	0.0	0.0	16.4
Poquonock Ave.	4.5	0.2	0.1	4.8	6.1	0.6	0.6	7.3	4.7	0.5	0.6	5.8	15.3	1.3	1.3	17.9
Bloomfield Ave.	4.0	0.2	0.1	4.3	5.4	0.6	0.6	6.6	4.3	0.6	0.7	5.6	13.7	1.4	1.4	16.5
Park Ave.	4.1	0.2	0.1	4.4	5.3	0.6	0.6	6.5	4.4	0.6	0.7	5.7	13.8	1.4	1.4	16.6
SR 291	4.1	0.2	0.1	4.4	5.2	0.6	0.6	6.4	4.3	0.6	0.7	5.6	13.6	1.4	1.4	16.4
Windsor Ave.	4.0	0.3	0.2	4.4	5.1	0.7	0.7	6.5	4.2	0.6	0.8	5.6	13.3	1.6	1.7	16.5
Jennings Rd.	3.9	0.3	0.2	4.3	5.2	0.7	0.7	6.6	4.4	0.6	0.8	5.8	13.5	1.6	1.7	16.7
Liebert Rd.	4.4	0.0	0.0	4.4	6.0	0.0	0.1	6.1	5.6	0.0	0.1	5.7	16.0	0.0	0.2	16.2

Northbound

	6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total			
		HOT Lane				HOT Lane				HOT Lane				HOT Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Kennedy Rd.	3.4	0.0	0.0	3.4	4.3	0.0	0.0	4.3	3.7	0.0	0.0	3.7	11.4	0.0	0.0	11.4
Poquonock Ave.	3.5	0.2	0.1	3.7	4.6	0.3	0.2	5.0	3.9	0.2	0.2	4.2	12.0	0.7	0.5	13.2
Bloomfield Ave.	3.5	0.2	0.1	3.7	4.5	0.3	0.2	4.9	4.2	0.2	0.2	4.5	12.2	0.7	0.5	13.4
Park Ave.	4.3	0.3	0.1	4.6	5.4	0.3	0.2	5.8	5.3	0.2	0.2	5.6	15.0	0.8	0.5	16.3
SR 291	4.5	0.3	0.1	4.8	5.6	0.3	0.2	6.0	5.4	0.2	0.2	5.7	15.5	0.8	0.5	16.8
Windsor Ave.	3.5	0.3	0.1	3.8	4.3	0.3	0.2	4.7	4.4	0.2	0.2	4.7	12.2	0.8	0.5	13.5
Jennings Rd.	3.5	0.3	0.1	3.8	4.4	0.3	0.2	4.8	4.6	0.2	0.2	4.9	12.5	0.8	0.5	13.8
Liebert Rd.	4.5	0.0	0.0	4.5	5.7	0.0	0.0	5.7	5.6	0.0	0.0	5.6	15.8	0.0	0.0	15.8

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - AM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-91 HOT LANES

CDM Smith

FIGURE 5-18

model used for Alternatives 1 through 6 was extracted and calibrated to existing volumes on the general purpose lanes and the HOV lanes by hour and by travel direction. The model was also calibrated to travel speeds for these same time periods in order to ensure the time savings benefit of the HOV lanes was accurately accounted for. **Figure 5-18** shows the estimated volumes in thousands for the AM peak hours in the southbound and northbound directions. The southbound direction is the heaviest travel direction during the AM Peak Period.

During both the 7-8AM and 8-9AM peak hours in the southbound direction, there are about 700 high occupancy vehicles in the HOT lane, and another 700 to 800 single occupant vehicles that are estimated to be willing to pay a toll to utilize the time savings and reliability benefit of the HOT lane. The northbound direction is the off peak direction during the AM and thus far fewer vehicles are estimated to use the HOT lane. Further information on toll rates and travel speeds will be discussed later in this document.

Figure 5-19 displays the same information for the I-91 HOT lanes, but for the PM peak period hours. During the PM peak period, congestion is present in both the southbound and northbound directions on I-91. Between the hours of 4 and 6PM in each travel direction, between 1,100 and 1,500 single occupant vehicles and about 1,200 to 1,300 high occupancy vehicles are estimated to use the HOT lane, respectively.

Figures 5-20 displays the 2020 estimated AM peak period volumes in thousands for the I-84 HOT lanes. During the AM peak period, the major travel direction is westbound as large amounts of traffic are heading to Hartford employment centers. During the 7 to 8AM peak hour, an estimated 800 single occupant vehicles would choose to use the HOT lanes over the general purpose lanes. This is in addition to the 700 high occupancy vehicles.

Figure 5-21 displays the same information for the I-84 HOT lanes, but for the PM peak period. The eastbound direction is the peak travel direction. An estimated 1,700 single occupant vehicles would utilize the HOT lanes during the 4 to 6PM time period rather than driving in the general purpose lanes. This is in addition to the 1,300 high occupancy vehicles.

It should be reiterated that the toll system of the HOT lanes would be set dynamically to manage the amount of SOV traffic entering the HOT lanes at any time, thereby ensuring that the HOT lanes provide a reliable and time savings alternative to the general purpose lanes.

Volume Line Charts

In addition to the schematics discussed above, I-84 mainline traffic volumes were plotted to visually demonstrate the estimated volume differences across Alternatives 1 through 5 and between tolled and toll free conditions. The variations in traffic volumes across the specific alternatives can be attributed to the different physical configurations among the alternatives and the use of a single point toll versus two tolling locations.

Alternative 1, Alternative 3, and Alternative 5 – Toll Free

Figures 5-22 shows the 2020 estimated toll free average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for Alternative 1, Alternative 3, and Alternative 5 configurations from Route 9 on the west to I-384 on the east. The top half of the **Figure 5-22** shows estimated I-84 mainline volumes for the AM peak period, while the bottom half shows estimated I-84 mainline volumes for the PM peak period.

Southbound

	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
	4.5	0.0	0.0	4.5	9.8	0.0	0.0	9.8	3.3	0.0	0.0	3.3	17.6	0.0	0.0	17.6
Kennedy Rd.																
	4.3	0.4	0.3	5.0	9.1	0.9	1.0	11.0	3.1	0.3	0.3	3.7	16.5	1.6	1.6	19.7
Poquonock Ave.																
	4.6	0.4	0.3	5.3	9.8	1.0	1.2	12.0	3.4	0.3	0.3	4.0	17.8	1.7	1.8	21.3
Bloomfield Ave.																
	5.3	0.5	0.3	6.1	10.7	1.2	1.5	13.4	3.7	0.4	0.3	4.4	19.7	2.1	2.1	23.9
Park Ave.																
	5.5	0.5	0.3	6.3	10.7	1.2	1.5	13.4	3.9	0.4	0.3	4.6	20.1	2.1	2.1	24.3
SR 291																
	4.6	0.5	0.3	5.4	8.8	1.2	1.5	11.5	3.5	0.4	0.3	4.2	16.9	2.1	2.1	21.1
Windsor Ave.																
	4.6	0.5	0.3	5.4	8.9	1.2	1.5	11.6	3.6	0.4	0.3	4.3	17.1	2.1	2.1	21.3
Jennings Rd.																
	5.9	0.0	0.0	5.9	12.5	0.1	0.1	12.7	4.6	0.0	0.0	4.6	23.0	0.1	0.1	23.2
Liebert Rd.																

Northbound

	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
	5.8	0.0	0.0	5.8	13.8	0.0	0.0	13.8	4.0	0.0	0.0	4.0	23.6	0.0	0.0	23.6
Kennedy Rd.																
	6.0	0.3	0.5	6.8	14.1	1.2	1.0	16.3	4.0	0.2	0.2	4.4	24.1	1.7	1.7	27.5
Poquonock Ave.																
	5.0	0.3	0.5	5.8	10.8	1.2	1.0	13.0	3.8	0.2	0.2	4.2	19.6	1.7	1.7	23.0
Bloomfield Ave.																
	5.6	0.3	0.5	6.4	11.7	1.2	1.1	14.0	4.2	0.2	0.2	4.6	21.5	1.7	1.8	25.0
Park Ave.																
	5.8	0.3	0.5	6.6	12.0	1.2	1.1	14.3	4.3	0.2	0.2	4.7	22.1	1.7	1.8	25.6
SR 291																
	5.3	0.3	0.5	6.1	11.0	1.3	1.1	13.4	4.2	0.2	0.2	4.6	20.5	1.8	1.8	24.1
Windsor Ave.																
	5.5	0.3	0.5	6.3	11.4	1.3	1.1	13.8	4.4	0.2	0.2	4.8	21.3	1.8	1.8	24.9
Jennings Rd.																
	6.5	0.0	0.0	6.5	13.0	0.1	0.1	13.2	4.5	0.0	0.0	4.5	24.0	0.1	0.1	24.2
Liebert Rd.																

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - PM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-91 HOT LANES

CDM Smith

FIGURE 5-19

Westbound

	6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Dobson Rd.	3.5	0.0	0.0	3.5	6.1	0.0	0.0	6.1	5.2	0.0	0.0	5.2	14.8	0.0	0.0	14.8
Hartford Tpke.	4.1	0.1	0.0	4.2	6.5	0.3	0.4	7.2	5.6	0.4	0.2	6.2	16.2	0.8	0.6	17.6
SR 30	4.5	0.1	0.0	4.6	7.3	0.3	0.4	8.0	6.1	0.4	0.2	6.7	17.9	0.8	0.6	19.3
Pleasant Valley Rd.	4.2	0.1	0.1	4.4	6.8	0.4	0.5	7.7	5.7	0.5	0.4	6.6	16.7	1.0	1.0	18.7
US 44	4.1	0.1	0.1	4.3	7.4	0.4	0.5	8.3	6.1	0.5	0.4	7.0	17.6	1.0	1.0	19.6
I-384	6.3	0.2	0.2	6.7	10.6	0.7	0.8	12.1	9.1	0.8	0.7	10.6	26.0	1.7	1.7	29.4
SR 15	3.8	0.0	0.0	3.8	6.4	0.0	0.0	6.4	5.6	0.0	0.0	5.6	15.8	0.0	0.0	15.8

Eastbound

	6:00-7:00 AM				7:00-8:00 AM				8:00-9:00 AM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Dobson Rd.	1.3	0.0	0.0	1.3	2.2	0.0	0.0	2.2	2.2	0.0	0.0	2.2	5.8	0.0	0.0	5.8
Hartford Tpke.	1.6	0.0	0.0	1.6	2.7	0.0	0.0	2.7	2.7	0.0	0.0	2.7	7.0	0.0	0.0	7.1
SR 30	1.8	0.0	0.0	1.8	2.9	0.0	0.0	2.9	3.0	0.0	0.0	3.0	7.8	0.0	0.0	7.8
Pleasant Valley Rd.	1.7	0.1	0.1	1.9	2.8	0.1	0.1	3.0	2.8	0.1	0.1	3.0	7.3	0.3	0.3	7.9
US 44	1.8	0.1	0.1	2.0	2.9	0.1	0.1	3.1	3.1	0.1	0.1	3.3	7.8	0.3	0.3	8.4
I-384	2.5	0.1	0.1	2.7	3.9	0.1	0.1	4.1	4.1	0.1	0.1	4.3	10.4	0.3	0.3	11.0
SR 15	1.8	0.0	0.0	1.8	2.8	0.0	0.0	2.8	3.2	0.0	0.0	3.2	7.8	0.0	0.0	7.8

00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - AM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-84 HOT LANES

CDM Smith

FIGURE 5-20

	Westbound																Eastbound															
	3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total				3:00-4:00 PM				4:00-6:00 PM				6:00-7:00 PM				Total			
		HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane				HOV Lane		
	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total	GP	HOV	SOV	Total
Dobson Rd.																																
	3.3	0.0	0.0	3.3	6.8	0.0	0.0	6.8	2.3	0.0	0.0	2.3	12.4	0.0	0.0	12.4	4.2	0.0	0.0	4.2	10.2	0.0	0.0	10.2	3.4	0.0	0.0	3.4	17.8	0.0	0.0	17.8
Hartford Tpke.																																
	3.8	0.1	0.0	3.9	7.9	0.2	0.0	8.1	2.8	0.1	0.0	2.9	14.5	0.4	0.0	14.9	4.9	0.1	0.2	5.2	11.7	0.6	0.9	13.2	4.3	0.1	0.1	4.5	20.9	0.8	1.2	22.9
SR 30																																
	4.1	0.1	0.0	4.2	8.4	0.2	0.0	8.6	3.0	0.1	0.0	3.1	15.5	0.4	0.0	15.9	5.5	0.1	0.2	5.8	13.3	0.6	0.9	14.8	4.6	0.1	0.1	4.8	23.4	0.8	1.2	25.4
Pleasant Valley Rd.																																
	3.7	0.1	0.3	4.1	7.5	0.3	0.6	8.4	2.5	0.1	0.1	2.7	13.7	0.5	1.0	15.2	5.0	0.2	0.4	5.6	12.3	0.8	1.1	14.2	4.1	0.2	0.1	4.4	21.4	1.2	1.6	24.2
US 44																																
	3.8	0.1	0.3	4.2	7.6	0.3	0.6	8.5	2.6	0.1	0.1	2.8	14.0	0.5	1.0	15.5	5.5	0.2	0.4	6.1	13.2	0.8	1.1	15.1	4.5	0.2	0.1	4.8	23.2	1.2	1.6	26.0
I-384																																
	5.2	0.2	0.3	5.7	10.3	0.4	0.6	11.3	3.7	0.2	0.2	4.1	19.2	0.8	1.1	21.1	7.5	0.3	0.5	8.3	17.7	1.3	1.7	20.7	5.9	0.3	0.2	6.4	31.1	1.9	2.4	35.4
SR 15																																
	3.4	0.0	0.0	3.4	6.5	0.0	0.0	6.5	2.2	0.0	0.0	2.2	12.1	0.0	0.0	12.1	5.6	0.0	0.0	5.6	14.0	0.0	0.0	14.0	4.2	0.0	0.0	4.2	23.8	0.0	0.0	23.8

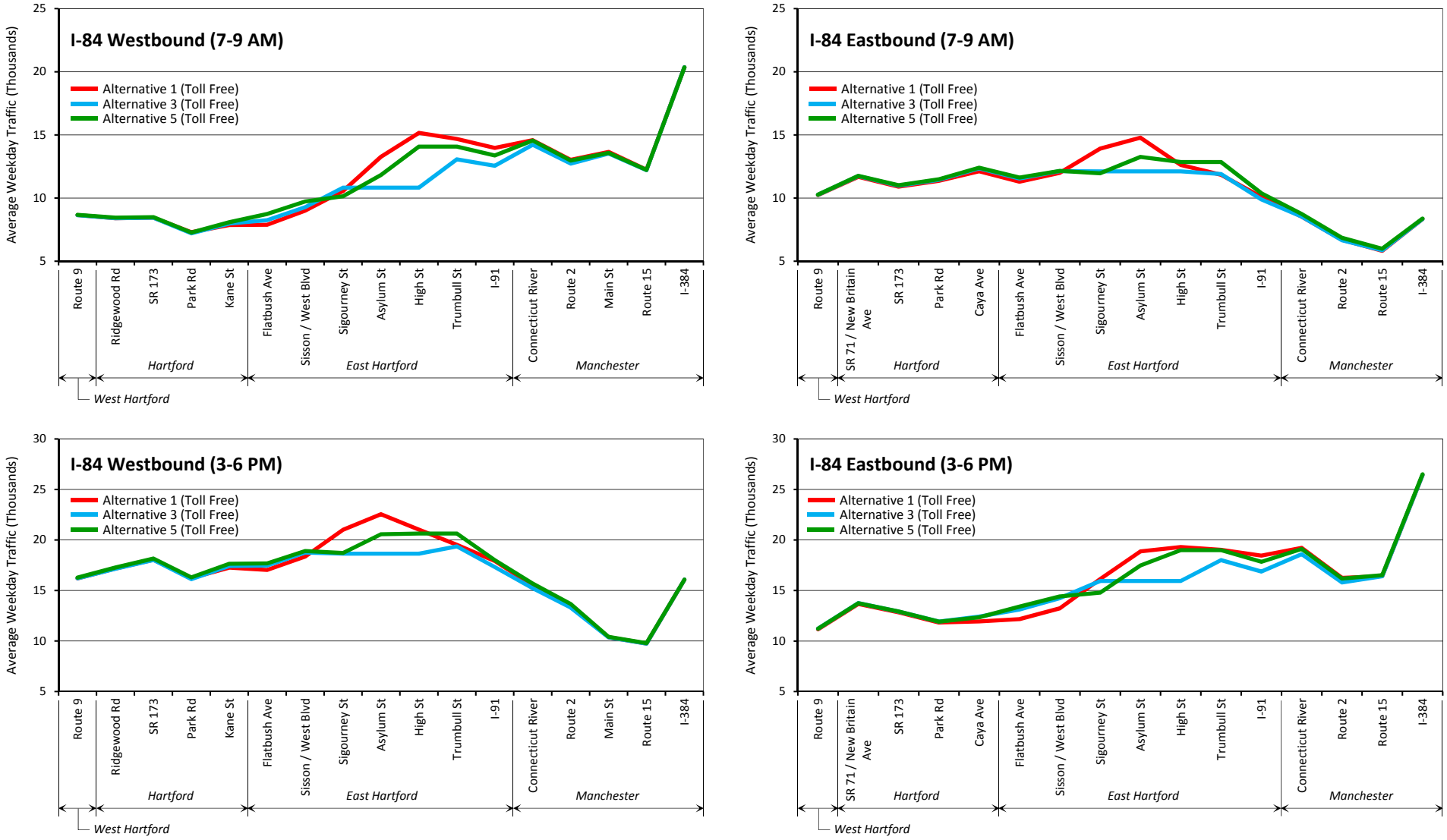
00.0 - Estimated Average Weekday Traffic (in thousands)

- Toll Gantry

ALTERNATIVE 7 - PM PEAK PERIOD
2020 ESTIMATED AVERAGE WEEKDAY TRAFFIC - I-84 HOT LANES

CDM Smith

FIGURE 5-21



2020 ESTIMATED AVERAGE DAILY TRAFFIC
ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 5 (TOLL FREE)
AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

FIGURE 5-22

As shown, the major volume differences among the alternatives occur within the Viaduct section to the I-91 interchange to the east. Alternative 3 removes the Sigourney Street interchange and concentrates demand to two new major interchanges on the east and west side of the Viaduct. This results in the lowest volume through the Viaduct. Alternative 5 results in slightly lower overall demand through the Viaduct segment as it incorporates a collector-distributor roadway parallel to the I-84 mainlines.

Figure 5-23 shows the same information, but for the midday period and for the average weekday total.

Toll Free versus Alternative 1 and Alternative 2

Figures 5-24 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for the existing toll free configuration, Alternative 1 (single point toll), and Alternative 2 (two tolling locations). Since all three of these scenarios use the existing configuration, the differences displayed here are a direct result of the toll rate and tolling locations.

Figure 5-25 shows the same information, but for the midday period and for the average weekday total. The total day chart on the lower half of the figure clearly demonstrates the impact of the single point toll (Alternative 1) and the impact of locating two tolling locations (Alternative 2) in the viaduct area of I-84. At the west end of the limits shown, we can conclude that about 5 percent of the reduction in traffic can likely be attributed to a regional diversion to avoid the toll. At the east end of the limits, traffic is similar among all three alternatives. Clearly, the diversion is concentrated locally, with traffic exiting I-84 at an earlier interchange, entering I-84 at a later interchange, or using a local highway or arterial to enter/exit Hartford to avoid the toll.

Toll Free versus Alternative 3 and Alternative 4

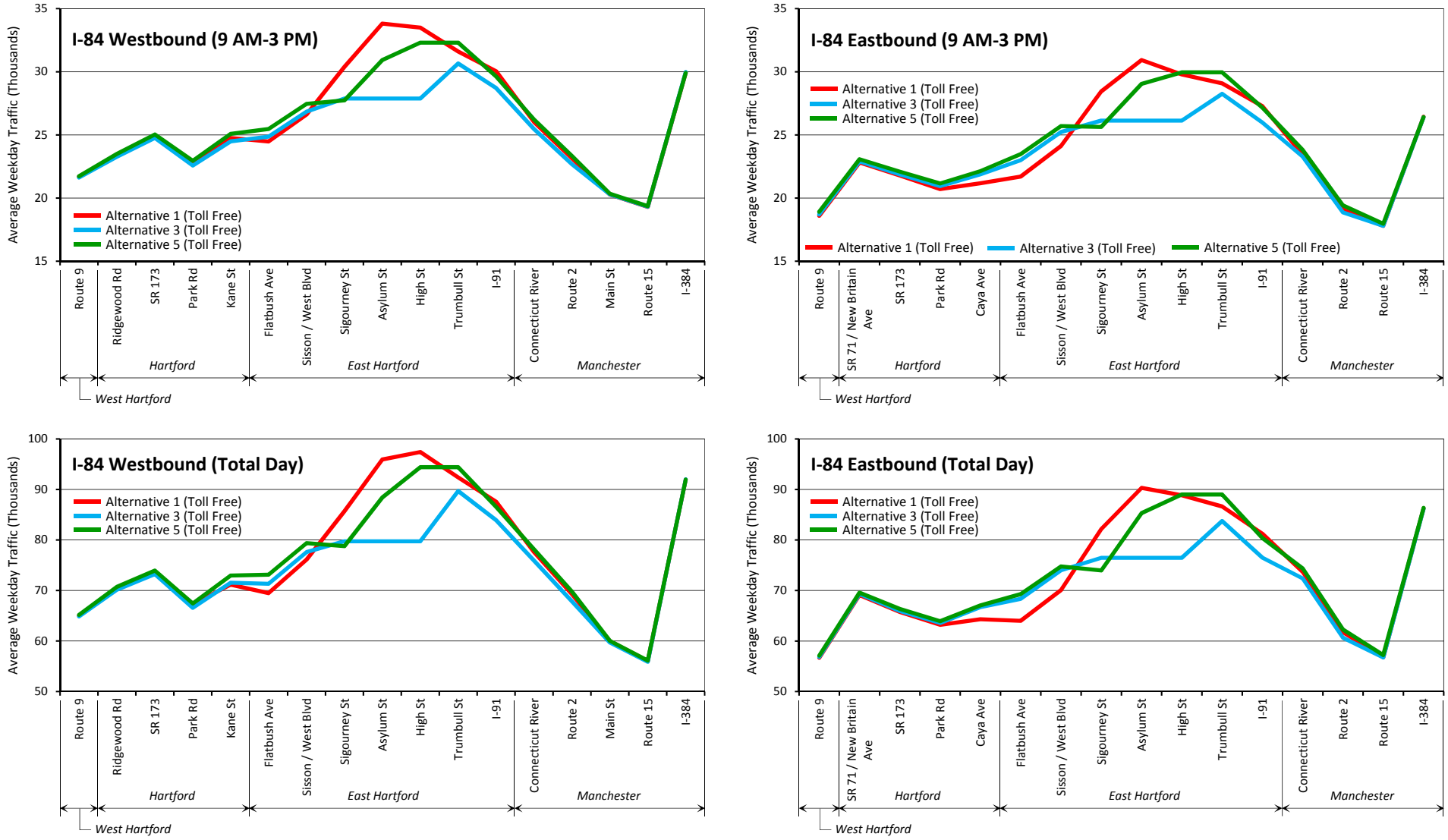
Figures 5-26 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for toll free conditions under this configuration, Alternative 3 (point toll), and Alternative 4 (two tolling locations). All three of these volume profiles reflect the physical changes of a major reconstruction of I-84 in Hartford and the consolidation of interchanges into two major interchanges. Similar reactions from tolling are seen in these alternatives as discussed in Alternative 1 and 2. **Figure 5-27** shows the same information, but for the Midday period and for the average weekday total.

Toll Free versus Alternative 5

Figures 5-28 shows the 2020 estimated average weekday traffic by travel direction during the AM (7-9AM) and PM (3-6PM) peak periods for toll free conditions under this configuration and Alternative 5 (two tolling locations). **Figure 5-29** shows the same information, but for the Midday period and for the average weekday total. Again, similar impacts from the tolling configuration is seen as compared to those demonstrated in Alternative 2 and 4.

Traffic Diversions

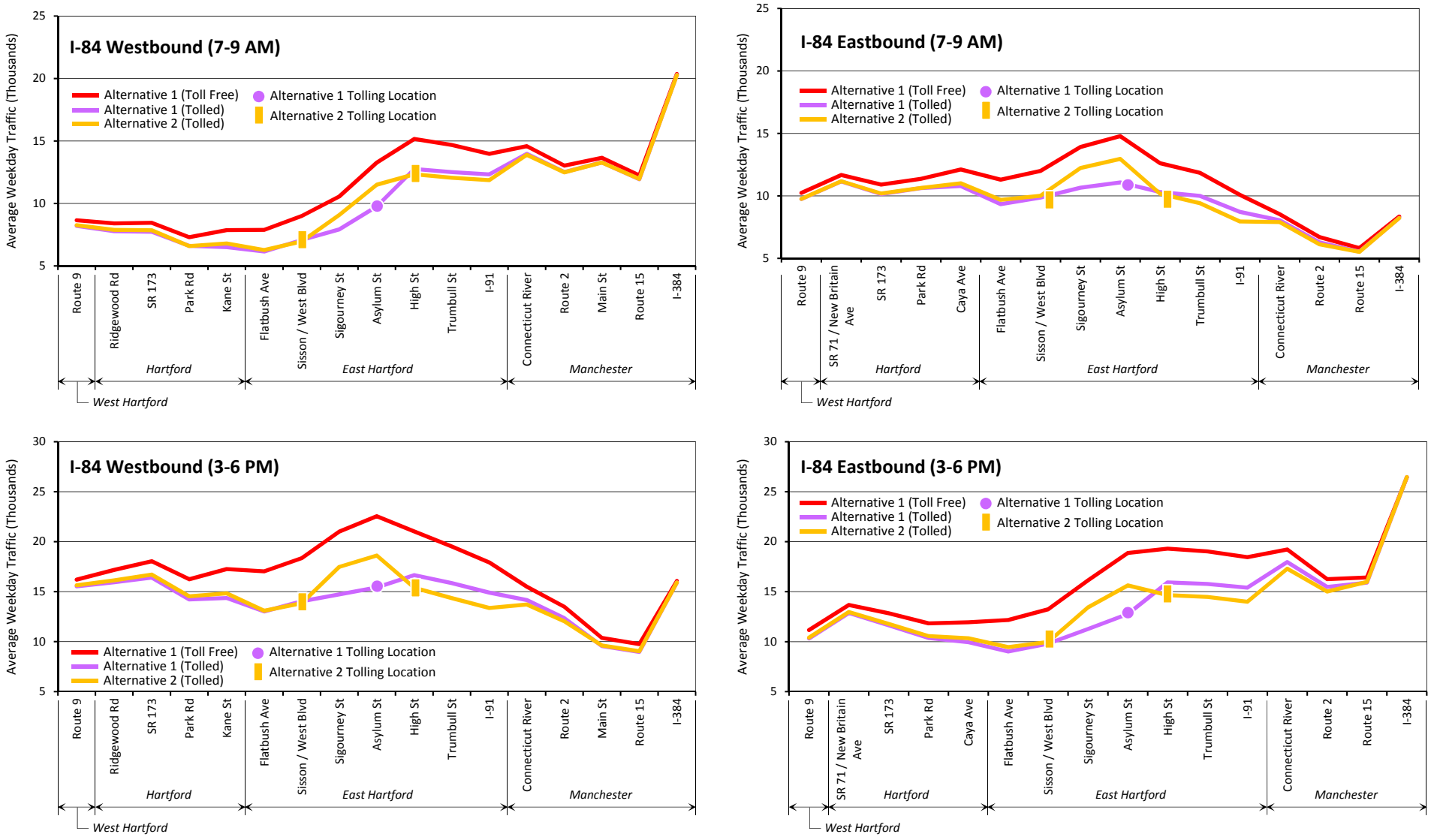
Traffic screenlines **(Figure 5-30)** develop for model calibration were used to demonstrate where traffic diversion would likely occur to avoid paying the toll. Screenline C crosses I-84 through the Viaduct segment east of Sigourney Street. **Table 5-1** shows the toll free volumes under the existing configuration and for the two build options (Alternative 3 and Alternative 5). AM and PM peak periods, as well as the total day is summarized.



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 5 (TOLL FREE) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

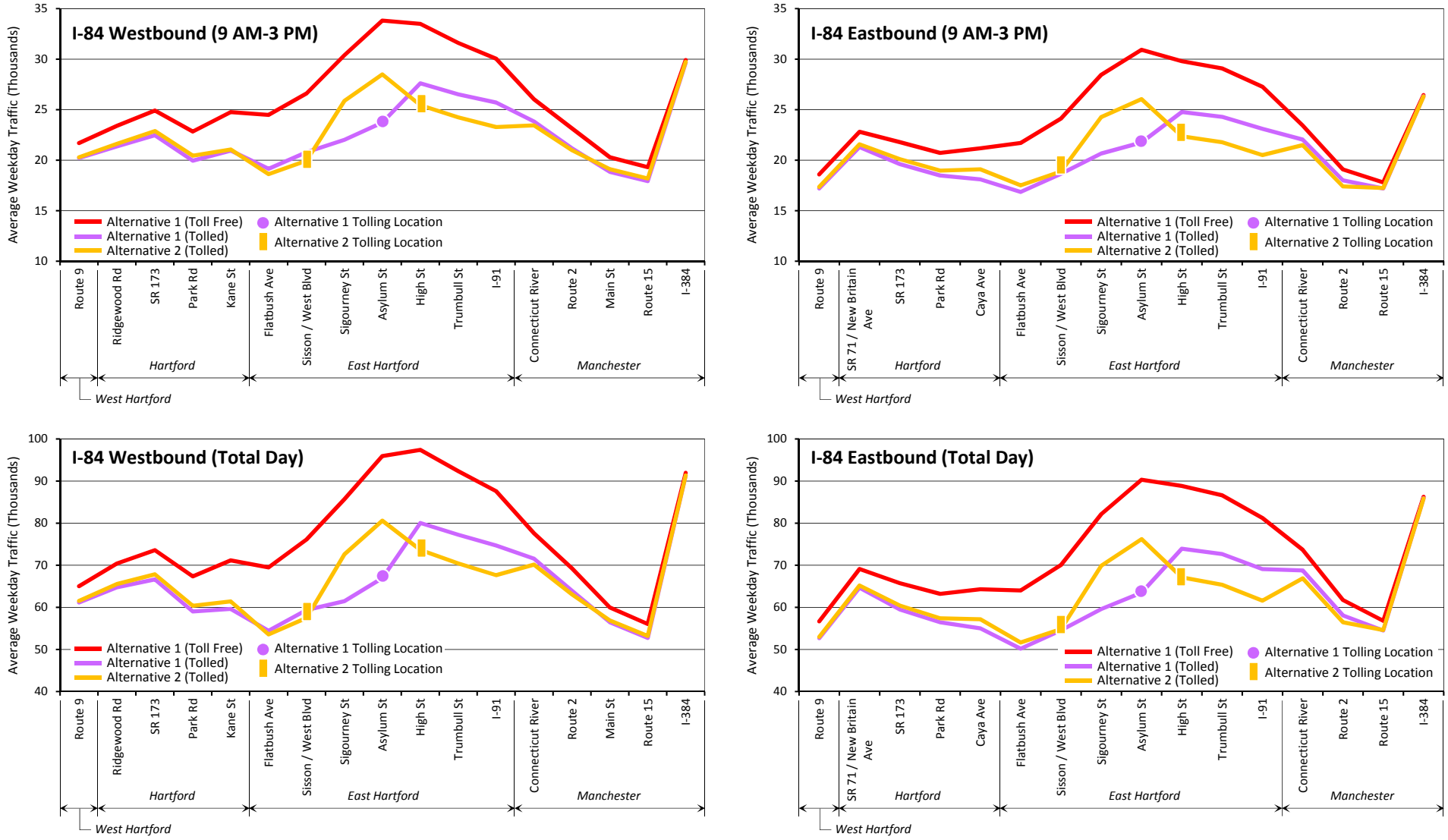
FIGURE 5-23



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 1 (TOLLED), ALTERNATIVE 2 (TOLLED) AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

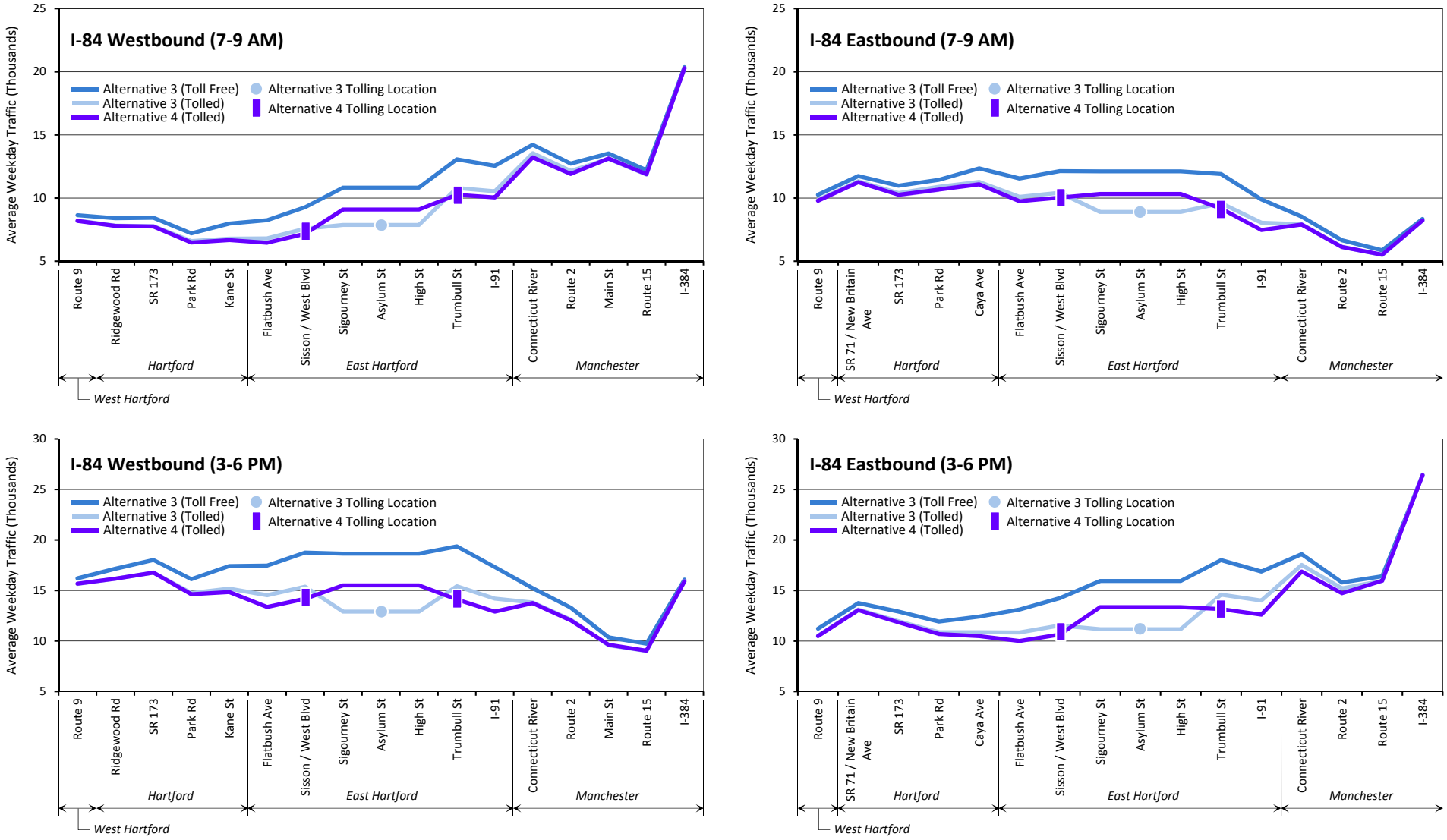
FIGURE 5-24



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 1 (TOLL FREE), ALTERNATIVE 1 (TOLLED), ALTERNATIVE 2 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

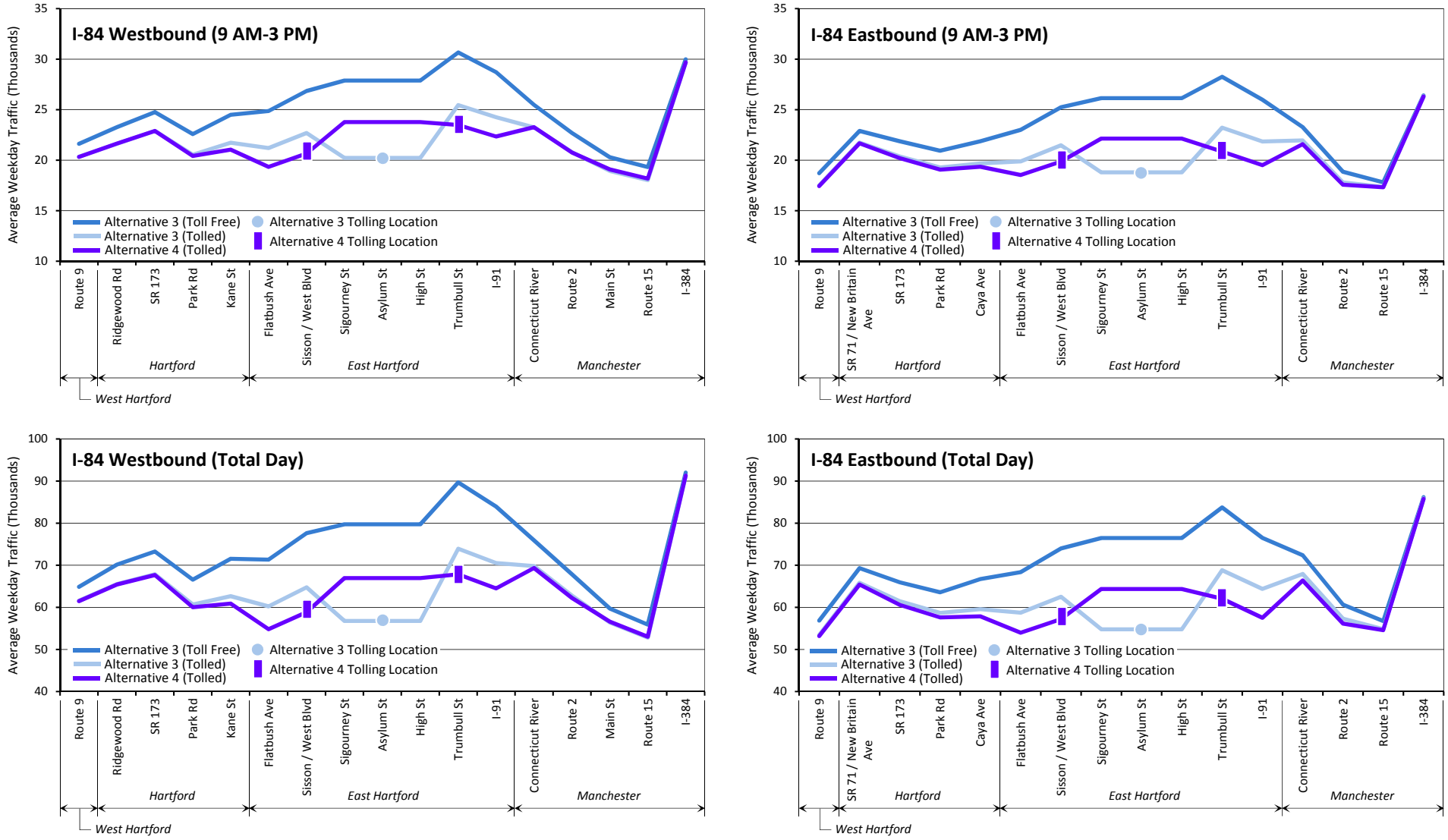
FIGURE 5-25



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 3 (TOLLED), ALTERNATIVE 4 (TOLLED) AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

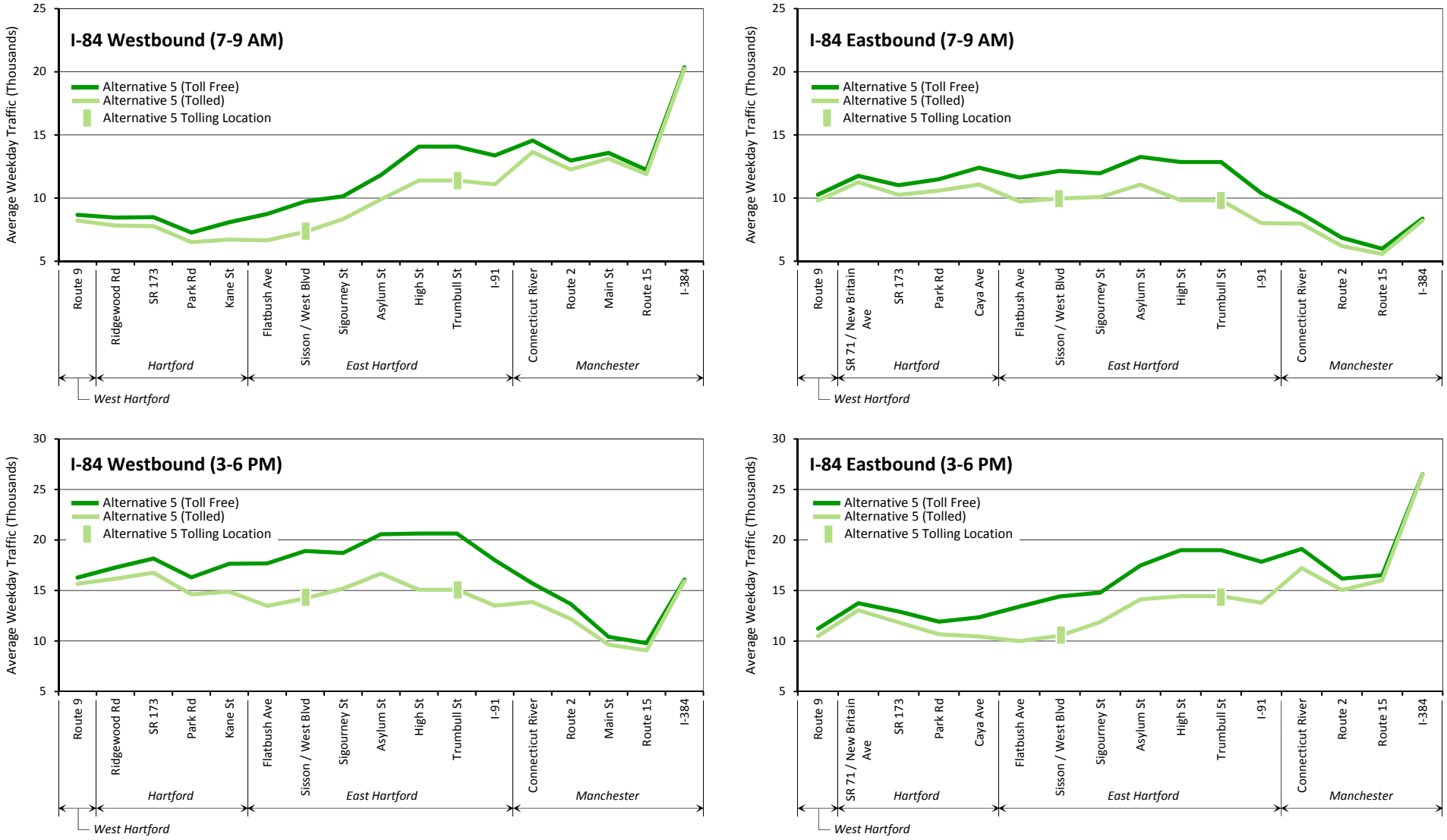
FIGURE 5-26



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 3 (TOLL FREE), ALTERNATIVE 3 (TOLLED), ALTERNATIVE 4 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

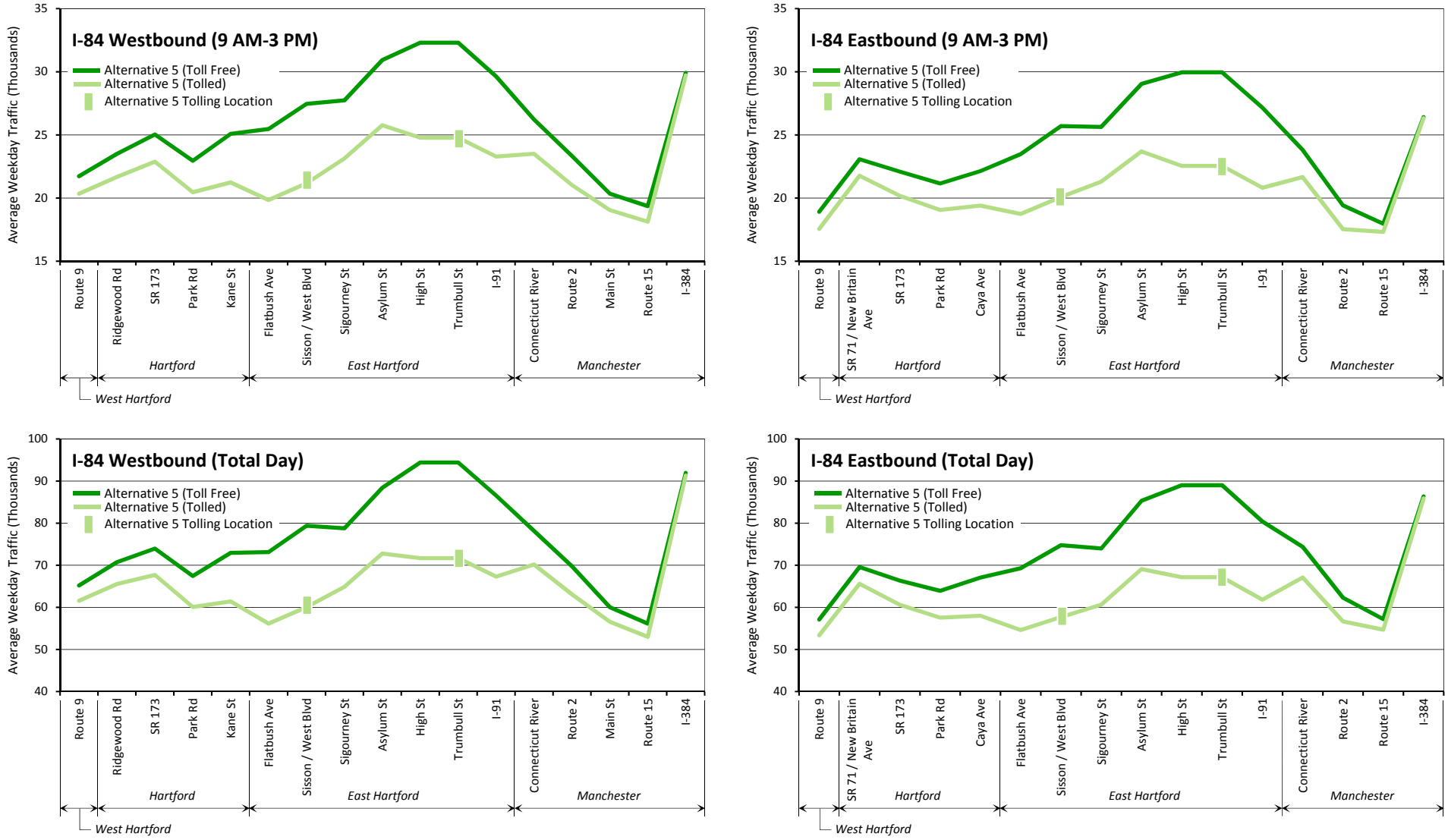
FIGURE 5-27



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 5 (TOLL FREE), ALTERNATIVE 5 (TOLLED) AM (7-9 AM) AND PM (3-6 PM) PERIODS

CDM Smith

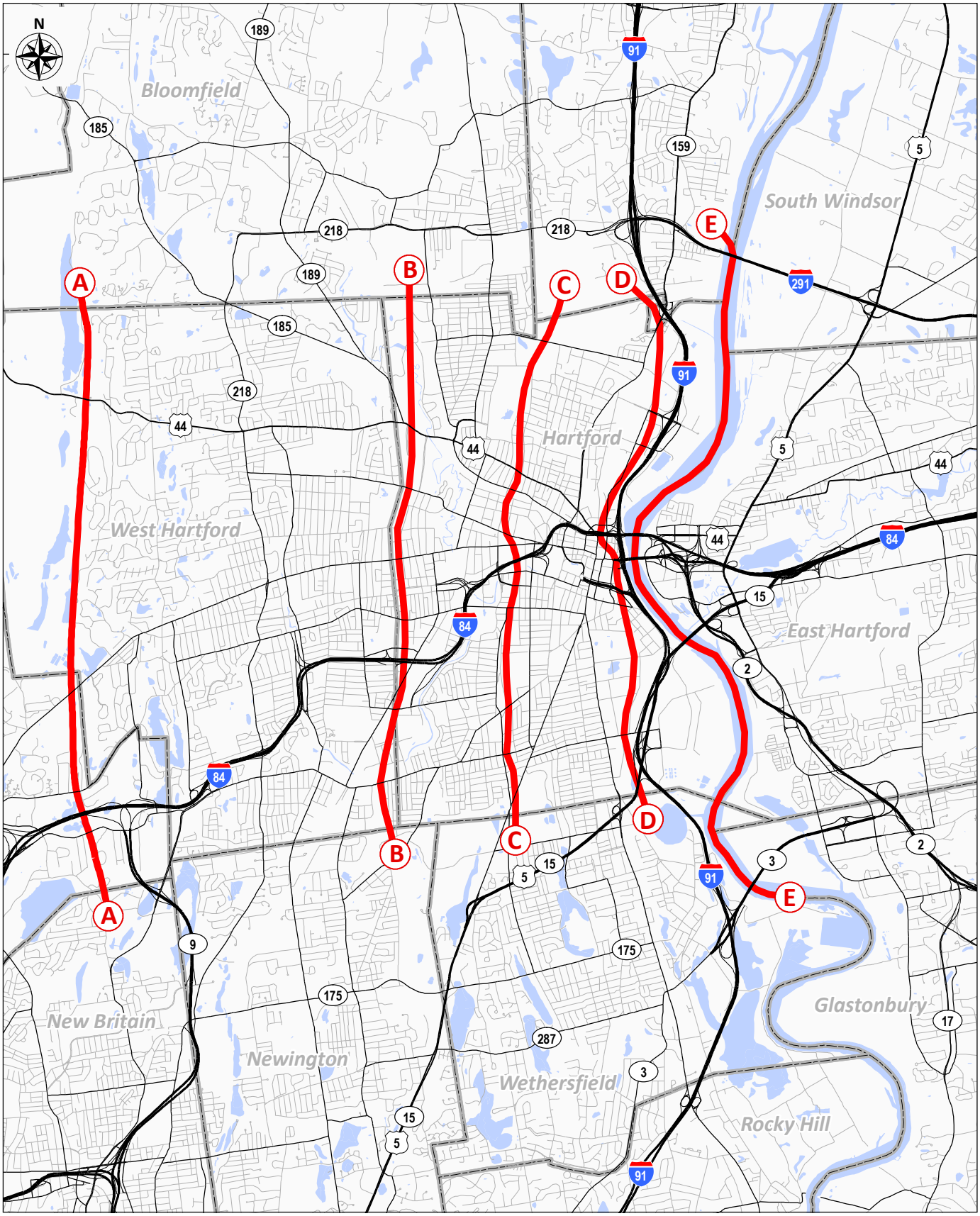
FIGURE 5-28



2020 ESTIMATED AVERAGE DAILY TRAFFIC ALTERNATIVE 5 (TOLL FREE), ALTERNATIVE 5 (TOLLED) MIDDAY (9 AM-3 PM) AND TOTAL DAY PERIODS

CDM Smith

FIGURE 5-29



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CDM Smith

SCREENLINES

FIGURE 5-30

Table 5-1
Traffic Screenline Comparison
No Build Toll Free 2020 Estimates and Net Impacts of Toll Free Build Alternatives

		AM Period (7-9 am)			PM Period (3-6 pm)			Total Day		
Screenline	Roadway	Nobuild Toll-Free	Alt 3	Alt 5	Nobuild Toll-Free	Alt 3	Alt 5	Nobuild Toll-Free	Alt 3	Alt 5
A	US-44 EB	2,900	-	10	2,700	-	10	13,400	(50)	(40)
	US-44 WB	1,600	-	(10)	3,300	10	-	13,000	-	(50)
	CT-4 EB	1,500	20	40	2,100	(10)	10	9,700	(60)	-
	CT-4 WB	1,600	-	10	2,100	10	10	9,500	20	20
	I-84 EB	8,300	40	60	10,600	80	70	49,400	120	390
	I-84 WB	8,600	-	20	16,200	-	70	65,000	(160)	170
	CT-508 EB	2,800	(20)	(40)	2,600	-	(10)	13,700	60	30
	South Rd EB	400	10	20	400	-	-	1,900	10	20
	South Rd WB	400	-	-	600	-	-	2,500	10	-
	Other Roads	500	-	-	700	20	20	2,800	20	20
Screenline A Total		**28,600**	**40**	**100**	**41,400**	**110**	**170**	**180,900**	**(20)**	**560**
B	US-44 EB	1,100	20	20	1,500	(20)	10	7,900	260	130
	US-44 WB	1,000	-	(20)	1,500	50	10	7,900	280	(20)
	Asylum Ave EB	1,100	(20)	(10)	1,500	(10)	(40)	7,000	(310)	(40)
	Asylum Ave WB	1,000	-	-	1,500	(40)	(120)	6,300	(160)	(350)
	Farmington Ave EB	1,000	-	10	1,300	(30)	(40)	6,600	(240)	(280)
	Farmington Ave WB	600	120	60	1,400	30	40	6,200	460	460
	West Blvd EB	1,200	110	100	1,100	40	(120)	6,200	(540)	(740)
	West Blvd WB	900	(80)	(340)	1,500	140	170	6,100	(310)	(720)
	Capitol Ave EB	400	(10)	(10)	500	(80)	(60)	2,200	(410)	(420)
	Capitol Ave WB	300	(10)	(10)	500	(10)	(10)	2,400	(310)	(330)
	Park St EB	400	(30)	(20)	600	(10)	(20)	3,200	(90)	(100)
	Park St WB	400	-	-	600	(10)	-	3,300	(20)	(30)
	I-84 WB	7,900	360	850	17,000	430	640	69,500	1,860	3,650
	I-84 EB	11,300	250	330	12,200	950	1,240	64,000	4,360	5,290
	New Park Ave EB	600	60	60	700	(20)	-	3,300	(100)	(30)
	New Park Ave WB	300	(20)	(20)	800	(10)	40	3,500	(340)	(170)
	Flatbush Ave EB	500	10	-	900	10	10	4,700	110	100
	Flatbush Ave WB	600	-	-	900	-	-	4,900	40	40
	New Britain Ave EB	1,700	-	20	2,600	10	(10)	12,000	(50)	(80)
	New Britain Ave WB	1,100	20	-	2,600	-	(10)	11,300	340	260
	Other Roads	4,100	(170)	(230)	5,400	(430)	(470)	22,200	(1,860)	(1,850)
Screenline B Total		**37,300**	**610**	**790**	**56,800**	**1,000**	**1,260**	**260,700**	**2,950**	**4,770**
C	Tower Ave EB	800	10	-	1,400	20	(20)	5,500	60	(80)
	Tower Ave WB	800	10	-	1,200	-	-	5,500	(20)	10
	US-44 EB	1,300	30	(10)	2,000	-	(90)	8,700	450	(290)
	US-44 WB	1,200	(80)	(100)	2,000	(90)	50	8,800	(180)	20
	Homestead Ave EB	500	-	-	700	30	(10)	3,500	(190)	180
	Homestead Ave WB	400	(30)	(40)	800	10	(40)	3,700	70	(240)
	Asylum Ave EB	800	160	80	500	560	290	5,000	1,090	(270)
	Asylum Ave WB	600	110	130	1,400	100	70	5,800	(50)	250
	Farmington Ave EB	900	190	110	1,400	140	(20)	5,600	2,000	450
	Farmington Ave WB	300	630	250	1,100	510	270	4,600	2,340	620
	I-84 WB	13,300	(2,440)	(1,430)	22,600	(3,910)	(1,980)	95,900	(16,200)	(7,520)
	I-84 EB	14,800	(2,670)	(1,520)	18,900	(2,940)	(1,400)	90,300	(13,860)	(5,010)
	Capitol Ave EB	700	60	10	1,000	20	(260)	4,400	280	(880)
	Capitol Ave WB	500	(90)	(160)	1,000	150	40	3,800	790	(350)
	Park St EB	300	60	40	500	50	30	2,600	300	230
	Park St WB	300	10	20	500	30	20	2,800	120	140
	New Britain Ave EB	1,100	-	(10)	1,400	70	20	7,700	230	10
	New Britain Ave WB	900	30	-	1,600	30	10	7,600	280	160
	White St EB	600	(10)	(40)	800	10	(10)	3,900	-	(100)
	White St WB	400	30	10	700	10	(30)	3,100	180	(20)
	Maple Ave EB	1,400	(10)	20	1,200	20	-	6,200	20	20
	Maple Ave WB	700	10	(20)	2,500	100	50	7,500	180	-
	Other Roads	7,400	1,160	430	10,300	2,460	630	45,000	8,700	2,320
Screenline C Total		**50,000**	**(2,830)**	**(2,230)**	**75,700**	**(2,630)**	**(2,380)**	**337,400**	**(13,410)**	**(10,330)**
D	Jennings Rd EB	1,200	30	20	3,000	80	30	11,300	170	-
	Jennings Rd WB	1,800	10	50	1,700	(10)	(10)	10,500	(10)	40
	Leibert Rd EB	100	-	-	200	10	10	1,200	(40)	20
	Leibert Rd WB	200	(10)	-	100	-	-	700	(20)	-
	US-44 WB	3,600	720	260	3,100	(230)	100	16,500	(530)	1,240
	US-44 EB	1,500	(70)	(40)	3,900	(110)	190	12,800	390	980
	I-84 WB	14,000	(1,420)	(590)	17,900	(600)	90	87,600	(3,660)	(1,020)
	I-84 EB	10,100	(200)	300	18,500	(1,570)	(620)	81,200	(4,720)	(850)
	CT-2 WB	7,500	240	60	4,400	330	(120)	24,000	1,420	(340)
	CT-2 EB	1,400	(10)	(30)	8,000	550	270	19,400	980	70
	Whitehead Hwy WB	5,400	130	100	3,600	90	(100)	24,200	760	(20)
	Whitehead Hwy EB	1,000	170	(20)	4,400	470	90	15,100	1,470	130
	Airport Rd EB	1,700	30	(20)	2,800	150	(30)	12,600	270	(200)
	Airport Rd WB	1,900	40	(40)	3,600	(20)	(80)	14,700	70	(240)
	CT-15 EB	7,100	(120)	(150)	8,100	(180)	(120)	36,300	(520)	(510)
	CT-15 WB	3,900	(60)	(20)	6,200	(100)	(150)	26,500	(310)	(410)
	Other Roads	4,500	120	100	8,500	20	(40)	35,500	20	170
Screenline D Total		**66,600**	**(410)**	**(30)**	**97,900**	**(1,120)**	**(490)**	**430,300**	**(4,240)**	**(950)**
E	I-291 WB	6,800	90	20	5,900	(10)	(10)	31,600	130	30
	I-291 EB	3,200	10	(10)	8,600	30	-	30,900	140	40
	I-84 WB	14,600	(360)	(20)	15,500	(260)	190	77,600	(1,680)	560
	I-84 EB	8,500	10	220	19,200	(630)	(110)	73,700	(1,290)	680
	CT-2 WB	6,800	250	80	4,000	310	(50)	21,800	1,370	(220)
	CT-2 EB	1,300	-	(20)	7,600	520	280	17,800	950	30
	CT-15 WB	7,100	30	(40)	8,300	(40)	(130)	38,500	200	(300)
	CT-15 EB	5,200	10	(110)	11,400	-	(110)	42,700	110	(570)
	CT-3 WB	5,700	-	(40)	7,200	20	(10)	31,600	70	(80)
	CT-3 EB	4,800	(20)	(50)	9,000	70	-	33,000	80	(90)
Screenline E Total		**64,100**	**20**	**30**	**96,800**	**10**	**60**	**399,000**	**80**	**80**

As discussed earlier, the physical configurations are estimated to have significant reductions on volumes through the viaduct portion of I-84. Conditional formatting is used to the show roads that would need to absorb additional traffic (green) for each of the alternatives versus the existing configuration, as well as those roads that would have lower traffic (red). The Alternative 3 configuration would significantly reduce the amount of traffic through the Viaduct, but at the expense of pushing more traffic onto Farmington Avenue due to the concentration of demand to two revamped interchanges. Alternative 5 looks to be less disruptive to the local network, as the total reduction through the Viaduct is less dramatic and therefore the impact to the local network is less severe.

Table 5-2 provides a similar comparison, except that it compares each of the tolling alternatives against the existing configuration (No Build) toll free volumes. Through the viaduct section (screenline C), the use of two tolling locations results in lower levels of diversion to the local network through this screenline. However, east and west of the viaduct (screenlines B and D), the use of two tolling locations has a larger impact to the local network at these locations. Further away from the Viaduct (screenlines A and E), very similar impacts are seen across all the Alternatives. It should be noted that these impacts also include the influence of the physical change assumed in each Alternative and not just the impact of the toll.

Estimated HOT Lane Operational Impacts

The purpose of converting the existing HOV lanes to HOT lanes in Connecticut would be to increase the utilization of the available capacity of the HOV lanes by allowing single occupant vehicles the choice to use the lanes in exchange for paying a toll. This would have the effect of moving traffic out of the existing general purpose lane traffic stream and therefore should provide some measurable congestion relief to the existing general purpose lanes. The other often cited benefit from these projects is that the HOT lane provides a reliable trip when it is needed. To demonstrate this potential, model output was summarized for two conditions; operation of the HOV lanes as they exist today versus under a HOT lane operation. It should be noted that the conditions estimated here are for an average weekday condition.

Table 5-3 displays by modelled time period and travel direction the estimated vehicle miles travelled (VMT), vehicle hours travelled (VHT), and average travel speeds along the I-91 corridor within the HOV limits. The top third of the table shows these estimates for the current I-91 HOV only condition, while the middle section of rows show the HOT condition. The bottom third section shows the difference between the two conditions (HOT minus HOV). The left side of the table shows the estimated VMT, followed by the estimated VHT in the middle columns, and finally the estimated speeds on the far right columns which is just VMT divided by VHT.

The largest impacts occur within the 7 to 9AM and 4 to 6PM peak periods where congestion in the general purpose lanes is highest under existing operation. Overall on an average weekday basis, VMT is estimated to increase slightly by 0.6 percent under HOT operation. However, VHT is estimated to be reduced by 4.0 percent, resulting in an increase in overall corridor travel speeds of 4.9 percent. Within the peak periods, travel speeds on the general purpose lanes are estimated to increase in the range of 6 to 9 mph under HOT operation than under the existing HOV only operation.

Table 5-2
I-84 Tolling Scenarios Comparison
Tolling Scenarios Vs. No Build Toll Free
2020 No Build Traffic Estimates and Alternative Net Impacts

		AM Period (7-9 am)						PM Period (3-6 pm)						Total Day					
Screenline	Roadway	Nobuild Toll-Free	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Nobuild Toll-Free	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Nobuild Toll-Free	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
A	US-44 EB	2,900	(10)	(10)	(20)	(10)	-	2,700	(50)	(40)	(50)	(40)	(30)	13,400	(80)	(60)	(140)	(60)	(50)
	US-44 WB	1,600	(50)	(60)	(60)	(70)	(70)	3,300	(50)	(10)	(30)	(10)	(10)	13,000	(100)	(90)	(90)	(70)	(80)
	CT-4 EB	1,500	(80)	(20)	(70)	(30)	(10)	2,100	(60)	(50)	(50)	(40)	(30)	9,700	(250)	(160)	(240)	(150)	(140)
	CT-4 WB	1,600	(10)	20	(20)	20	20	2,100	(70)	(60)	(70)	(60)	(50)	9,500	20	130	-	130	130
	I-84 EB	8,300	(370)	(340)	(270)	(310)	(260)	10,600	(690)	(630)	(500)	(510)	(520)	49,400	(3,270)	(3,060)	(2,680)	(2,830)	(2,610)
	I-84 WB	8,600	(450)	(390)	(430)	(460)	(430)	16,200	(670)	(570)	(560)	(530)	(550)	65,000	(3,860)	(3,480)	(3,450)	(3,540)	(3,470)
	CT-508 EB	2,800	(80)	(110)	(80)	(110)	(140)	2,600	(50)	(50)	(50)	(70)	(70)	13,700	(450)	(410)	(320)	(450)	(470)
	South Rd EB	400	(60)	(70)	(60)	(60)	(60)	400	-	-	-	-	-	1,900	(70)	(70)	(60)	(60)	(60)
	South Rd WB	400	-	-	-	-	-	600	(60)	(40)	(30)	(30)	(40)	2,500	(40)	(40)	(30)	(20)	(20)
	Other Roads	500	-	-	10	10	10	700	10	20	10	20	20	2,800	60	80	60	90	90
Screenline A Total		**28,600**	**(1,110)**	**(970)**	**(1,050)**	**(1,050)**	**(1,040)**	**41,400**	**(1,700)**	**(1,430)**	**(1,430)**	**(1,370)**	**(1,450)**	**180,900**	**(8,050)**	**(7,150)**	**(6,930)**	**(6,940)**	**(7,240)**
B	US-44 EB	1,100	10	10	20	20	20	1,500	(30)	-	20	10	20	7,900	(110)	110	340	330	200
	US-44 WB	1,000	-	10	20	10	-	1,500	10	20	50	60	50	7,900	70	80	340	330	160
	Asylum Ave EB	1,100	(20)	(20)	(20)	(10)	(10)	1,500	(40)	20	(70)	(20)	(40)	7,000	(120)	(160)	(450)	(360)	(320)
	Asylum Ave WB	1,000	-	-	-	-	-	1,500	20	(120)	(70)	(40)	(90)	6,300	-	(200)	(120)	20	(110)
	Farmington Ave EB	1,000	-	20	-	20	50	1,300	10	40	20	30	30	6,600	210	410	290	380	360
	Farmington Ave WB	600	60	140	190	170	140	1,400	20	130	50	110	110	6,200	550	990	1,020	1,010	990
	West Blvd EB	1,200	(30)	80	120	280	260	1,100	30	640	270	760	680	6,200	(420)	2,460	(220)	2,550	1,840
	West Blvd WB	900	-	360	(100)	150	90	1,500	(70)	800	240	1,060	930	6,100	(930)	3,790	(170)	3,740	3,080
	Capitol Ave EB	400	-	-	(10)	(10)	(10)	500	10	-	(90)	(60)	(50)	2,200	270	150	(380)	(290)	(300)
	Capitol Ave WB	300	-	20	(10)	-	-	500	-	10	-	10	10	2,400	220	180	(250)	(110)	(140)
	Park St EB	400	20	10	(20)	(10)	(20)	600	20	10	(10)	(10)	-	3,200	90	80	(80)	20	(10)
	Park St WB	400	-	10	-	10	10	600	-	20	-	20	20	3,300	50	80	-	50	50
	I-84 WB	7,900	(1,730)	(1,620)	(1,080)	(1,420)	(1,240)	17,000	(4,020)	(3,950)	(2,510)	(3,670)	(3,560)	69,500	(15,040)	(15,920)	(9,250)	(14,670)	(13,350)
	I-84 EB	11,300	(1,950)	(1,610)	(1,200)	(1,540)	(1,570)	12,200	(3,150)	(2,710)	(1,320)	(2,160)	(2,180)	64,000	(13,810)	(12,350)	(5,260)	(10,010)	(9,380)
	New Park Ave EB	600	(40)	-	20	20	(10)	700	30	60	(80)	80	80	3,300	(40)	420	(210)	460	320
	New Park Ave WB	300	(10)	40	(50)	20	20	800	60	120	(10)	150	170	3,500	130	470	(350)	310	330
	Flatbush Ave EB	500	20	50	40	50	50	900	20	20	20	20	20	4,700	140	230	220	270	290
	Flatbush Ave WB	600	10	20	10	20	20	900	10	10	20	20	20	4,900	90	100	120	130	130
	New Britain Ave EB	1,700	120	80	30	60	90	2,600	290	210	180	200	230	12,000	1,910	1,100	800	1,230	1,460
	New Britain Ave WB	1,100	200	140	150	160	150	2,600	270	170	140	160	170	11,300	1,700	930	1,220	1,280	1,380
	Other Roads	4,100	410	280	(30)	160	170	5,400	1,290	920	30	520	600	22,200	4,230	2,780	(540)	1,190	1,500
Screenline B Total		**37,300**	**(2,940)**	**(1,990)**	**(2,520)**	**(2,450)**	**(2,570)**	**56,800**	**(5,230)**	**(3,570)**	**(4,130)**	**(3,760)**	**(4,050)**	**260,700**	**(20,800)**	**(14,250)**	**(15,880)**	**(15,090)**	**(16,280)**
C	Tower Ave EB	800	10	-	40	20	-	1,400	(30)	(20)	50	50	(30)	5,500	(20)	(30)	140	170	(60)
	Tower Ave WB	800	10	10	20	30	20	1,200	10	-	10	10	-	5,500	60	30	30	20	50
	US-44 EB	1,300	30	-	80	20	-	2,000	50	10	50	40	30	8,700	70	70	960	530	(30)
	US-44 WB	1,200	100	40	80	(60)	(20)	2,000	120	150	230	170	240	8,800	520	480	810	410	550
	Homestead Ave EB	500	10	10	-	10	10	700	10	-	40	50	30	3,500	70	70	(260)	(130)	210
	Homestead Ave WB	400	50	(10)	50	10	(20)	800	(10)	(10)	10	(10)	(50)	3,700	100	(130)	290	140	(160)
	Asylum Ave EB	800	120	(10)	240	180	60	500	590	210	810	590	450	5,000	1,390	370	2,140	1,260	190
	Asylum Ave WB	600	60	50	240	140	120	1,400	120	-	240	140	90	5,800	900	220	680	300	490
	Farmington Ave EB	900	190	20	300	200	140	1,400	220	20	320	160	120	5,600	2,560	350	3,390	2,200	2,010
	Farmington Ave WB	300	600	50	720	660	390	1,100	520	150	680	560	340	4,600	3,100	610	4,360	2,800	1,480
	I-84 WB	13,300	(3,510)	(1,760)	(5,380)	(4,160)	(3,370)	22,600	(7,130)	(3,930)	(9,640)	(7,050)	(5,870)	95,900	(28,800)	(14,900)	(38,700)	(28,400)	(22,600)
	I-84 EB	14,800	(3,700)	(1,820)	(5,880)	(4,460)	(3,720)	18,900	(6,110)	(3,250)	(7,710)	(5,530)	(4,750)	90,300	(25,900)	(13,600)	(34,500)	(26,200)	(20,100)
	Capitol Ave EB	700	80	(10)	170	70	10	1,000	200	40	220	30	(160)	4,400	1,710	180	1,950	340	(580)
	Capitol Ave WB	500	90	20	60	(100)	(150)	1,000	140	50	240	160	60	3,800	1,640	420	1,960	790	(130)
	Park St EB	300	50	20	60	40	40	500	30	10	70	40	40	2,600	130	80	410	320	250
	Park St WB	300	20	20	20	20	30	500	30	20	60	40	30	2,800	100	70	200	140	170
	New Britain Ave EB	1,100	30	20	20	30	30	1,400	170	130	160	130	140	7,700	1,030	860	900	970	970
	New Britain Ave WB	900	70	60	80	70	60	1,600	100	80	90	90	90	7,600	900	690	840	850	820
	White St EB	600	190	120	150	130	110	800	100	30	50	40	30	3,900	600	360	430	440	370
	White St WB	400	110	70	130	120	110	700	270	200	240	210	210	3,100	1,130	750	1,030	960	960
	Maple Ave EB	1,400	70	60	20	10	40	1,200	40	30	20	30	40	6,200	280	240	150	180	200
	Maple Ave WB	700	20	20	30	20	-	2,500	60	90	100	110	90	7,500	150	170	280	290	190
	Other Roads	7,400	1,880	620	3,180	1,950	1,430	10,300	4,150	1,430	6,790	3,870	2,510	45,000	13,990	5,410	23,220	14,160	9,600
Screenline C Total		**50,000**	**(3,440)**	**(2,400)**	**(2,730)**	**(2,210)**	**(2,430)**	**75,700**	**(6,350)**	**(4,560)**	**(4,260)**	**(3,430)**	**(3,960)**	**337,400**	**(25,430)**	**(18,190)**	**(17,370)**	**(14,440)**	**(16,500)**
D	Jennings Rd EB	1,200	40	30	80	70	50	3,000	110	150	270	240	200	11,300	290	300	460	500	310
	Jennings Rd WB	1,800	20	10	40	70	50	1,700	20	10	10	10	-	10,500	390	300	330	320	350
	Leibert Rd EB	100	-	30	-	40	10	200	10	20	10	40	20	1,200	-	60	(30)	160	50
	Leibert Rd WB	200	(20)	(10)	(10)	(10)	(10)	100	(30)	(10)	(30)	(10)	(10)	700	(60)	(30)	(50)	(20)	(30)
	US-44 WB	3,600	(90)	330	910	1,100	590	3,100	(80)	1,000	(70)	1,250	960	16,500	(260)	5,010	300	5,990	5,040
	US-44 EB	1,500	30	420	(60)	640	370	3,900	230	820	(100)	1,020	800	12,800	770	4,380	690	6,160	4,170
	I-84 WB	14,000	(1,650)	(2,110)	(3,430)	(3,920)	(2,890)	17,900	(3,010)	(4,550)	(3,720)	(5,010)	(4,410)	87,600	(12,910)	(19,940)	(17,070)	(23,080)	(20,290)
	I-84 EB	10,100	(1,370)	(2,140)	(2,050)	(2,620)	(2,070)	18,500	(3,060)	(4,460)	(4,440)	(5,850)	(4,670)	81,200	(12,140)	(19,640)	(16,830)	(23,690)	(19,410)
	CT-2 WB	7,500	(140)	40	180	450	160	4,400	150	590	530	630	590	24,000	420	2,360	2,230	2,750	2,150
	CT-2 EB	1,400	(40)	100	(30)	60	90	8,000	240	840	610	1,150	930	19,400	440	2,420	1,350	2,840	2,420
	Whitehead Hwy WB	5,400	180	160	150	290	200	3,600	190	330	160	310	210	24,200	960	1,450	1,140	1,950	1,240
	Whitehead Hwy EB	1,000	(10)	60	150	160	70	4,400	210	420	580	680	420	15,100	630	1,490	1,870	2,220	1,670
	Airport Rd EB	1,700	100	110	180	140	140	2,800	410	350	640	540	460	12,600	1,680	1,340	1,900	1,730	1,730
	Airport Rd WB	1,900	160	150	220	200	140	3,600	420	280	350	250	300	14,700	1,570	1,070	1,420	1,160	1,190
	CT-15 EB	7,100	170	170	70	90	70	8,100	560	540	290	330	370	36,300	2,900	2,670	1,900	2,120	2,090
	CT-15 WB	3,900	360	280	300	300	330	6,200	670	630	560	550	520	26,500	3,220	2,730	2,420	2,480	2,620
	Other Roads	4,500	150	260	370	430	350	8,500	(10)	90	40	40	(10)	35,500	160	1,120	160	870	680
Screenline D Total		**66,600**	**(2,110)**	**(2,120)**	**(2,490)**	**(2,110)**	**(2,330)**	**97,900**	**(2,970)**	**(2,960)**	**(3,180)**	**(2,690)**	**(2,840)**	**430,300**	**(11,940)**	**(12,890)**	**(13,590)**	**(11,290)**	**(13,060)**
E	I-291 WB	6,800	(20)	(30)	(20)	60	10	5,900	(10)	(30)	(30)	(30)	(30)	31,600	50	30	50	110	90
	I-291 EB	3,200	60	60	100	70	60	8,600	(10)	(20)	30	20	(20)	30,900	20	50	190	160	90
	I-84 WB	14,600	(610)	(690)	(1,040)	(1,360)	(940)	15,500	(1,330)	(1,770)	(1,680)	(1,740)	(1,630)	77,600	(6,040)	(7,430)	(7,780)	(8,260)	(7,420)
	I-84 EB	8,500	(480)	(630)	(600)	(620)	(560)	19,200	(1,260)	(1,930)	(1,700)	(2,350)	(2,000)	73,700	(4,900)	(6,790)	(5,750)	(7,290)	(6,590)
	CT-2 WB	6,800	(140)	50	180	480	200	4,000	50	630	520	640	570	21,800	330	2,530	2,180	2,910	2,290
	CT-2 EB	1,300	(70)	30	(40)	-	50	7,600	100	800	500	1,090	880	17,800	40	2,120	1,080	2,390	1,940
	CT-15 WB	7,100	440	360	510	480	410	8,300	840	750	750	710	670	38,500	3,760	3,170	3,600	3,390	3,290
	CT-15 EB	5,200	170	210	220	210	140	11,400	820	800	770	790	760	42,700	3,190	2,950	2,760	2,970	2,900
	CT-3 WB	5,700	90	60	100	110	60	7,200	160	140	160	140	130	31,600	660	500	650	610	500
	CT-3 EB	4,800	70	70	70	70	50	9,000	110	130	150	180	130	33,000	600	610	660	680	590
Screenline E Total		**64,100**	**(490)**	**(510)**	**(550)**	**(530)**	**(570)**	**96,800**	**(530)**	**(510)**	**(540)**	**(560)**	**(590)**	**399,000**	**(2,290)**	**(2,260)**	**(2,420)**	**(2,410)**	**(2,380)**

Table 5-3
Alternative 7: I-91 HOV to HOT Conversion
2020 Estimated Vehicle Miles Traveled, Vehicle Hours Traveled, and Average Speeds

VMT (HOV limits) - Current HOV operation

Time Period		I-91 Southbound GP	I-91 Southbound HOV	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOV	I-91 Northbound Total	I-91 Total GP	I-91 Total HOV	I-91 Total Total
AM1	6:00-7:00	34,542	1,839	36,381	25,285	1,854	27,140	59,828	3,694	63,521
AM2	7:00-8:00	47,600	4,867	52,467	32,201	2,288	34,489	79,801	7,154	86,955
AM3	8:00-9:00	38,913	4,476	43,388	31,448	1,582	33,030	70,361	6,058	76,418
MD	9:00-3:00	183,812	9,231	193,043	150,232	6,228	156,460	334,044	15,459	349,503
PM1	3:00-4:00	40,540	3,422	43,963	39,281	2,263	41,545	79,822	5,686	85,508
PM2	4:00-6:00	84,098	9,677	93,775	81,745	9,032	90,777	165,843	18,709	184,551
PM3	6:00-7:00	30,041	2,649	32,690	27,906	1,241	29,147	57,947	3,890	61,837
Night	7:00-6:00	108,981	3,587	112,568	106,305	3,684	109,989	215,286	7,271	222,557
Average Weekday		568,527	39,747	608,274	494,408	28,173	522,576	1,062,931	67,920	1,130,850
Annual Weekday								265,732,681	16,979,936	282,712,617

VHT (HOV limits) - Current HOV operation

Time Period		I-91 Southbound GP	I-91 Southbound HOV	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOV	I-91 Northbound Total	I-91 Total GP	I-91 Total HOV	I-91 Total Total
AM1	6:00-7:00	31,380	1,577	32,957	22,482	1,590	24,073	53,863	3,167	57,030
AM2	7:00-8:00	59,434	4,209	63,643	29,941	1,963	31,904	89,375	6,171	95,546
AM3	8:00-9:00	51,181	3,862	55,043	29,239	1,357	30,596	80,420	5,218	85,639
MD	9:00-3:00	171,222	7,914	179,135	136,194	5,341	141,535	307,416	13,255	320,670
PM1	3:00-4:00	40,000	2,940	42,940	42,959	1,942	44,901	82,959	4,882	87,841
PM2	4:00-6:00	108,798	8,376	117,174	96,923	7,807	104,729	205,720	16,183	221,903
PM3	6:00-7:00	30,161	2,272	32,434	25,077	1,064	26,141	55,238	3,336	58,574
Night	7:00-6:00	96,277	3,075	99,352	94,220	3,159	97,379	190,497	6,234	196,731
Average Weekday		588,453	34,225	622,678	477,085	24,222	501,258	1,065,488	58,447	1,123,935
Annual Weekday								266,372,036	14,611,717	280,983,753

Average Travel Speed (HOV limits) - Current HOV operation

Time Period		I-91 Southbound GP	I-91 Southbound HOV	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOV	I-91 Northbound Total	I-91 Total GP	I-91 Total HOV	I-91 Total Total
AM1	6:00-7:00	66	70	66	67	70	68	67	70	67
AM2	7:00-8:00	48	69	49	65	70	65	54	70	55
AM3	8:00-9:00	46	70	47	65	70	65	52	70	54
MD	9:00-3:00	64	70	65	66	70	66	65	70	65
PM1	3:00-4:00	61	70	61	55	70	56	58	70	58
PM2	4:00-6:00	46	69	48	51	69	52	48	69	50
PM3	6:00-7:00	60	70	60	67	70	67	63	70	63
Night	7:00-6:00	68	70	68	68	70	68	68	70	68
Average Weekday		58	70	59	62	70	63	60	70	60

VMT (HOV limits) - HOT Operation

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	33,503	2,823	36,326	25,278	1,892	27,170	58,781	4,715	63,496
AM2	7:00-8:00	43,706	9,560	53,266	31,712	2,740	34,453	75,418	12,300	87,719
AM3	8:00-9:00	35,304	9,558	44,861	30,880	2,323	33,203	66,184	11,881	78,064
MD	9:00-3:00	177,218	15,601	192,818	149,401	7,135	156,536	326,619	22,736	349,355
PM1	3:00-4:00	38,454	5,777	44,230	36,430	5,477	41,907	74,883	11,254	86,137
PM2	4:00-6:00	77,222	18,721	95,943	76,258	16,134	92,391	153,480	34,855	188,335
PM3	6:00-7:00	28,152	4,831	32,983	27,815	1,337	29,153	55,968	6,168	62,136
Night	7:00-6:00	107,085	5,454	112,539	106,194	3,815	110,009	213,279	9,269	222,549
Average Weekday		540,643	72,324	612,968	483,968	40,854	524,822	1,024,612	113,178	1,137,790
Annual Weekday								256,152,934	28,294,572	284,447,506

VHT (HOV limits) - HOT Operation

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	30,264	2,422	32,686	22,472	1,623	24,095	52,736	4,045	56,781
AM2	7:00-8:00	47,313	9,296	56,609	29,333	2,353	31,685	76,646	11,649	88,295
AM3	8:00-9:00	39,043	9,336	48,379	28,515	1,993	30,508	67,559	11,328	78,887
MD	9:00-3:00	163,096	13,389	176,486	135,331	6,118	141,449	298,428	19,508	317,935
PM1	3:00-4:00	36,717	5,044	41,761	36,601	4,780	41,381	73,318	9,823	83,141
PM2	4:00-6:00	84,812	18,351	103,163	81,315	14,982	96,297	166,127	33,333	199,460
PM3	6:00-7:00	26,992	4,178	31,171	24,987	1,147	26,133	51,979	5,325	57,304
Night	7:00-6:00	94,603	4,676	99,279	94,087	3,272	97,359	188,690	7,948	196,637
Average Weekday		522,841	66,692	589,533	452,641	36,266	488,907	975,482	102,959	1,078,441
Annual Weekday								243,870,470	25,739,695	269,610,165

Average Travel Speed (HOV limits) - HOT Operation

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	66	70	67	67	70	68	67	70	67
AM2	7:00-8:00	55	62	56	65	70	65	59	63	60
AM3	8:00-9:00	54	61	56	65	70	65	59	63	59
MD	9:00-3:00	65	70	66	66	70	66	66	70	66
PM1	3:00-4:00	63	69	64	60	69	61	61	69	62
PM2	4:00-6:00	55	61	56	56	65	58	55	63	57
PM3	6:00-7:00	63	69	63	67	70	67	65	70	65
Night	7:00-6:00	68	70	68	68	70	68	68	70	68
Average Weekday		62	65	62	64	68	64	63	66	63

VMT Differences (HOV limits) - HOT vs HOV

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	-1,039	984	-56	-7	38	30	-1,047	1,021	-26
AM2	7:00-8:00	-3,894	4,693	799	-488	453	-36	-4,383	5,146	763
AM3	8:00-9:00	-3,609	5,082	1,473	-568	741	173	-4,177	5,823	1,646
MD	9:00-3:00	-6,594	6,370	-224	-830	907	76	-7,425	7,276	-148
PM1	3:00-4:00	-2,087	2,354	268	-2,852	3,214	362	-4,938	5,568	630
PM2	4:00-6:00	-6,876	9,045	2,169	-5,487	7,102	1,615	-12,363	16,147	3,784
PM3	6:00-7:00	-1,889	2,182	294	-91	96	5	-1,980	2,279	299
Night	7:00-6:00	-1,896	1,868	-28	-111	131	20	-2,007	1,999	-8
Average Weekday		-27,884	32,577	4,694	-10,435	12,681	2,246	-38,319	45,259	6,940
Annual Weekday								-9,579,747	11,314,636	1,734,889
Percent Impact		-4.9%	82.0%	0.8%	-2.1%	45.0%	0.4%	-3.6%	66.6%	0.6%

VHT Differences (HOV limits) - HOT vs HOV

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	-1,117	845	-271	-10	32	22	-1,127	878	-249
AM2	7:00-8:00	-12,121	5,087	-7,033	-608	390	-219	-12,729	5,477	-7,252
AM3	8:00-9:00	-12,137	5,474	-6,664	-724	636	-88	-12,862	6,110	-6,752
MD	9:00-3:00	-8,125	5,476	-2,650	-863	777	-86	-8,988	6,253	-2,735
PM1	3:00-4:00	-3,283	2,103	-1,179	-6,358	2,838	-3,520	-9,641	4,941	-4,700
PM2	4:00-6:00	-23,985	9,975	-14,011	-15,608	7,175	-8,433	-39,594	17,150	-22,443
PM3	6:00-7:00	-3,169	1,906	-1,263	-90	83	-7	-3,259	1,989	-1,270
Night	7:00-6:00	-1,675	1,601	-73	-132	113	-20	-1,807	1,714	-93
Average Weekday		-65,612	32,468	-33,144	-24,394	12,044	-12,350	-90,006	44,512	-45,494
Annual Weekday								-22,501,567	11,127,979	-11,373,588
Percent Impact		-11.1%	94.9%	-5.3%	-5.1%	49.7%	-2.5%	-8.4%	76.2%	-4.0%

Average Travel Speed Differences (HOV limits) - HOT vs HOV

Time Period		I-91 Southbound GP	I-91 Southbound HOT	I-91 Southbound Total	I-91 Northbound GP	I-91 Northbound HOT	I-91 Northbound Total	I-91 Total GP	I-91 Total HOT	I-91 Total Total
AM1	6:00-7:00	0	0	0	0	0	0	0	0	0
AM2	7:00-8:00	7	-8	7	0	0	0	5	-6	5
AM3	8:00-9:00	9	-8	8	0	0	1	6	-7	6
MD	9:00-3:00	1	0	1	0	0	0	0	0	1
PM1	3:00-4:00	2	-1	2	5	-1	5	4	-1	4
PM2	4:00-6:00	8	-8	8	6	-5	6	7	-7	7
PM3	6:00-7:00	3	-1	3	0	0	0	2	0	2
Night	7:00-6:00	0	0	0	0	0	0	0	0	0
Average Weekday		4	-5	4	2	-2	2	3	-4	3
Percent Impact		7.0%	-6.6%	6.4%	3.2%	-3.1%	3.0%	5.3%	-5.4%	4.9%

Table 5-4 displays the same information presented in Table 5-3, but for the I-84 corridor within the HOV limits. The largest impacts occur within the 7 to 9AM and 4 to 6PM peak periods where congestion in the general purpose lanes is highest under existing operation. Overall on an average weekday basis, VMT is estimated to increase by 0.8 percent under HOT operation. However, VHT is estimated to be reduced by 1.1 percent, resulting in an increase in overall corridor travel speeds of 1.9 percent. Within the peak periods, travel speeds on the general purpose lanes are estimated to be in the range of 2 to 4 mph better under HOT operation than under the existing HOV only operation.

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 5-5 summarize the estimated toll transactions and toll revenue of Alternative 1 at 2020 and 2040 levels. All revenue shown is in 2014 dollars. Three time periods are shown AM Peak (7-9AM), PM Peak (3-6PM), and Off Peak (6PM-7AM plus 9AM-3PM). Transactions and toll revenue are shown for both ETC (transponder) and License Plate Tolling (LPT) traffic.

For Alternative 1, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $1.00. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was assumed to be $0.75 for passenger vehicles. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate. The video toll (including the surcharge) was applied to video users 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 additional cost to collect from video toll users and revenue leakage associated with video toll collection.

131,600 transactions are estimated to occur on an average weekday in 2020, producing $126,266 in gross toll revenue. Utilizing an average weekday to annual total expansion factor of 330 days, this translates into an estimated annual gross toll revenue for 2020 of $41.7 million (in 2014 dollars). The 330 days assumes 250 weekdays and 115 weekend/holidays. However, weekends would have slightly less than 70 percent of the weekday traffic and thus equate to 80 average weekdays. 146,300 transactions are estimated to occur on an average weekday in 2040, producing $141,746 in gross toll revenue. Estimated annual gross toll revenue for 2040 is $46.8 million (in 2014 dollars).

Table 5-4
Alternative 7: I-84 HOV to HOT Conversion
2020 Estimated Vehicle Miles Traveled, Vehicle Hours Traveled, and Average Speeds

VMT (HOV limits) - Current HOV operation

Time Period		I-84 Westbound GP	I-84 Westbound HOV	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOV	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOV	I-84 Total Total
AM1	6:00-7:00	62,638	1,514	64,152	22,605	397	23,002	85,242	1,911	87,154
AM2	7:00-8:00	107,803	6,974	114,777	35,991	729	36,720	143,794	7,703	151,497
AM3	8:00-9:00	91,803	7,861	99,664	37,990	762	38,751	129,793	8,623	138,415
MD	9:00-3:00	295,239	9,559	304,799	233,427	6,725	240,152	528,667	16,284	544,951
PM1	3:00-4:00	55,616	2,259	57,875	72,061	2,798	74,859	127,678	5,057	132,735
PM2	4:00-6:00	110,340	3,646	113,986	173,151	12,953	186,104	283,491	16,599	300,090
PM3	6:00-7:00	38,437	1,381	39,818	56,158	2,280	58,439	94,595	3,662	98,257
Night	7:00-6:00	153,027	3,712	156,739	148,354	3,503	151,857	301,381	7,215	308,596
Average Weekday		914,904	36,906	951,810	779,737	30,147	809,885	1,694,641	67,054	1,761,695
Annual Weekday								423,660,205	16,763,453	440,423,658

VHT (HOV limits) - Current HOV operation

Time Period		I-84 Westbound GP	I-84 Westbound HOV	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOV	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOV	I-84 Total Total
AM1	6:00-7:00	56,823	1,298	58,121	20,194	341	20,535	77,017	1,638	78,656
AM2	7:00-8:00	128,502	6,011	134,513	32,308	625	32,932	160,810	6,636	167,445
AM3	8:00-9:00	93,696	6,798	100,494	34,303	653	34,955	127,999	7,450	135,449
MD	9:00-3:00	265,406	8,195	273,601	211,948	5,762	217,710	477,353	13,958	491,311
PM1	3:00-4:00	49,873	1,937	51,810	72,784	2,398	75,182	122,657	4,335	126,992
PM2	4:00-6:00	98,886	3,126	102,011	201,743	11,172	212,915	300,628	14,298	314,926
PM3	6:00-7:00	34,254	1,184	35,439	52,148	1,955	54,103	86,402	3,139	89,541
Night	7:00-6:00	136,217	3,182	139,399	132,772	3,002	135,774	268,989	6,184	275,173
Average Weekday		863,657	31,730	895,388	758,199	25,907	784,106	1,621,856	57,637	1,679,494
Annual Weekday								405,464,073	14,409,314	419,873,387

Average Travel Spped (HOV limits) - Current HOV operation

Time Period		I-84 Westbound GP	I-84 Westbound HOV	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOV	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOV	I-84 Total Total
AM1	6:00-7:00	66	70	66	67	70	67	66	70	66
AM2	7:00-8:00	50	70	51	67	70	67	54	70	54
AM3	8:00-9:00	59	69	60	66	70	67	61	69	61
MD	9:00-3:00	67	70	67	66	70	66	66	70	67
PM1	3:00-4:00	67	70	67	59	70	60	62	70	63
PM2	4:00-6:00	67	70	67	51	70	52	57	70	57
PM3	6:00-7:00	67	70	67	65	70	65	66	70	66
Night	7:00-6:00	67	70	67	67	70	67	67	70	67
Average Weekday		64	70	64	62	70	62	63	70	63

VMT (HOV limits) - HOT Operation

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	61,583	2,825	64,407	22,454	587	23,040	84,036	3,411	87,447
AM2	7:00-8:00	102,636	14,392	117,027	35,721	1,073	36,794	138,357	15,465	153,822
AM3	8:00-9:00	87,151	13,184	100,335	37,646	1,130	38,776	124,796	14,314	139,110
MD	9:00-3:00	289,023	18,454	307,476	231,465	9,356	240,821	520,488	27,810	548,298
PM1	3:00-4:00	53,953	4,274	58,227	68,138	7,586	75,724	122,091	11,860	133,951
PM2	4:00-6:00	107,168	7,899	115,067	162,273	27,925	190,198	269,441	35,824	305,265
PM3	6:00-7:00	37,642	2,484	40,126	54,950	3,696	58,647	92,592	6,181	98,773
Night	7:00-6:00	151,692	5,612	157,303	147,739	4,272	152,011	299,431	9,884	309,314
Average Weekday		890,846	69,122	959,968	760,385	55,626	816,011	1,651,231	124,748	1,775,979
Annual Weekday								412,807,772	31,187,096	443,994,868

VHT (HOV limits) - HOT Operation

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	55,761	2,422	58,183	20,057	503	20,559	75,818	2,925	78,743
AM2	7:00-8:00	114,639	13,245	127,884	32,071	920	32,990	146,710	14,164	160,874
AM3	8:00-9:00	85,457	11,863	97,321	33,969	968	34,938	119,427	12,832	132,258
MD	9:00-3:00	259,555	15,827	275,381	210,030	8,018	218,048	469,585	23,844	493,429
PM1	3:00-4:00	48,314	3,669	51,983	66,872	6,566	73,438	115,186	10,235	125,421
PM2	4:00-6:00	95,951	6,779	102,730	176,673	25,948	202,621	272,625	32,727	305,351
PM3	6:00-7:00	33,547	2,130	35,677	50,822	3,172	53,994	84,369	5,302	89,671
Night	7:00-6:00	135,035	4,811	139,846	132,212	3,661	135,873	267,247	8,472	275,719
Average Weekday		828,259	60,746	889,005	722,707	49,754	772,462	1,550,967	110,500	1,661,467
Annual Weekday								387,741,643	27,625,108	415,366,751

Average Travel Speed (HOV limits) - HOT Operation

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	66	70	66	67	70	67	67	70	67
AM2	7:00-8:00	54	65	55	67	70	67	57	66	57
AM3	8:00-9:00	61	67	62	66	70	67	63	67	63
MD	9:00-3:00	67	70	67	66	70	66	67	70	67
PM1	3:00-4:00	67	70	67	61	69	62	64	70	64
PM2	4:00-6:00	67	70	67	55	65	56	59	66	60
PM3	6:00-7:00	67	70	67	65	70	65	66	70	66
Night	7:00-6:00	67	70	67	67	70	67	67	70	67
Average Weekday		65	68	65	63	67	63	64	68	64

VMT Differences (HOV limits) - HOT vs HOV

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	-1,055	1,311	256	-151	189	38	-1,206	1,500	294
AM2	7:00-8:00	-5,168	7,418	2,250	-270	344	74	-5,438	7,762	2,325
AM3	8:00-9:00	-4,653	5,323	671	-344	368	24	-4,997	5,691	695
MD	9:00-3:00	-6,217	8,894	2,678	-1,962	2,632	669	-8,179	11,526	3,347
PM1	3:00-4:00	-1,663	2,014	351	-3,924	4,788	865	-5,587	6,803	1,216
PM2	4:00-6:00	-3,173	4,253	1,080	-10,878	14,972	4,094	-14,050	19,225	5,174
PM3	6:00-7:00	-795	1,103	308	-1,208	1,416	208	-2,003	2,519	516
Night	7:00-6:00	-1,335	1,900	565	-615	769	154	-1,950	2,669	718
Average Weekday		-24,058	32,216	8,158	-19,352	25,479	6,127	-43,410	57,695	14,285
Annual Weekday								-10,852,433	14,423,644	3,571,211
Percent Impact		-2.6%	87.3%	0.9%	-2.5%	84.5%	0.8%	-2.6%	86.0%	0.8%

VHT Differences (HOV limits) - HOT vs HOV

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	-1,062	1,124	62	-137	162	25	-1,199	1,286	87
AM2	7:00-8:00	-13,863	7,234	-6,629	-237	295	58	-14,100	7,529	-6,571
AM3	8:00-9:00	-8,239	5,066	-3,173	-333	316	-18	-8,572	5,381	-3,191
MD	9:00-3:00	-5,851	7,632	1,781	-1,917	2,255	338	-7,768	9,887	2,119
PM1	3:00-4:00	-1,559	1,732	173	-5,912	4,168	-1,744	-7,471	5,900	-1,571
PM2	4:00-6:00	-2,935	3,653	719	-25,069	14,776	-10,293	-28,004	18,429	-9,575
PM3	6:00-7:00	-707	946	238	-1,326	1,217	-109	-2,033	2,163	130
Night	7:00-6:00	-1,182	1,629	447	-560	659	99	-1,742	2,287	545
Average Weekday		-35,398	29,016	-6,382	-35,492	23,848	-11,644	-70,890	52,863	-18,027
Annual Weekday								-17,722,430	13,215,794	-4,506,636
Percent Impact		-4.1%	91.4%	-0.7%	-4.7%	92.1%	-1.5%	-4.4%	91.7%	-1.1%

Average Travel Speed Differences (HOV limits) - HOT vs HOV

Time Period		I-84 Westbound GP	I-84 Westbound HOT	I-84 Westbound Total	I-84 Eastbound GP	I-84 Eastbound HOT	I-84 Eastbound Total	I-84 Total GP	I-84 Total HOT	I-84 Total Total
AM1	6:00-7:00	0	0	0	0	0	0	0	0	0
AM2	7:00-8:00	3	-4	4	0	0	0	3	-4	3
AM3	8:00-9:00	2	-3	2	0	0	0	2	-3	2
MD	9:00-3:00	0	0	0	0	0	0	0	0	0
PM1	3:00-4:00	0	0	0	2	-1	2	1	0	1
PM2	4:00-6:00	0	0	0	4	-5	4	3	-4	3
PM3	6:00-7:00	0	0	0	0	0	0	0	0	0
Night	7:00-6:00	0	0	0	0	0	0	0	0	0
Average Weekday		1	-2	1	1	-3	1	1	-2	1
Percent Impact		1.5%	-2.2%	1.6%	2.3%	-3.9%	2.3%	1.9%	-3.0%	1.9%

Table 5-5
Estimated Transactions and Toll Revenue
Alternative 1 - Existing Configuration with Single Point Toll

2020	Transactions			Revenue		
Period	**ETC**	**LPT**	**Total**	**ETC**	**LPT**	**Total**
AM Peak	14,100	7,100	21,200	$15,952	$7,654	$23,607
PM Peak	19,000	9,600	28,600	$21,126	$10,252	$31,378
Off Peak	54,000	27,800	81,800	$48,116	$23,165	$71,281
Weekday Total	87,100	44,500	131,600	$85,195	$41,071	$126,266
Annual			43,428,000			$41,668,000

2040	Transactions			Revenue		
Period	**ETC**	**LPT**	**Total**	**ETC**	**LPT**	**Total**
AM Peak	20,600	2,700	23,300	$23,260	$2,976	$26,235
PM Peak	28,300	3,700	32,000	$31,574	$4,044	$35,618
Off Peak	80,200	10,800	91,000	$70,726	$9,167	$79,893
Weekday Total	129,100	17,200	146,300	$125,560	$16,186	$141,746
Annual			48,279,000			$46,776,000

Revenue in 2014 Dollars.

Alternative 2

Tables 5-6 summarize the estimated toll transactions and toll revenue of Alternative 2 at 2020 and 2040 levels. All revenue shown is in 2014 dollars. Three time periods are shown AM Peak (7-9AM), PM Peak (3-6PM), and Off Peak (6PM-7AM plus 9AM-3PM). Transactions and toll revenue are shown for both ETC (transponder) and License Plate Tolling (LPT) traffic. Two tolling locations are assumed in Alternative 2. Transactions and toll revenue are shown for each tolling location.

For Alternative 2, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $0.50 at each tolling location. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was

assumed to be $0.375 for passenger vehicles at each tolling location. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

Table 5-6
Estimated Transactions and Toll Revenue
Alternative 2 - Existing Configuration with East and West Tolling Locations

2020	Transactions			Revenue		
Period	**ETC**	**LPT**	**Total**	**ETC**	**LPT**	**Total**
AM Peak East Plaza	14,700	8,000	22,700	$8,278	$4,295	$12,573
AM Peak West Plaza	10,800	5,800	16,600	$6,122	$3,147	$9,269
PM Peak East Plaza	19,900	10,700	30,600	$11,124	$5,744	$16,868
PM Peak West Plaza	15,500	8,300	23,800	$8,537	$4,430	$12,967
Off Peak East Plaza	57,400	31,000	88,400	$25,696	$12,954	$38,650
Off Peak West Plaza	47,100	25,500	72,600	$20,868	$10,590	$31,458
Weekday Total East Plaza	92,000	49,700	141,700	$45,098	$22,993	$68,091
Weekday Total West Plaza	73,400	39,600	113,000	$35,527	$18,167	$53,694
Weekday Total	165,400	89,300	254,700	$80,625	$41,161	$121,785
Annual			84,051,000			$40,189,000

2040	Transactions			Revenue		
Period	**ETC**	**LPT**	**Total**	**ETC**	**LPT**	**Total**
AM Peak East Plaza	21,600	3,100	24,700	$12,156	$1,676	$13,832
AM Peak West Plaza	16,300	2,300	18,600	$9,209	$1,257	$10,466
PM Peak East Plaza	29,600	4,100	33,700	$16,576	$2,253	$18,829
PM Peak West Plaza	23,400	3,200	26,600	$12,945	$1,762	$14,707
Off Peak East Plaza	85,600	12,200	97,800	$37,889	$5,165	$43,054
Off Peak West Plaza	69,300	9,800	79,100	$30,416	$4,156	$34,572
Weekday Total East Plaza	136,800	19,400	156,200	$66,621	$9,094	$75,716
Weekday Total West Plaza	109,000	15,300	124,300	$52,571	$7,174	$59,745
Weekday Total	245,800	34,700	280,500	$119,192	$16,269	$135,461
Annual			92,565,000			$44,702,000

Revenue in 2014 Dollars.

A total of 254,700 transactions are estimated to occur on an average weekday in 2020, producing $121,785 in gross toll revenue. Utilizing an average weekday to annual total expansion factor of 330 days, this translates into an estimated annual gross toll revenue for 2020 of $40.2 million (in 2014 dollars). 280,500 transactions are estimated to occur on an average weekday in 2040, producing $135,461 in gross toll revenue. Estimated annual gross toll revenue for 2040 is $44.7 million (in 2014 dollars).

Alternative 3

Tables 5-7 summarize the estimated toll transactions and toll revenue of Alternative 3 at 2020 and 2040 levels. All revenue shown is in 2014 dollars. Three time periods are shown AM Peak (7-9AM), PM Peak (3-6PM), and Off Peak (6PM-7AM plus 9AM-3PM). Transactions and toll revenue are shown for both ETC (transponder) and License Plate Tolling (LPT) traffic.

Table 5-7
Estimated Transactions and Toll Revenue
Alternative 3 - I-84 Reconstruction and Interchange Reconfiguration and Single Point Toll

2020	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	Video	Total
AM Peak	11,300	5,900	17,200	$12,676	$6,339	$19,015
PM Peak	16,200	8,400	24,600	$17,850	$8,947	$26,796
Off Peak	46,600	24,700	71,300	$41,045	$20,450	$61,495
Weekday Total	74,100	39,000	113,100	$71,571	$35,736	$107,306
Annual			37,323,000			$35,411,000

2040	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	Video	Total
AM Peak	16,800	2,300	19,100	$18,944	$2,506	$21,450
PM Peak	24,200	3,200	27,400	$26,785	$3,522	$30,307
Off Peak	69,400	9,600	79,000	$60,727	$8,094	$68,822
Weekday Total	110,400	15,100	125,500	$106,457	$14,122	$120,579
Annual			41,415,000			$39,791,000

Revenue in 2014 Dollars.

For Alternative 3, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $1.00. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was assumed to be $0.75 for passenger vehicles. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

113,100 transactions are estimated to occur on an average weekday in 2020, producing $107,300 in gross toll revenue. Utilizing an average weekday to annual total expansion factor of 330 days, this translates into an estimated annual gross toll revenue for 2020 of $35.4 million (in 2014 dollars). 125,500 transactions are estimated to occur on an average weekday in 2040, producing $120,579 in gross toll revenue. Estimated annual gross toll revenue for 2040 is $39.8 million (in 2014 dollars).

Alternative 4

Tables 5-8 summarize the estimated toll transactions and toll revenue of Alternative 4 at 2020 and 2040 levels. All revenue shown is in 2014 dollars. Three time periods are shown AM Peak (7-9AM), PM Peak (3-6PM), and Off Peak (6PM-7AM and 9AM-3PM). Transactions and toll revenue are shown for both ETC (transponder) and License Plate Tolling (LPT) traffic. Two tolling locations are assumed in Alternative 4. Transactions and toll revenue are shown for each tolling location.

For Alternative 4, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $0.50 at each tolling location. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was assumed to be $0.375 for passenger vehicles at each tolling location. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

A total of 248,800 transactions are estimated to occur on an average weekday in 2020, producing $118,723 in gross toll revenue. Utilizing an average weekday to annual total expansion factor of 330 days, this translates into an estimated annual gross toll revenue for 2020 of $39.2 million (in 2014 dollars). 274,500 transactions are estimated to occur on an average weekday in 2040, producing $132,186 in gross toll revenue. Estimated annual gross toll revenue for 2040 is $43.6 million (in 2014 dollars).

Alternative 5

Tables 5-9 summarize the estimated toll transactions and toll revenue of Alternative 5 at 2020 and 2040 levels. All revenue shown is in 2014 dollars. Three time periods are shown AM Peak (7-9AM), PM Peak (3-6PM), and Off Peak (6PM-7AM and 9AM-3PM). Transactions and toll revenue are shown for both ETC (transponder) and video tolling traffic. Two tolling locations are assumed in Alternative 5. Transactions and toll revenue are shown for each tolling location.

For Alternative 5, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $0.50 at each tolling location. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was assumed to be $0.375 for passenger vehicles at each tolling location. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

A total of 259,400 transactions are estimated to occur on an average weekday in 2020, producing $124,036 in gross toll revenue. Utilizing an average weekday to annual total expansion factor of 330 days, this translates into an estimated annual gross toll revenue for 2020 of $40.9 million (in 2014 dollars). 285,100 transactions are estimated to occur on an average weekday in 2040, producing $137,749 in gross toll revenue. Estimated annual gross toll revenue for 2040 is $45.5 million (in 2014 dollars).

Table 5-8
Estimated Transactions and Toll Revenue
Alternative 4 - I-84 Reconstruction and Interchange Reconfiguration with East and West Tolling Locations

2020	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	LPT	Total
AM Peak East Plaza	12,900	7,100	20,000	$7,330	$3,802	$11,131
AM Peak West Plaza	11,200	6,100	17,300	$6,381	$3,284	$9,665
PM Peak East Plaza	18,200	9,800	28,000	$10,089	$5,254	$15,343
PM Peak West Plaza	16,400	8,800	25,200	$9,054	$4,709	$13,763
Off Peak East Plaza	54,100	29,400	83,500	$24,144	$12,259	$36,403
Off Peak West Plaza	48,500	26,300	74,800	$21,471	$10,947	$32,418
Weekday Total East Plaza	85,200	46,300	131,500	$41,563	$21,315	$62,877
Weekday Total West Plaza	76,100	41,200	117,300	$36,906	$18,940	$55,846
Weekday Total	161,300	87,500	248,800	$78,469	$40,254	$118,723
Annual			82,104,000			$39,179,000

2040	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	LPT	Total
AM Peak East Plaza	19,200	2,700	21,900	$10,788	$1,492	$12,280
AM Peak West Plaza	16,900	2,400	19,300	$9,525	$1,310	$10,834
PM Peak East Plaza	26,900	3,800	30,700	$14,998	$2,052	$17,050
PM Peak West Plaza	24,800	3,500	28,300	$13,735	$1,877	$15,611
Off Peak East Plaza	80,400	11,500	91,900	$35,521	$4,872	$40,392
Off Peak West Plaza	72,100	10,300	82,400	$31,679	$4,338	$36,018
Weekday Total East Plaza	126,500	18,000	144,500	$61,306	$8,416	$69,722
Weekday Total West Plaza	113,800	16,200	130,000	$54,939	$7,525	$62,464
Weekday Total	240,300	34,200	274,500	$116,245	$15,941	$132,186
Annual			90,585,000			$43,621,000

Revenue in 2014 Dollars.

Table 5-9
Estimated Transactions and Toll Revenue
Alternative 5 - I-84 Reconstruction with Collector-Distributor Road with East and West Tolling Locations

2020	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	LPT	Total
AM Peak East Plaza	14,200	7,700	21,900	$8,019	$4,177	$12,197
AM Peak West Plaza	11,200	6,100	17,300	$6,381	$3,288	$9,669
PM Peak East Plaza	19,200	10,400	29,600	$10,865	$5,503	$16,368
PM Peak West Plaza	16,700	9,100	25,800	$9,399	$4,779	$14,178
Off Peak East Plaza	58,700	31,700	90,400	$25,955	$13,461	$39,417
Off Peak West Plaza	48,400	26,000	74,400	$21,213	$10,996	$32,208
Weekday Total East Plaza	92,100	49,800	141,900	$44,840	$23,141	$67,981
Weekday Total West Plaza	76,300	41,200	117,500	$36,993	$19,063	$56,056
Weekday Total	168,400	91,000	259,400	$81,832	$42,204	$124,036
Annual			85,602,000			$40,932,000

2040	Transactions			Revenue		
Period	ETC	LPT	Total	ETC	LPT	Total Expected
AM Peak East Plaza	21,000	3,000	24,000	$11,840	$1,639	$13,479
AM Peak West Plaza	16,900	2,400	19,300	$9,577	$1,313	$10,891
PM Peak East Plaza	29,100	4,100	33,200	$16,261	$2,230	$18,490
PM Peak West Plaza	24,500	3,400	27,900	$13,629	$1,858	$15,487
Off Peak East Plaza	84,900	12,100	97,000	$37,573	$5,151	$42,724
Off Peak West Plaza	73,300	10,400	83,700	$32,258	$4,419	$36,677
Weekday Total East Plaza	135,000	19,200	154,200	$65,674	$9,019	$74,693
Weekday Total West Plaza	114,700	16,200	130,900	$55,465	$7,591	$63,056
Weekday Total	249,700	35,400	285,100	$121,139	$16,610	$137,749
Annual			94,083,000			$45,457,000

Alternative 6

Table 5-10 summarizes the estimated toll transactions and toll revenue of Alternative 6 at 2020 and 2040 levels. Alternative 6 assumes an expanded tolling scenario of I-84 between Hartford and New York assuming 11 tolling locations. For each tolling location, estimated daily traffic under toll free and tolled conditions is shown, as well as the percent retained (tolled traffic/toll free traffic). Overall, about 81 percent of the toll free traffic at the tolling locations would be retained at the assumed toll rates.

For Alternative 6, the passenger vehicle ETC toll rate during the AM and PM Peak Periods was assumed to be $0.50 at each tolling location. Commercial vehicles were assumed to have an average toll rate of 2.8 times the passenger vehicle toll rate. During the off peak periods, the ETC toll rate was assumed to be $0.375 for passenger vehicles at each tolling location. For all time periods, video tolling traffic was assessed a 50 percent surcharge on top of the ETC toll rate.

964,000 transactions are estimated to occur on an average day, generating $474,253 in toll revenue. Annual gross toll revenue is estimated at $173.1 million. By 2040, annual revenue is estimate at $196.2 million. All revenue shown is in 2014 dollars.

Alternative 7

Table 5-11 summarizes the estimated toll transactions and toll revenue of Alternative 7 at 2020 and 2040 levels. Alternative 7 assumes a conversion of the existing I-91 and I-84 HOV lanes to HOT lanes.

For Alternative 7, a minimum toll of $0.50 was assumed for passenger vehicles. A higher toll was selected only if required to ensure total volume (SOV and HOV traffic) within the HOT lane was at or below a maximum of 1,600 vehicles per hour. Higher tolls than the minimum assumed were necessary in 2040 for the 8AM-9AM and 4PM-6PM time periods for I-91 in the southbound direction. Similarly, higher tolls than the assumed minimum would be needed in the peak directions of travel on I-84 as shown in the table.

The HOT lanes on I-91 are estimated to produce nearly 7,700 average weekday transactions in 2020, resulting in average weekday revenue of $3,840. By 2040, transactions are estimated to increase to more than 13,200, resulting in toll revenue of $9,312 on an average weekday. Annual gross toll revenue is estimated at $1.0 million for 2020, growing to an estimated $2.5 million by 2040.

The HOT lanes I-84 are estimated to produce more than 7,100 average weekday transactions in 2020, resulting in average weekday revenue of $4,249. By 2040, toll transactions are estimated to increase to more than 12,000, resulting in toll revenue of $9,304 on an average weekday. Annual gross toll revenue is estimated at $1.2 million for 2020, growing to an estimated $2.5 million by 2040.

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 equal to or lower than transactions. Annual toll revenue is presented in 2014 dollars.

Table 5-10
Estimated Transactions and Toll Revenue
I-84 Expanded Tolling - Hartford to New York

2020

Toll Location	Average Daily Transactions Toll Free	Average Daily Transactions Tolled	% Retained	Avg Toll	Average Daily Revenue	Annual Tolled Transactions	Annual Revenue
1	86,000	74,400	87%	0.50	$36,901	27,156,000	$13,469,000
2	139,900	116,700	83%	0.49	$57,268	42,596,000	$20,903,000
3	86,800	72,700	84%	0.49	$35,730	26,536,000	$13,041,000
4	81,700	65,200	80%	0.49	$31,637	23,798,000	$11,547,000
5	80,500	64,700	80%	0.49	$31,516	23,616,000	$11,503,000
6	144,000	116,200	81%	0.49	$57,172	42,413,000	$20,868,000
7	108,600	88,200	81%	0.49	$43,652	32,193,000	$15,933,000
8	93,300	73,500	79%	0.49	$36,097	26,828,000	$13,175,000
9	87,000	67,100	77%	0.49	$32,687	24,492,000	$11,931,000
10	134,600	105,800	79%	0.49	$52,229	38,617,000	$19,064,000
11	154,500	119,500	77%	0.50	$59,363	43,618,000	$21,668,000
Total	1,196,900	964,000	81%		$474,253	351,863,000	$173,102,000

2040

Toll Location	Average Daily Transactions Toll Free	Average Daily Transactions Tolled	% Retained	Avg Toll	Average Daily Revenue	Annual Tolled Transactions	Annual Revenue
1	97,300	84,500	87%	0.49	$41,144	30,843,000	$15,017,000
2	158,600	135,700	86%	0.48	$65,086	49,531,000	$23,756,000
3	96,800	82,700	85%	0.48	$39,758	30,186,000	$14,512,000
4	96,000	77,900	81%	0.48	$37,149	28,434,000	$13,559,000
5	94,700	77,200	82%	0.48	$36,916	28,178,000	$13,474,000
6	166,000	136,100	82%	0.48	$65,341	49,677,000	$23,849,000
7	126,100	104,700	83%	0.48	$50,691	38,216,000	$18,502,000
8	105,100	84,300	80%	0.48	$40,528	30,770,000	$14,793,000
9	99,100	79,400	80%	0.48	$37,956	28,981,000	$13,854,000
10	150,500	122,100	81%	0.48	$59,058	44,567,000	$21,556,000
11	165,500	131,400	79%	0.49	$63,819	47,961,000	$23,294,000
Total	1,355,700	1,116,000	82%		$537,445	407,344,000	$196,166,000

Revenue in 2014 Dollars.

Table 5-11
Estimated Transactions and Toll Revenue
Alternative 7

I-91 HOT Lanes

2020

		I-91 Southbound			I-91 Northbound			I-91 Total		
Time Period		Transactions	Avg Toll	Revenue	Transactions	Avg Toll	Revenue	Transactions	Avg Toll	Revenue
AM1	6:00-7:00	200	$0.50	$100	110	$0.50	$55	310	$0.50	$155
AM2	7:00-8:00	660	$0.50	$330	200	$0.50	$100	860	$0.50	$430
AM3	8:00-9:00	770	$0.50	$385	220	$0.50	$110	990	$0.50	$495
MD	9:00-3:00	860	$0.50	$430	280	$0.50	$140	1,140	$0.50	$570
PM1	3:00-4:00	330	$0.50	$165	530	$0.50	$265	860	$0.50	$430
PM2	4:00:6:00	1,530	$0.50	$765	1,090	$0.50	$545	2,620	$0.50	$1,310
PM3	6:00-7:00	300	$0.50	$150	160	$0.50	$80	460	$0.50	$230
Night	7:00-6:00	270	$0.50	$135	170	$0.50	$85	440	$0.50	$220
Average Weekday		4,920	$0.50	$2,460	2,760	$0.50	$1,380	7,680	$0.50	$3,840
Annual								2,097,000		$1,048,000

2040

		I-91 Southbound			I-91 Northbound			I-91 Total		
Time Period		SOV	Avg Toll	Revenue	SOV	Avg Toll	Revenue	SOV	Avg Toll	Revenue
AM1	6:00-7:00	360	$0.50	$180	230	$0.50	$115	590	$0.50	$295
AM2	7:00-8:00	800	$0.80	$640	540	$0.50	$270	1,340	$0.68	$910
AM3	8:00-9:00	810	$1.20	$972	540	$0.50	$270	1,350	$0.92	$1,242
MD	9:00-3:00	2,210	$0.50	$1,105	1,210	$0.50	$605	3,420	$0.50	$1,710
PM1	3:00-4:00	670	$0.50	$335	830	$0.50	$415	1,500	$0.50	$750
PM2	4:00:6:00	1,450	$1.80	$2,610	1,520	$0.50	$760	2,970	$1.13	$3,370
PM3	6:00-7:00	650	$0.50	$325	280	$0.50	$140	930	$0.50	$465
Night	7:00-6:00	840	$0.50	$420	300	$0.50	$150	1,140	$0.50	$570
Average Weekday		7,790	$0.85	$6,587	5,450	$0.50	$2,725	13,240	$0.70	$9,312
Annual								3,615,000		$2,542,000

I-84 HOT Lanes

2020

		I-84 Westbound			I-84 Eastbound			I-84 Total		
Time Period		Transactions	Avg Toll	Revenue	Transactions	Avg Toll	Revenue	Transactions	Avg Toll	Revenue
AM1	6:00-7:00	160	$0.50	$80	55	$0.50	$28	215	$0.50	$108
AM2	7:00-8:00	820	$1.00	$823	75	$0.50	$38	895	$0.96	$861
AM3	8:00-9:00	650	$0.50	$325	85	$0.50	$43	735	$0.50	$368
MD	9:00-3:00	1,000	$0.50	$500	340	$0.50	$170	1,340	$0.50	$670
PM1	3:00-4:00	320	$0.50	$160	530	$0.50	$265	850	$0.50	$425
PM2	4:00:6:00	610	$0.50	$305	1,700	$0.66	$1,123	2,310	$0.62	$1,428
PM3	6:00-7:00	150	$0.50	$75	170	$0.50	$85	320	$0.50	$160
Night	7:00-6:00	260	$0.50	$130	200	$0.50	$100	460	$0.50	$230
Average Weekday		3,970	$0.60	$2,398	3,155	$0.59	$1,851	7,125	$0.60	$4,249
Annual								1,945,000		$1,160,000

2040

		I-84 Westbound			I-84 Eastbound			I-84 Total		
Time Period		SOV	Avg Toll	Revenue	SOV	Avg Toll	Revenue	SOV	Avg Toll	Revenue
AM1	6:00-7:00	510	$0.50	$255	120	$0.50	$60	630	$0.50	$315
AM2	7:00-8:00	830	$2.17	$1,805	230	$0.50	$115	1,060	$1.81	$1,920
AM3	8:00-9:00	690	$1.04	$719	240	$0.50	$120	930	$0.90	$839
MD	9:00-3:00	1,610	$0.50	$805	1,070	$0.50	$535	2,680	$0.50	$1,340
PM1	3:00-4:00	650	$0.50	$325	1,030	$0.50	$515	1,680	$0.50	$840
PM2	4:00:6:00	1,280	$0.50	$640	1,630	$1.42	$2,310	2,910	$1.01	$2,950
PM3	6:00-7:00	350	$0.50	$175	530	$0.50	$265	880	$0.50	$440
Night	7:00-6:00	760	$0.50	$380	560	$0.50	$280	1,320	$0.50	$660
Average Weekday		6,680	$0.76	$5,104	5,410	$0.78	$4,200	12,090	$0.77	$9,304
Annual								3,301,000		$2,540,000

Table 5-12 shows the 25-year annual trip and gross toll revenue (2014 dollars) stream for Alternatives 1, 2, 3, 4, 5 and 6. 25-year average annual estimates spanning over 2020-2044 are included at the bottom of the table, as well as the annual percent growth rate during this period. Alternative 1 is estimated to produce 46.3 million trips and yield $44.7 million in toll revenue annually on average over the 25-year span. Alternative 2 is estimated to produce 55.5 million trips and $42.9 million in toll revenue annually on average. Alternative 3 is estimated to produce 39.8 million trips and $38.0 million in toll revenue annually on average. Alternative 4 is estimated to produce 54.3 million trips and $41.8 million in toll revenue annually on average. Alternative 5 is estimated to produce 56.4 million trips and $43.6 million in toll revenue annually on average. Alternative 6 is estimated to produce 160.2 million trips and $186.8 million in toll revenue annually on average. The estimated toll revenue for Alternative 6 is approximately 4 to 5 times more than the other alternatives.

Table 5-13 shows the 25-year annual trip and gross toll revenue stream for Alternative 7. Over 25 years, Alternative 7 is estimated to produce 3.0 million trips and $1.2 million (2014 dollars) in toll revenue annually and 2.7 million trips and $1.2 million (2014 dollars) in toll revenue annually for the I-91 and I-84 HOT lanes, respectively.

Table 5-12
Estimated Annual Trips and Toll Revenue

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
Year	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue	Annual Toll Trips	Annual Gross Toll Revenue
2020	43,428,000	$41,668,000	52,649,000	$40,189,000	37,323,000	$35,411,000	51,428,000	$39,179,000	53,440,000	$40,932,000	148,283,000	$173,102,000
2021	43,659,000	$41,910,000	52,882,000	$40,403,000	37,518,000	$35,618,000	51,658,000	$39,390,000	53,681,000	$41,147,000	149,226,000	$174,188,000
2022	43,890,000	$42,153,000	53,116,000	$40,619,000	37,713,000	$35,826,000	51,890,000	$39,602,000	53,923,000	$41,363,000	150,175,000	$175,281,000
2023	44,123,000	$42,397,000	53,351,000	$40,836,000	37,910,000	$36,036,000	52,123,000	$39,815,000	54,165,000	$41,581,000	151,129,000	$176,380,000
2024	44,358,000	$42,643,000	53,587,000	$41,054,000	38,108,000	$36,247,000	52,356,000	$40,030,000	54,409,000	$41,799,000	152,090,000	$177,487,000
2025	44,593,000	$42,890,000	53,824,000	$41,273,000	38,306,000	$36,459,000	52,591,000	$40,245,000	54,654,000	$42,019,000	153,057,000	$178,600,000
2026	44,830,000	$43,139,000	54,062,000	$41,493,000	38,506,000	$36,672,000	52,826,000	$40,462,000	54,901,000	$42,240,000	154,030,000	$179,721,000
2027	45,068,000	$43,389,000	54,302,000	$41,714,000	38,707,000	$36,886,000	53,063,000	$40,680,000	55,148,000	$42,462,000	155,010,000	$180,848,000
2028	45,307,000	$43,641,000	54,542,000	$41,937,000	38,909,000	$37,102,000	53,301,000	$40,899,000	55,396,000	$42,685,000	155,995,000	$181,983,000
2029	45,548,000	$43,894,000	54,783,000	$42,161,000	39,112,000	$37,319,000	53,540,000	$41,119,000	55,646,000	$42,910,000	156,987,000	$183,125,000
2030	45,789,000	$44,148,000	55,026,000	$42,385,000	39,316,000	$37,537,000	53,780,000	$41,340,000	55,897,000	$43,135,000	157,985,000	$184,274,000
2031	46,032,000	$44,404,000	55,269,000	$42,612,000	39,521,000	$37,757,000	54,021,000	$41,563,000	56,148,000	$43,362,000	158,990,000	$185,430,000
2032	46,277,000	$44,662,000	55,514,000	$42,839,000	39,727,000	$37,977,000	54,263,000	$41,787,000	56,401,000	$43,590,000	160,000,000	$186,593,000
2033	46,522,000	$44,921,000	55,760,000	$43,068,000	39,934,000	$38,200,000	54,506,000	$42,012,000	56,655,000	$43,819,000	161,018,000	$187,763,000
2034	46,769,000	$45,181,000	56,006,000	$43,297,000	40,142,000	$38,423,000	54,750,000	$42,238,000	56,910,000	$44,049,000	162,041,000	$188,941,000
2035	47,018,000	$45,443,000	56,254,000	$43,528,000	40,352,000	$38,648,000	54,996,000	$42,465,000	57,167,000	$44,281,000	163,072,000	$190,127,000
2036	47,267,000	$45,707,000	56,503,000	$43,761,000	40,562,000	$38,874,000	55,242,000	$42,694,000	57,424,000	$44,514,000	164,108,000	$191,320,000
2037	47,518,000	$45,972,000	56,753,000	$43,994,000	40,774,000	$39,101,000	55,490,000	$42,924,000	57,683,000	$44,748,000	165,152,000	$192,520,000
2038	47,770,000	$46,238,000	57,004,000	$44,229,000	40,986,000	$39,330,000	55,738,000	$43,155,000	57,943,000	$44,983,000	166,202,000	$193,728,000
2039	48,024,000	$46,506,000	57,257,000	$44,465,000	41,200,000	$39,560,000	55,988,000	$43,387,000	58,204,000	$45,219,000	167,259,000	$194,943,000
2040	48,279,000	$46,776,000	57,510,000	$44,702,000	41,415,000	$39,791,000	56,239,000	$43,621,000	58,466,000	$45,457,000	168,322,000	$196,166,000
2041	48,535,000	$47,048,000	57,764,000	$44,940,000	41,631,000	$40,023,000	56,491,000	$43,856,000	58,729,000	$45,696,000	169,392,000	$197,397,000
2042	48,793,000	$47,321,000	58,019,000	$45,180,000	41,848,000	$40,257,000	56,744,000	$44,093,000	58,993,000	$45,937,000	170,469,000	$198,635,000
2043	49,052,000	$47,596,000	58,275,000	$45,421,000	42,066,000	$40,492,000	56,998,000	$44,331,000	59,259,000	$46,179,000	171,552,000	$199,881,000
2044	49,312,000	$47,872,000	58,532,000	$45,663,000	42,286,000	$40,728,000	57,254,000	$44,570,000	59,526,000	$46,422,000	172,642,000	$201,135,000
Revenue in 2014 Dollars.												
25Yr Avg Pct Change	0.5%	0.6%	0.4%	0.5%	0.5%	0.6%	0.4%	0.5%	0.5%	0.5%	0.6%	0.6%
25Yr Avg 2020-2044	46,300,000	$44,700,000	55,500,000	$42,900,000	39,800,000	$38,000,000	54,300,000	$41,800,000	56,400,000	$43,600,000	160,200,000	$186,800,000

Table 5-13
Estimated Annual Trips and Gross Toll Revenue
Alternative 7

	I-91 HOT Lanes			I-84 HOT Lanes		
	Annual	Annual Gross Toll Revenue		Annual	Annual Gross Toll Revenue	
Year	Toll Trips	Future Year $	2014 Dollars	Toll Trips	Future Year $	2014 Dollars
2020	2,097,000	$1,048,000	$903,700	1,945,000	$1,160,000	$1,000,300
2021	2,155,000	$1,095,000	$921,200	1,997,000	$1,206,000	$1,014,600
2022	2,214,000	$1,145,000	$939,800	2,051,000	$1,255,000	$1,030,000
2023	2,275,000	$1,197,000	$958,500	2,106,000	$1,305,000	$1,045,000
2024	2,338,000	$1,251,000	$977,300	2,162,000	$1,357,000	$1,060,100
2025	2,403,000	$1,308,000	$996,900	2,220,000	$1,411,000	$1,075,400
2026	2,469,000	$1,367,000	$1,016,400	2,279,000	$1,467,000	$1,090,800
2027	2,537,000	$1,429,000	$1,036,600	2,341,000	$1,526,000	$1,107,000
2028	2,607,000	$1,494,000	$1,057,300	2,403,000	$1,587,000	$1,123,200
2029	2,679,000	$1,561,000	$1,077,800	2,468,000	$1,651,000	$1,140,000
2030	2,753,000	$1,632,000	$1,099,400	2,534,000	$1,717,000	$1,156,600
2031	2,829,000	$1,706,000	$1,121,200	2,602,000	$1,785,000	$1,173,100
2032	2,907,000	$1,783,000	$1,143,200	2,671,000	$1,856,000	$1,190,000
2033	2,988,000	$1,864,000	$1,166,000	2,743,000	$1,931,000	$1,207,900
2034	3,070,000	$1,949,000	$1,189,400	2,817,000	$2,008,000	$1,225,400
2035	3,155,000	$2,037,000	$1,212,800	2,892,000	$2,088,000	$1,243,200
2036	3,242,000	$2,129,000	$1,236,700	2,970,000	$2,171,000	$1,261,100
2037	3,331,000	$2,226,000	$1,261,500	3,049,000	$2,258,000	$1,279,600
2038	3,423,000	$2,326,000	$1,286,000	3,131,000	$2,349,000	$1,298,700
2039	3,518,000	$2,432,000	$1,311,800	3,215,000	$2,442,000	$1,317,200
2040	3,615,000	$2,542,000	$1,337,700	3,301,000	$2,540,000	$1,336,600
2041	3,715,000	$2,657,000	$1,364,100	3,389,000	$2,642,000	$1,356,400
2042	3,817,000	$2,777,000	$1,390,900	3,480,000	$2,748,000	$1,376,400
2043	3,922,000	$2,903,000	$1,418,600	3,573,000	$2,858,000	$1,396,600
2044	4,030,000	$3,034,000	$1,446,400	3,669,000	$2,973,000	$1,417,400
Annual Pct Change	2.8%	4.5%	2.0%	2.7%	4.0%	1.5%
25 year Annual Avg	2,963,560	$1,875,680	$1,154,848	2,720,320	$1,931,640	$1,196,904

Chapter 6

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

The purpose of this section is to describe the estimated tolling system related capital and toll system maintenance and operations costs for the proposed alternatives evaluated as part of this study. Alternatives included both all electronic tolling (AET) across all lanes on I-84 in Hartford and between Hartford and the border with New York, as well as on the I-84 and I-91 HOV lanes if converted to HOT lanes. Both the I-84 toll collection system (TCS) and the I-84 and I-91 HOT lane conversions will utilize AETS technology to collect tolls from motorists that choose to use these 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 E-ZPass 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, including conventional tolling projects and high occupancy toll (HOT) lanes, 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 tolling related capital and maintenance and operations (M&O) of the following tolling alternatives:

- **Alternative 1 -** Assumes the current configuration ("No Build") of I-84 with a single point toll gantry located east of the Sigourney ramps. The toll for a passenger vehicle equipped with a transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively. For this and the other below six I-84 toll alternatives a toll for a vehicle not equipped with a transponder and captured through license plate tolling was assumed to be 50% higher and all commercial vehicles were assumed to pay a proportionately higher toll rate based on the number of vehicle axles.

- **Alternative 2 -** Assumes the current configuration ("No Build") of I-84 with two tolling locations. The first gantry was assumed to be west of the Sisson Avenue Interchange and the second gantry east of the Asylum/Capitol Avenue interchange. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively.

- **Alternative 3 –** This alternative assumes a reconfigured I-84 through Hartford with major reconstruction and consolidation of the existing interchanges on the western and eastern edges of the Viaduct. The interchange with Sigourney Street is assumed to be removed. Alternative 3 assumes the same point toll location as used in Alternative 1. The toll for a passenger vehicle equipped with a transponder was assumed to be $1.00 and $0.75 for peak and off peak time periods, respectively.

- **Alternative 4** – Same as Alterative 3, but with two tolling locations. The first tolling gantry is assumed to be west of a new West Boulevard/Sisson Avenue Interchange and the second tolling

location east of a new Church Street interchange. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively.

- **Alternative 5 -** Assumes I-84 is reconfigured through Hartford with the addition of a collector-distributor (C-D) roadway. This alternative assumes two tolling locations, strategically positioned just outside of the C-D and I-84 connections so as to prevent the C-D roadway from being used as a toll diversion alternative. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.375 for peak and off peak time periods, respectively.

- **Alternative 6 -** Assumes an expanded tolling configuration consisting of 11 AET locations spaced approximately 6 miles apart along I-84 from the New York border to Hartford. The toll at each location for a passenger vehicle equipped with a transponder was assumed to be $0.50 and $0.35 for peak and off peak time periods, respectively.

- **Alternative 7 -** Assumes the conversion of the existing I-91 and I-84 HOV lanes to HOT lanes. Toll rates would vary dynamically in response to traffic conditions on each of the facilities to ensure that the HOT lanes operate near or at free flow at all times of the day. The existing physical configuration of the high occupancy vehicle (HOV) lanes is such that a single tolling location could be implemented on each of the corridors to manage single occupancy vehicle (SOV) demand through dynamic pricing.

The tolling related 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 ConnDOT; and

- Self-operating the full back office operation where ConnDOT sets up and staffs 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. Some of the toll agencies choose to initially implement the outsourced option and migrate 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 for conventional and HOT lane facilities;

- Civil costs for toll gantry footings, lane controller pads and closed circuit TV (CCTV) poles are not included in the cost estimates;
- 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;
- Estimated annual trips for each alternative were used to estimate the M&O costs;
- ConnDOT management and oversight staff will be required to support the outsourced back office operations approach and these costs are included in the cost estimates;
- 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 AET system design, development, integration, testing and implementation 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 facilities. 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. 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. Other associated equipment that will be required includes illumination devices to enhance the license plate images and vehicle separation overhead scanners. Toll zone and Host equipment costs are estimated for each of the 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 CCTV subsystems will be comprised of video cameras that will be installed at a location that will allow ConnDOT 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 alternatives.

Toll System Software

The toll system software licenses that are required for the AET system include the back office and roadside locations. The required software will be provided 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 licensing costs include the design and development of each of these subsystems that will be provided by the toll systems integrator (TSI) and the back office platform provider(s). The total estimated cost of all required AET software is estimated below for each tolling alternative.

Alternative 1 – Tolling I-84 (Single Point Toll on I-84 in Hartford)

Table 6-1 below shows the summary for the estimated capital cost for Alternative 1. The estimated actual toll equipment and infrastructure cost is $2,657,000, the system design, development and deployment cost is $8,251,000 and the total electronic toll system (ETS) estimated capital cost is $10,908,000. With a 20% contingency the total estimated cost would be $13,089,600.

Table 6-1 – Alternative 1 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 1 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$714,000
ETC Equipment	490,000
VES Equipment	168,000
CSC Equipment	490,000
CCTV Equipment	17,000
Vehicle Detection Equipment	165,000
Spare Equipment	183,000
Toll Gantries (includes installation)	380,000
CCTV Poles (includes installation)	50,000
Subtotal	**$2,657,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty	56,000
Training	500,000
Project Management	1,500,000
Equipment Installation	310,000
Subtotal	**$8,251,000**
Total Estimated Capital Costs	**$10,908,000**
20% Contingency	$2,181,600
Total Estimated Costs with Contingency	**$13,089,600**

Alternative 2 – Tolling I-84 (Two Toll Locations in Hartford)

Presented below as **Table 6-2** is the summary for the estimated capital cost for Alternative 2. The estimated actual toll equipment and infrastructure cost is $4,180,000, the system design, development and deployment cost is $8,529,000 and the total ETS estimated capital cost is $12,709,000. With a 20% contingency the total estimated cost would be $15,250,800.

Table 6-2 – Alternative 2 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 2 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$1,303,000
ETC Equipment	875,000
VES Equipment	300,000
CSC Equipment	490,000
CCTV Equipment	34,000
Vehicle Detection Equipment	165,000
Spare Equipment	183,000
Toll Gantries (includes installation)	730,000
CCTV Poles (includes installation)	100,000
Subtotal	**$4,180,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty	84,000
Training	500,000
Project Management	1,500,000
Equipment Installation	560,000
Subtotal	**$8,529,000**
Total Estimated Capital Costs	**$12,709,000**
20% Contingency	$2,541,800
Total Estimated Costs with Contingency	**$15,250,800**

Alternative 3 – Tolling I-84 (Single Point Toll on I-84 in Hartford)

Table 6-3 shows the summary for the estimated capital cost for Alternative 3. The estimated actual toll equipment and roadside infrastructure cost is $2,419,000, the system design, development and deployment cost is $8,206,000 and the total ETS estimated capital cost is $10,625,000. With a 20% contingency the total estimated cost would be $12,750,000.

Table 6-3 – Alternative 3 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 3 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$630,000
ETC Equipment	420,000
VES Equipment	144,000
CSC Equipment	490,000
CCTV Equipment	17,000
Vehicle Detection Equipment	165,000
Spare Equipment	183,000
Toll Gantries (includes installation)	320,000
CCTV Poles (includes installation)	50,000
Subtotal	**$2,419,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty	51,000
Training	500,000
Project Management	1,500,000
Equipment Installation	270,000
Subtotal	**$8,206,000**
Total Estimated Capital Costs	**$10,625,000**
20% Contingency	$2,125,000
Total Estimated Costs with Contingency	**$12,750,000**

Alternative 4 – Tolling I-84 (Two Toll Locations in Hartford)

Table 6-4 shows the summary for the estimated capital cost for Alternative 4. The estimated actual toll equipment and infrastructure cost is $4,001,000, the system design, development and deployment cost is $8,507,000 and the total ETS estimated capital cost is $12,508,000. With a 20% contingency the total estimated cost would be $15,009,600.

Table 6-4 – Alternative 4 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 4 Tolling System Summary of Estimated Toll System Capital Costs	
ETS System Cost	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$1,261,000
ETC Equipment	840,000
VES Equipment	288,000
CSC Equipment	490,000
CCTV Equipment	34,000
Vehicle Detection Equipment	165,000
Spare Equipment	183,000
Toll Gantries (includes installation)	640,000
CCTV Poles (includes installation)	100,000
Subtotal	**$4,001,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	5,135,000
Documentation	750,000
Warranty	82,000
Training	500,000
Project Management	1,500,000
Equipment Installation	540,000
Subtotal	**$8,507,000**
Total Estimated Capital Cost	**$12,508,000**
20% Contingency	2,501,600
Total Estimated Costs with Contingency	**$15,009,600**

Alternative 5 – Tolling I-84 (Two Toll Locations in Hartford)

Table 6-5 shows the summary for the estimated capital cost for Alternative 5. The estimated actual toll equipment and infrastructure cost is $3,763,000 the system design, development cost is $8,462,000 and the total ETS estimated capital cost is $12,225,000. With a 20% contingency the total estimated cost would be $14,670,000.

Table 6-5 – Alternative 5 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 5 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$1,177,000
ETC Equipment	770,000
VES Equipment	264,000
CSC Equipment	490,000
CCTV Equipment	34,000
Vehicle Detection Equipment	165,000
Spare Equipment	183,000
Toll Gantries (includes installation)	580,000
CCTV Poles (includes installation)	100,000
Subtotal	**$3,763,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty	77,000
Training	500,000
Project Management	1,500,000
Equipment Installation	500,000
Subtotal	**$8,462,000**
Total Estimated Capital Cost	**$12,225,000**
20% Contingency	2,445,000
Total Estimated Costs w/ Contingency	**$14,670,000**

Alternative 6 – Tolling I-84 (Expanded Tolling Between Hartford and New York)

Table 6-6 shows the summary for the estimated capital costs for Alternative 6. The estimated actual toll equipment and infrastructure cost is $16,106,000, the system design, development and deployment cost is $10,732,000 and the total ETS estimated capital cost is $26,838,000. With a 20% contingency the total estimated cost would be $32,205,600.

Table 6-6 – Alternative 6 – Estimated Tolling Capital Costs

CTDOT I-84 Alternative 6 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$6,017,000
ETC Equipment	3,850,000
VES Equipment	1,320,000
CSC Equipment	490,000
CCTV Equipment	187,000
Vehicle Detection Equipment	292,500
Spare Equipment	539,500
Toll Gantries (includes installation)	2,860,000
CCTV Poles (includes installation)	550,000
Subtotal	**$16,106,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,135,000
Documentation	750,000
Warranty	317,000
Training	500,000
Project Management	1,500,000
Equipment Installation	2,530,000
Subtotal	**$10,732,000**
Total Estimated Capital Costs	**$26,838,000**
20% Contingency	5,367,600
Total Estimated Costs w/ Contingency	**$32,205,600**

Alternative 7 – I-84 and I-91 HOT Lanes

Table 6-7 shows the summary for the estimated capital cost for Alternative 7, which is to deploy HOT lanes on these two facilities. The estimated actual toll equipment and infrastructure cost is $2,032,000, the system design, development and deployment cost is $8,605,000 and the total ETS estimated capital cost is $10,637,000. With a 20% contingency the total estimated cost would be $12,764,400.

Table 6-7 – Alternative 7 – I-84 and I-91 HOT Lanes Estimated Tolling Capital Costs

CTDOT I-84 and I-91 HOT Lanes Alternative 7 Tolling System Summary of Estimated Toll System Capital Costs	
Electronic Toll System Costs	
Equipment/Communications	**Estimated Cost (2014$)**
Roadside Equipment	$281,000
ETC Equipment	200,000
VES Equipment	48,000
CSC Equipment	467,500
Dynamic Message Signs	60,000
CCTV Equipment	34,000
Vehicle Detection Equipment	165,000
Spare Equipment	116,500
Toll Gantries (includes installation)	300,000
CCTV Poles (includes installation)	200,000
DMS Gantries (including installation)	100,000
Subtotal	**$2,032,000**
System Design, Development and Deployment	**Estimated Cost (2014$)**
Software	$5,385,000
Documentation	750,000
Warranty	150,000
Training	500,000
Project Management	1,500,000
Equipment Installation	320,000
Subtotal	**$8,605,000**
Total Estimated Capital Costs	**$10,637,000**
20% Contingency	2,127,400
Total Estimated Costs w/ Contingency	**$12,764,400**

Toll Maintenance & Operations Costs

The estimated toll maintenance and operations costs are presented herein for both a self-operated and outsourced back office approach, including the ETC account management, customer service center, and violation processing system. Under each scenario the maintenance of the AET system toll equipment, software and all subsystems is assumed to be conducted by the TSI, under a contract with ConnDOT.

Back Office Outsourced Approach

The outsourced back office operation estimated costs are presented in sections below for each of the 7 tolling alternatives. The outsourced approach includes a reduced number of ConnDOT staff to support the AET system 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 operational costs. The actual costs may vary depending on the specific ConnDOT outsourcing requirements and which operator is selected. A 20% contingency is included and all labor costs are in 2014 dollars. All costs associated with fees for credit cards, ACH, etc. are not included in the below cost estimates and may (or may not) be included in the outsourcing operators per transaction cost, which is subject to negotiations with the operators during the selection process.

Back Office Self-Operated Approach

The self-operated back office operation presented herein includes a full ConnDOT 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 each of the tolling alternatives. A 20% contingency is also included. All estimated labor costs are in 2014 dollars and costs associated with fees for credit cards, ACH, etc. are not included.

Alternative 1 – Tolling I-84 (Single Point Toll on I-84 in Hartford)

Table 6-8 below shows the estimated M&O costs for Alternative 1. The total estimated M&O outsourced back office cost is $5,642,000. Applying a 20% contingency increases the outsourced costs to $6,770,400. The self-operated estimated M&O costs is $3,138,000 and increases to $3,765,600 when adding a 20% contingency. The cost differential is primarily due to the increased transaction processing cost under the outsourced operational scenario.

Table 6-8 – Alternative 1 – Estimated Tolling M&O Costs

CTDOT I-84 Alternative 1 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	862,000
Transaction Record Processing	4,134,000
Total Maintenance and Operating Cost	**$5,642,000**
Total Cost with 20% Contingency	**$6,770,400**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,386,000
Maintenance and Miscellaneous	883,000
Transaction Record Processing	869,000
Total Maintenance and Operating Cost	**$3,138,000**
Total Cost with 20% Contingency	**$3,765,600**

Alternative 2 – Tolling I-84 (Two Toll Locations in Hartford)

Table 6-9 below shows a summary of the estimated M&O costs for Alternative 2. The total estimated M&O outsourced back office operational cost is $6,565,000. Adding a 20% contingency increases the costs to $7,878,000. The estimated M&O costs for a self-operated approach is $3,381,000 and increases to $4,057,200 when adding a 20% contingency.

Table 6-9 – Alternative 2 – Estimated Tolling M&O Costs

CTDOT I-84 Alternative 2 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	921,000
Transaction Record Processing	4,998,000
Total Maintenance and Operating Cost	**$6,565,000**
Total Cost with 20% Contingency	**$7,878,000**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,386,000
Maintenance and Miscellaneous	942,000
Transaction Record Processing	1,053,000
Total Maintenance and Operating Cost	**$3,381,000**
Total Cost with 20% Contingency	**$4,057,200**

Alternative 3 – Tolling I-84 (Single Point Toll on I-84 in Hartford)

Table 6-10 shows the summary of estimated M&O costs for Alternative 3. The total estimated M&O outsourced back office operational cost is $4,996,000. Applying a 20% contingency increases the costs to $5,995,200. The estimated M&O costs for a self-operated operational approach is $2,975,000 and increases to $3,570,000 when adding a 20% contingency.

Table 6-10 – Alternative 3 – Tolling I-84 Estimated M&O Costs

CTDOT I-84 Alternative 3 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	822,000
Transaction Record Processing	3,528,000
Total Maintenance and Operating Cost	**$4,996,000**
Total Cost with 20% Contingency	**$5,995,200**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,386,000
Maintenance and Miscellaneous	843,000
Transaction Record Processing	746,000
Total Maintenance and Operating Cost	**$2,975,000**
Total Cost with 20% Contingency	**$3,570,000**

Alternative 4 – Tolling I-84 (Two Toll Locations in Hartford)

Table 6-11 below shows a summary of the estimated M&O costs for Alternative 4. The total estimated outsourced M&O back office operational cost is $6,437,000. Adding a 20% contingency increases the M&O costs to $7,724,400. The estimated M&O costs for a self-operated approach is $3,350,000 and increases to $4,020,000 when adding a 20% contingency.

Table 6-11 – Alternative 4 – Tolling I-84 Estimated M&O Cost

CTDOT I-84 Alternative 4 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	914,000
Transaction Record Processing	4,877,000
Total Maintenance and Operating Cost	**$6,437,000**
Total Cost with 20% contingency	**$7,724,400**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,386,000
Maintenance and Miscellaneous	935,000
Transaction Record Processing	1,029,000
Total Maintenance and Operating Cost	**$3,350,000**
Total Cost with 20% contingency	**$4,020,000**

Alternative 5 – Tolling I-84 (Two Toll Locations in Hartford)

Table 6-12 shows a summary of the estimated M&O costs for Alternative 5. The total estimated M&O outsourced back office operational cost is $6,646,000. Adding a 20% contingency increases the costs to $7,975,200. The estimated M&O costs for a self-operated approach is $3,403,000 and increases to $4,083,600 when adding a 20% contingency.

Table 6-12 – Alternative 5 – Tolling I-84 Estimated M&O Costs

CTDOT I-84 Alternative 5 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	927,000
Transaction Record Processing	5,073,000
Total Maintenance and Operating Cost	**$6,646,000**
Total Cost with 20% contingency	**$7,975,200**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,386,000
Maintenance and Miscellaneous	948,000
Transaction Record Processing	1,069,000
Total Maintenance and Operating Cost	**$3,403,000**
Total Cost with 20% contingency	**$4,083,600**

Alternative 6 – Tolling I-84 (Expanded Tolling Between Hartford and New York)

Table 6-13 shows a summary of the estimated M&O costs for Alternative 6. The total estimated M&O outsourced back office operational cost is $17,502,000. Adding a 20% contingency increases the costs to $21,002,400. The estimated M&O costs for a self-operated approach is $7,474,000 and increases to $8,968,800 when adding a 20% contingency.

Table 6-13 – Alternative 6 – Tolling I-84 Estimated M&O Costs

CTDOT I-84 Alternative 6 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$973,000
Maintenance and Miscellaneous	2,454,000
Transaction Record Processing	14,075,000
Total Maintenance and Operating Cost	**$17,502,000**
Total Cost with 20% contingency	**$21,002,400**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$2,077,000
Maintenance and Miscellaneous	2,431,000
Transaction Record Processing	2,966,000
Total Maintenance and Operating Cost	**$7,474,000**
Total Cost with 20% contingency	**$8,968,800**

Alternative 7 – I-84 and I-91 HOT Lanes

Table 6-14 shows a summary of the estimated M&O costs for Alternative 7. The total estimated M&O outsourced back office operational cost is $1,571,000. Adding a 20% contingency increases the costs to $1,885,200. The estimated M&O costs for a self-operated approach is $1,764,000 and increases to $2,116,800 when adding a 20% contingency. The cost for self-operated approach is actually higher than the outsourced-approach mainly due the relatively low volume of toll traffic in the HOT lanes.

Table 6-14 – Alternative 7 – I-84 and I-91 HOT Lane Estimated M&O Costs

CTDOT I-84 and I-91 HOT Lanes Alternative 7 Tolling System Estimated Annual Tolling Maintenance and Operating Costs	
Outsourced Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$646,000
Maintenance and Miscellaneous	540,000
Transaction Record Processing	385,000
Total Maintenance and Operating Cost	**$1,571,000**
Total Cost with 20% contingency	**$1,885,200**
Self Operated Back Office and Customer Service	
	Estimated Cost (2014$)
Back Office Staff	$1,122,000
Maintenance and Miscellaneous	561,000
Transaction Record Processing	81,000
Total Maintenance and Operating Cost	**$1,764,000**
Total Cost with 20% contingency	**$2,116,800**

Net Toll Revenue

Table 6-15 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. For the I-84 Hartford based alternatives (1-5), cumulative net toll revenue over a 25-year period is estimated to range between $768 Million to $990 Million. Alternative 6 which includes expanded tolling between Hartford and New York is estimated to produce between $4.064 and $4.365 Billion in cumulative net toll revenue over a 25-year period. Alternative 7 is estimated to produce annual gross toll revenue that is higher than the annual tolling O&M costs. However, including the tolling capital cost amortized over a ten-year period in addition to the tolling O&M costs and subtracting from the gross toll revenue results in an overall negative net toll revenue for the HOT lanes.

Table 6-15
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	$44,700,000	$3,765,600	$1,308,960	$39,625,440	$990,636,000
2	$42,900,000	$4,057,200	$1,525,080	$37,317,720	$932,943,000
3	$38,000,000	$3,570,000	$1,275,000	$33,155,000	$828,875,000
4	$41,800,000	$4,020,000	$1,500,960	$36,279,040	$906,976,000
5	$43,600,000	$4,083,600	$1,467,000	$38,049,400	$951,235,000
6	$186,800,000	$8,968,800	$3,220,560	$174,610,640	$4,365,266,000
7	$2,351,752	$2,116,800	$1,276,440	-$1,041,488	-$26,037,000

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	$44,700,000	$6,770,400	$1,308,960	$36,620,640	$915,516,000
2	$42,900,000	$7,878,000	$1,525,080	$33,496,920	$837,423,000
3	$38,000,000	$5,995,200	$1,275,000	$30,729,800	$768,245,000
4	$41,800,000	$7,724,400	$1,500,960	$32,574,640	$814,366,000
5	$43,600,000	$7,975,200	$1,467,000	$34,157,800	$853,945,000
6	$186,800,000	$21,002,400	$3,220,560	$162,577,040	$4,064,426,000
7	$2,351,752	$1,885,200	$1,276,440	-$809,888	-$20,247,000

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 7

I-84 Hartford Operations Analysis

In order to assess the potential operational impacts from tolling I-84 in Hartford, a microscopic simulation model was developed by Cambridge Systematics using the TransModeler modeling platform. The purpose of building a microsimulation model was to evaluate the traffic impacts of various pricing and operational improvement alternatives.

The microsimulation model was built to include the transportation network which could be potentially impacted by the alternatives, including local arterials through Hartford. The microsimulation model includes I-84 from Trout Brook Drive (Exit 42) in West Hartford to the Middle Turnpike / U.S. 6 / U.S. 44 (Exit 61) in Manchester. The model also includes portions of I-91 from Brainard Road (Exit 27) to Trumbull Street (Exit 32B). Also included are the connections to I-384, Route 15, and Route 2. The microsimulation model also includes a significant portion of the arterial system in downtown Hartford. **Figure 7-1** highlights in orange the roadways which are explicitly simulated in the model.

Figure 7-1
Simulation Model Geographic Limits

Source of Aerial Imagery: Google Maps

This chapter summarizes the development of the simulation model as well as the operational findings from exercising the model under the various study alternatives. Cambridge Systematics created two reports for this study. The first report documents the development and calibration of the simulation model and the second report documents the results from application of the model to the study alternatives. These are found as **Appendices B** to this report.

Base Year Model Development and Calibration

The following section outlines the development of the base year subarea demand model used in the simulation model.

Subarea Demand Model Development

The network structure used in the model development was extracted from the Capital Region Council of Government (CRCOG) time-of-day regional travel demand model in the TransCAD modeling platform, as adjusted and updated by CDM Smith. The updated CRCOG model considers a two hour AM peak period (7 a.m. to 9 a.m.) and a three hour PM peak period (3 p.m. to 6 p.m.). Along with the subarea network extraction, an Origin-Destination matrix for the subarea was also extracted from the updated time-of-day CRCOG model.

Existing Year Subarea Demand Estimation

Following the creation of the subarea demand model, an iterative multi-class (SOVs, HOVs, & Trucks) Origin Destination Matrix Estimation (ODME) procedure was undertaken to refine the existing year AM and PM peak period demands as produced by the updated CRCOG time-of-day model to better match the AM and PM peak period counts.

OD Validation Criteria

Following the AM and PM peak period subarea OD adjustments, the resulting TransCAD subarea highway assignment link volumes were validated against the total peak period volume counts in the simulation subarea. The established criteria were to have a GEH value of 5.0 or less for at least 85% of the count links used in the ODME process. This is a published and recognized threshold in the modeling community. A GEH of less than 5.0 is considered a good match between the modelled and observed volumes. The GEH statistic, named such after the creator Geoffrey E. Havers, is calculated using the following formula:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

where: M = Modeled volume
C = Count volume

Tables 7-1 and 7-2 indicate the distribution of GEH statistics for the AM and PM peak periods. The criterion of at least 85% of counts with a GEH of 5.0 or less was met for both peak periods.

Table 7-1
OD VALIDATION GEH STATISTICS FOR THE AM PEAK PERIOD

Number of Counts	Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	Validation Criteria Threshold and Result
521	GEH <= 1	184	35.3%	N/A
521	GEH <= 3	371	71.2%	N/A
521	**GEH <= 5**	**459**	**88.1%**	**> 85% (met)**
521	GEH <= 7	485	93.1%	N/A

Table 7-2
OD VALIDATION GEH STATISTICS FOR THE PM PEAK PERIOD

Number of Counts	Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	Validation Criteria Threshold and Result
521	GEH <= 1	192	36.9%	N/A
521	GEH <= 3	387	74.3%	N/A
521	**GEH <= 5**	**464**	**89.1%**	**> 85% (met)**
521	GEH <= 7	483	92.7%	N/A

Base Year Microsimulation Model Development

This section discusses the development and calibration of the TransModeler microsimulation model. The model was developed to perform a detailed operations assessment of the study area under varying future year geometric and tolling conditions.

Network Development

The initial step in developing a microsimulation model is to ensure that it accurately represents the roadway infrastructure. This includes developing the simulation network to match existing conditions in terms of number of lanes and geometric details, signal infrastructure, parking regulations, and typical free flow travel speeds. The subarea network initially developed from the CRCOG model was used as the basis for the microsimulation model network. The TransCAD subarea network was imported into a TransModeler microsimulation network.

Details regarding the exact lane configurations for highway ramp and intersection turning lanes, peak period parking regulations, and posted speed limits were coded into in the simulation model based on a combined review of available aerial orthophotography, the Skycomp aerial surveillance imagery, available online ground level photos (e.g. Google StreetView), and field observations.

As the subarea demand model does not contain any intersection controls, stop signs, yield signs, and traffic signals, these controls had to be added to the microsimulation network. Unsignalized control were added based on aerial photos, ground photos, and field observations. Signalized controls were added according to the actual controller data as collected from the operating agencies. Full signal

controls, including any actuation and detectors details, coordination information, and pedestrian phases were included in the simulation model.

Calibration and Validation Process

Before the microscopic models can be used to evaluate the future traffic operations, the models needed to be adjusted to ensure that they represent observed traffic conditions in the study area. The process is collectively referred to as calibration and validation. The procedure entails the adjustment of network attributes and model parameters in order to replicate a certain set of observed conditions.

During the calibration stage of the microsimulation model, adjustments of the local network attributes, coefficients, and parameters were made to replicate the observed conditions. Throughout the calibration process, the overall simulated results were compared to the observed conditions and the overall model estimates of system performance (e.g., simulated volumes, congested speeds, and queues) were compared to the field observations. Depending on the results, adjustments were made to the simulation model parameters. Throughout the calibration, roadway speed limits were adjusted to not only reflect posted speed limits but the free flow speed limit and perceived attractiveness (a perceived higher speed equals a shorter travel time) of using the roadway for route choice. Finally, in selected locations where programmed signal timing plans were providing insufficient capacity for the simulated demands, minor adjustments to the timing plans were made to better reflect observed intersection throughput and field observations of phase green times.

Microscopic Calibration Results

Observed data was collected for and compared to three performance measures – volumes, congested travel speeds, and queues. Each of these measures was used during calibration to various degrees. The general rule in simulation model applications is that as the model coverage increases, the model validation precision decreases. Furthermore, it is assumed that links with higher hourly volumes will have less day-to-day percent variability in traffic volume, and therefore, expected variation should be lower. Similarly, as the average link volumes decrease, it is assumed that there is higher variability in observed counts; therefore, the expected variation should be higher.

The calibration and validation process was an iterative cycle of running the model, testing simulated results for reasonableness and against validation criteria, revising the network, demand, route choice, and scenario parameters, and then rerunning the models. The following sections present the validation results for the final AM and PM period models.

Volume Validation

The GEH statistics for average flow rates were calculated by comparing the modeled hourly flows to the observed count data, and are reported in **Tables 7-3 through Table 7-6** for the Highway and Arterial road classes for the AM and PM peak periods in the final base year simulation model. The established target for the volume calibration was to have eighty-five percent (85%) of links with a GEH value of five (5) or lower.

TABLE 7.3: AM PEAK PERIOD FREEWAY VOLUME VALIDATION RESULTS

Number of Freeway & Ramp Count Locations	Criteria	7 - 8 AM		8 - 9 AM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
158	GEH <= 5	120	76%	111	70%
	GEH <= 6	132	84%	119	75%
	GEH <= 7	136	86%	130	82%
	GEH <= 8	139	88%	134	85%
	GEH <= 9	142	90%	141	89%
	GEH <= 10	147	93%	147	93%

TABLE 7.4: AM PEAK PERIOD ARTERIAL VOLUME VALIDATION RESULTS

Number of Arterial Count Locations	Criteria	7 - 8 AM		8 - 9 AM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
343	GEH <= 5	187	55%	185	54%
	GEH <= 6	221	64%	209	61%
	GEH <= 7	239	70%	225	66%
	GEH <= 8	253	74%	245	71%
	GEH <= 9	263	77%	260	76%
	GEH <= 10	277	81%	276	80%

TABLE 7.5: PM PEAK PERIOD FREEWAY VOLUME VALIDATION RESULTS

Number of Freeway & Ramp Count Locations	Criteria	3 - 4 PM		4 - 5 PM		5 - 6 PM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
158	GEH <= 5	106	67%	112	71%	111	70%
	GEH <= 6	120	76%	122	77%	124	78%
	GEH <= 7	126	80%	130	82%	132	84%
	GEH <= 8	126	80%	130	82%	132	84%
	GEH <= 9	140	89%	140	89%	145	92%
	GEH <= 10	147	93%	146	92%	147	93%

TABLE 7.6: PM PEAK PERIOD ARTERIAL VOLUME VALIDATION RESULTS

Number of Arterial Count Locations	Criteria	3 - 4 PM		4 - 5 PM		5 - 6 PM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
333	GEH <= 5	189	57%	190	57%	158	47%
	GEH <= 6	221	66%	205	62%	177	53%
	GEH <= 7	242	73%	227	68%	201	60%
	GEH <= 8	257	77%	245	74%	218	65%
	GEH <= 9	266	80%	259	78%	233	70%
	GEH <= 10	284	85%	268	80%	251	75%

It is noted that while the validation targets were met for the subarea demand model calibration, the microscopic model's volume validation were below the targets. There are several reasons that the validation targets for the microscopic model were below the ODME results. Foremost amongst these reasons is the differences in the vehicle assignment methodologies. The microscopic model is a dynamic route choice model that considers varying travel time conditions throughout the simulated peak period, and the ODME macroscopic model is a static route choice model that routes vehicles against only the average conditions during the peak period. An additional difference between the assignment methodologies is in the number of paths used. In the ODME model, a single path is chosen for all vehicles traveling between each OD pair, while in the microscopic model vehicles are routed to a variety of routes with similar generalized route travel time costs.

Another key set of differences exists in the underlying differences between the vehicle flow models. The ODME macro model is an aggregate peak period model and does not consider the impacts of the time required for vehicles to traverse the network, queue spillback blockage delays, or other detailed operational delays at signals, turning delays, weaving sections, or other capacity constrained areas of the model. The microscopic model of course does consider these effects, which is why the model is a much better analysis platform for assessing operational impacts. However, these additional delays and queuing concerns, combined with the temporal impacts of vehicles traversing the network over a period of time complicate the calibration of the mesoscopic model and result in lower validation numbers when compared to the ODME validation results.

Finally, as stated previously, the calibration of the microscopic model is not only a volume based validation, but also considers travel time and speed validation parameters. In order to properly calibrate the travel time and speed components (and the bottlenecks that cause these effects), the calibration of the microscopic model is often a balancing act between meeting the volume targets and the non-volume targets. This is yet another reason why the microsimulation validation targets are lower than the ODME validation results and lower than preferred.

Speed Contours Comparison

INRIX data of congested speeds were available for the 2012 calendar year throughout the study area for comparison against simulated speeds. **Figures 7-2 through 7-5** show the comparisons of the observed INRIX speed data and the simulation speed data throughout the AM and PM peak periods for eastbound and westbound direction along I-84.

Under existing conditions, I-84 has many congested sections through downtown Hartford. These sections of I-84 have many closely spaced interchanges that create weaving conflicts between traffic entering and exiting the highway. This section of I-84 has substandard shoulder widths with an undesirable horizontal alignment. Within this section of I-84 there are some left side exit and entrance ramps. On I-84 through downtown Hartford the horizontal and vertical sight distances are insufficient due to the tunnel and the viaduct. These design deficiencies of I-84 combined with high demands lead to congestion slowdowns and frequent accidents.[1]

During the AM peak period, the I-84 westbound direction is the peak direction of traffic demand. As observed in the INRIX speed contours in **Figure 7-2**, significant congestion is seen to the east of the Asylum Street off ramp (Exit 48). Just upstream of the Asylum Street off ramp, a weaving section is formed with the nearby High Street on ramp. The Asylum Street off ramp in the westbound direction combined with the proximity of the traffic signal at Asylum Avenue and Farmington Avenue and the complex nature of the intersection which demands quick lane changes create traffic slowdown and queues on the off ramp. On many occasions during the AM peak period, the congestion on the off ramp leads to standing queues which spills back on to the freeway mainline. When this off ramp failure occurs, the weaving section between High Street and Asylum Street sees delays increase enormously due to breakdown of the operations of the weaving section, and this can cause a cascading effect on the congestion at this location. To the east of this weaving section there are number of on and off ramps with inadequate acceleration/deceleration lanes, along with the horizontal and vertical sight distance issues with the tunnel. During the AM peak period, this combination of high demands and the inadequate design of I-84 leads to congestion and slow travel speeds which extend back and beyond the Route 2 interchange.

In the AM peak period, the eastbound direction of I-84 is, for the most part, uncongested due to the lower demand. Some slowdown is observed west of Flatbush Avenue due to the friction in traffic stream flow with vehicles getting on at the Flatbush on ramp (Exit 45) **Figure 7-3**. The calibrated simulation model accurately reproduces the location and the severity of congestion on I-84 as shown in **Figure 7-2 and 7-3.**

During the PM peak period, in the westbound direction the nature of the demand is different than during the AM peak period. In the AM peak period, vehicles access the off ramps to Sigourney Street, Asylum Avenue, and Main Street to travel to the business district in the downtown Hartford area. In the PM peak period the demand patterns are different with reduced demands for these off ramps and increases in the demand for the Flatbush Avenue off ramp (Exit 45) further west of the downtown area. Due to the nature of the left hand exit and the friction with vehicles entering from the Sisson Avenue on ramp, significant slowdown of traffic is observed approaching the Flatbush Avenue off ramp. While the simulated congestion patterns do not fully capture the temporal nature of the observed congestion **(Figure 7-4)**, the major bottleneck location at the Flatbush Avenue off ramp is well captured in the calibrated simulation. During the PM period, the eastbound direction is the peak demand direction where the demand of vehicles depart the downtown Hartford area to destinations east of the Connecticut River are high. The Bulkeley Bridge (I-84) and Founders Bridge (Route 2) are the two local options for vehicles to cross the Connecticut River from the downtown area. The capacity of these bridges acts as the limiting factor for vehicles wanting to cross the river during the PM peak period. In addition to the limited capacity over the Bulkeley Bridge, the reduced sight distances in the tunnel and design deficiencies of I-84 contribute to significant congestion on I-84 in the eastbound direction during the PM peak period. The calibrated simulation model accurately

[1] http://www.i84hartford.com

reproduces the congestion and slowdown on the Bulkeley Bridge on I-84 in the eastbound direction, as shown in **Figure 7-5**. The secondary bottleneck just west of the Capitol Avenue interchange, however, is not as well captured in the simulation model.

Queue Lengths and Areas of Congestion

The model results were checked to observe areas of queues and areas of high flow densities as simulated in the model, both on the freeways and the arterials. These congestion areas were qualitatively reviewed and validated against the Skycomp aerial photo survey imagery and summary report. The results of these modeler's audits found that simulation results accurately represent the congested locations known to exist in typical weekday peak period conditions.

Calibration Summary

The purpose of the simulation model development was to develop a tool with which to estimate the impacts on the operations of both I-84 and the downtown Hartford arterial network under possible tolling strategies along I-84 in downtown Hartford. Though the volume validation results are below established targets for the microsimulation model due to the reasons discussed in this chapter, the model does a good job of simulating the congestion patterns in the study area. The model replicates the location and intensity of congestion at the major bottleneck locations along I-84, and locations of congestion on the arterial street grid. The model was found to be adequately capable of representing the base conditions and fit to be applied for future year alternative analysis to assess the impact to I-84 and the local network under various I-84 tolling alternatives in Hartford.

Figure 7-2

Speed Profiles I-84 WB (AM Peak Period) – Observed versus Simulation

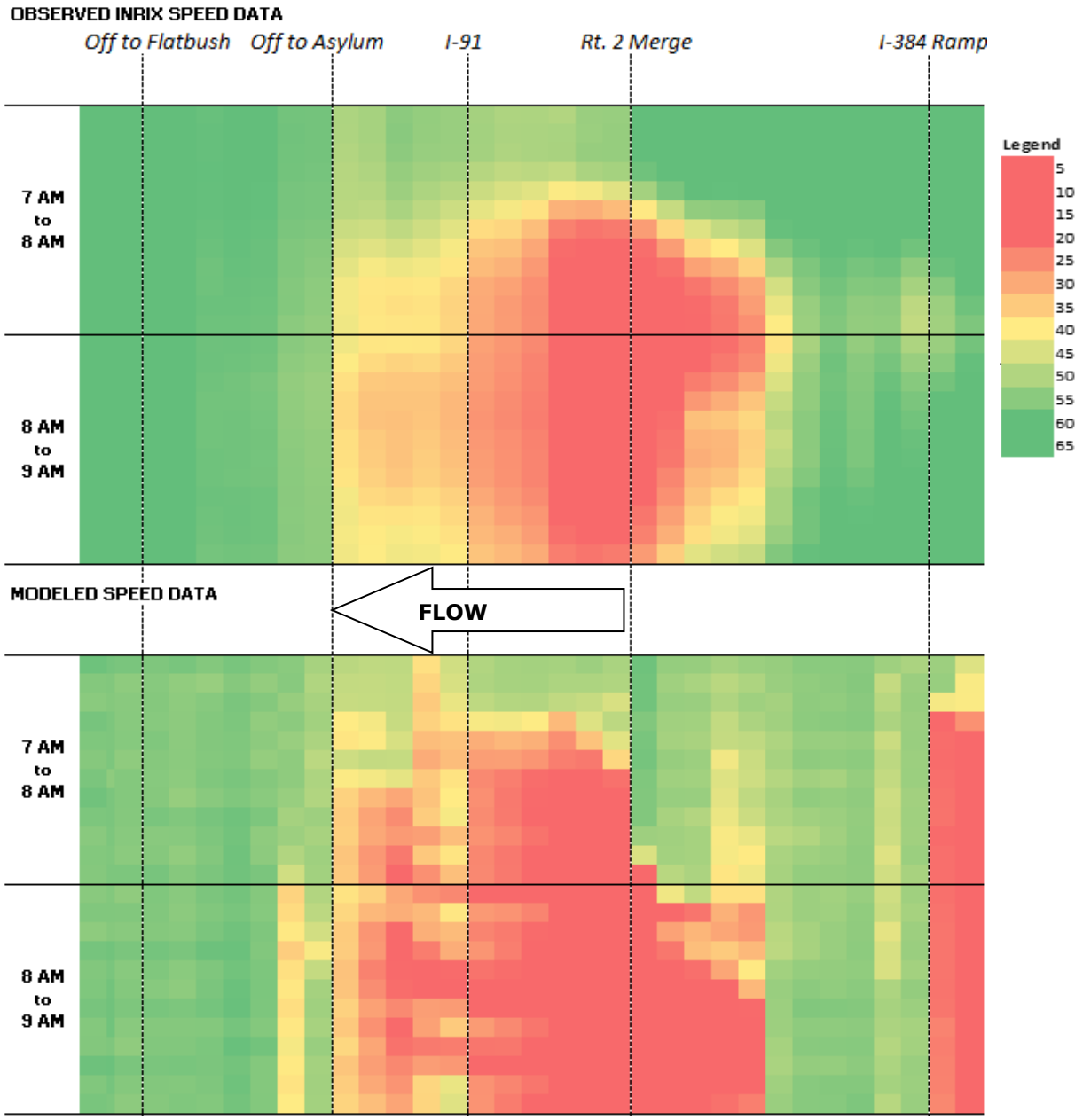


Figure 7-3

Speed Profiles I-84 EB (AM Peak Period) – Observed versus Simulation

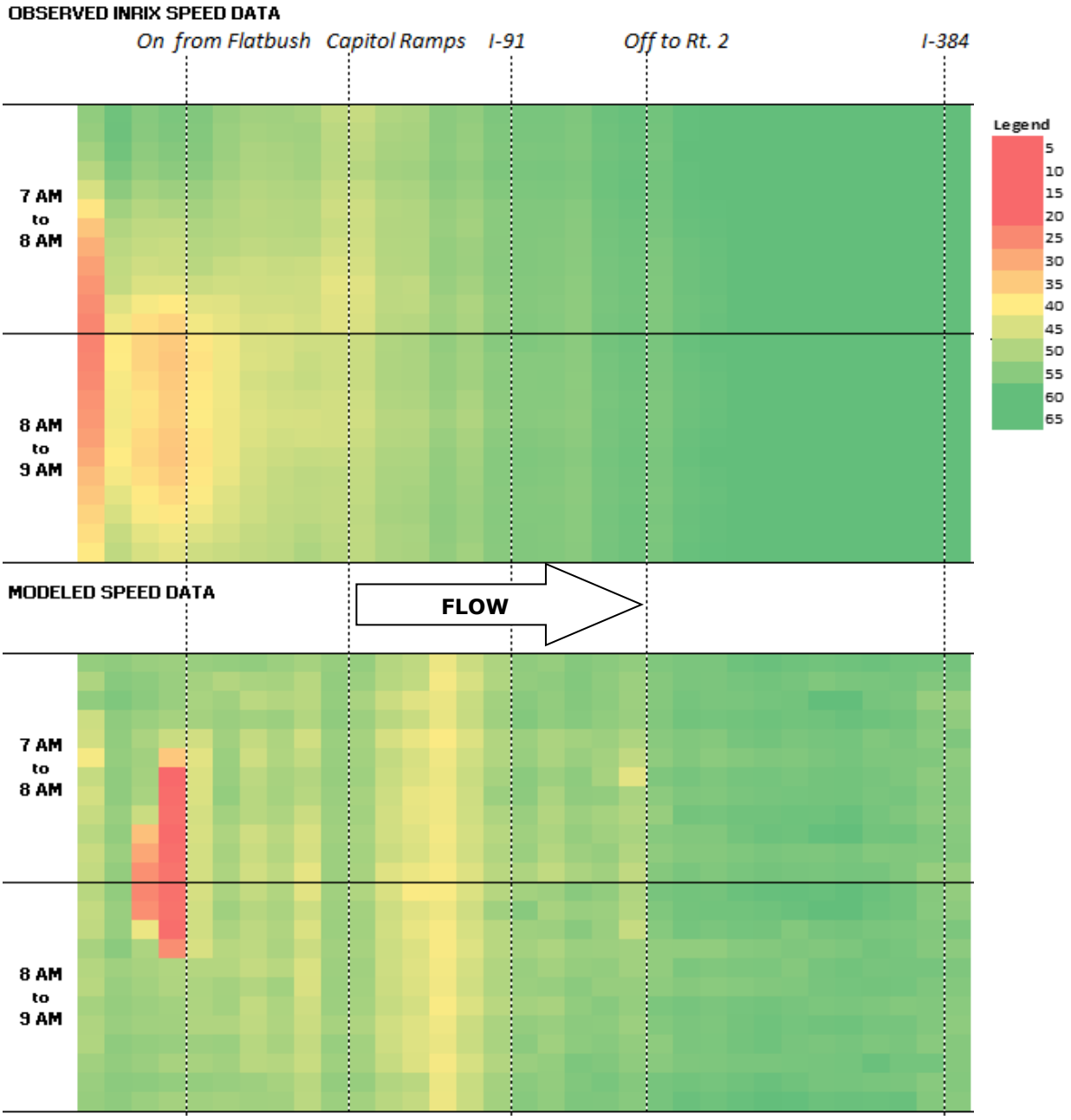


Figure 7-4

Speed Profiles I-84 WB (PM Peak Period) – Observed versus Simulation

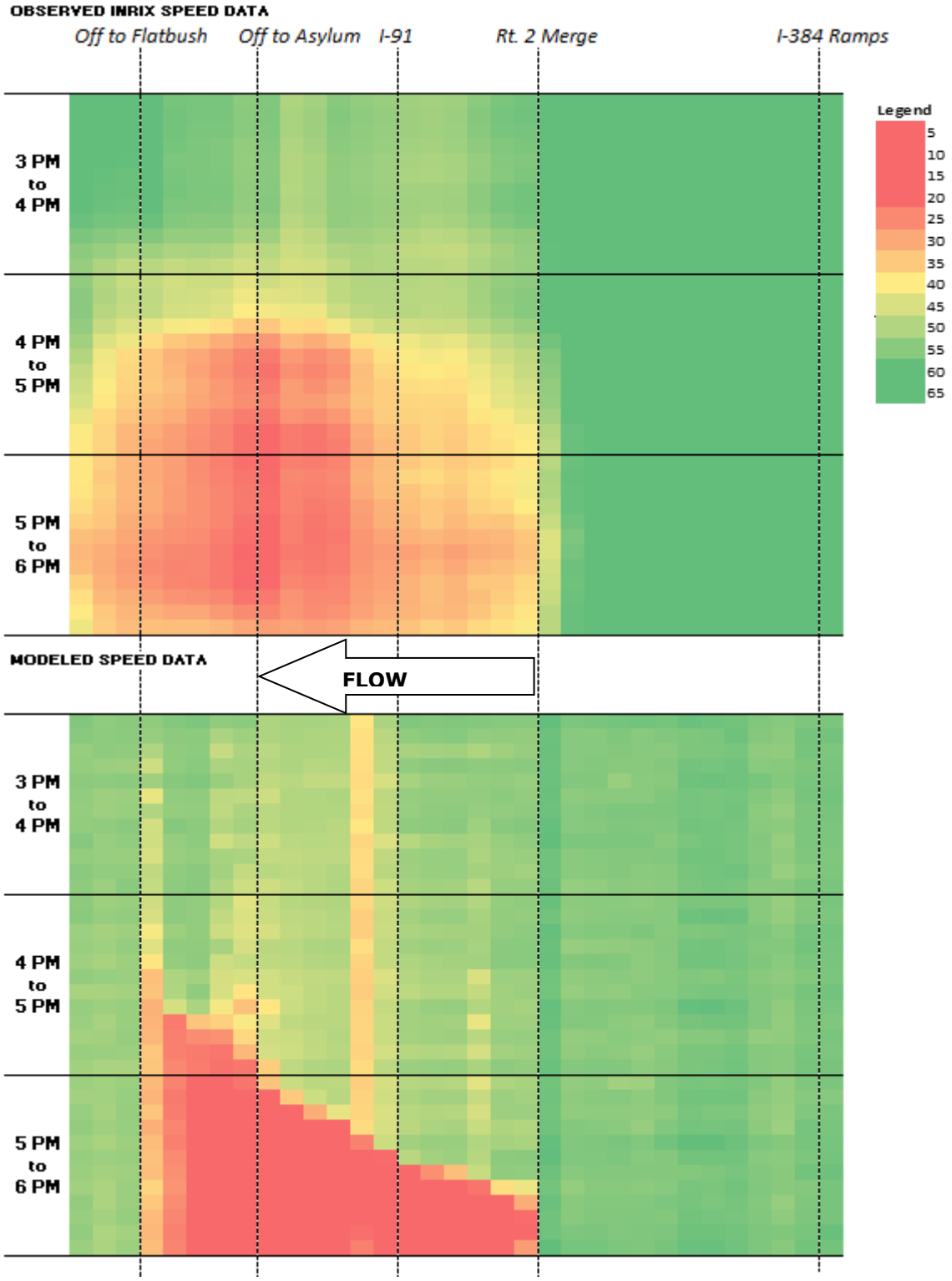
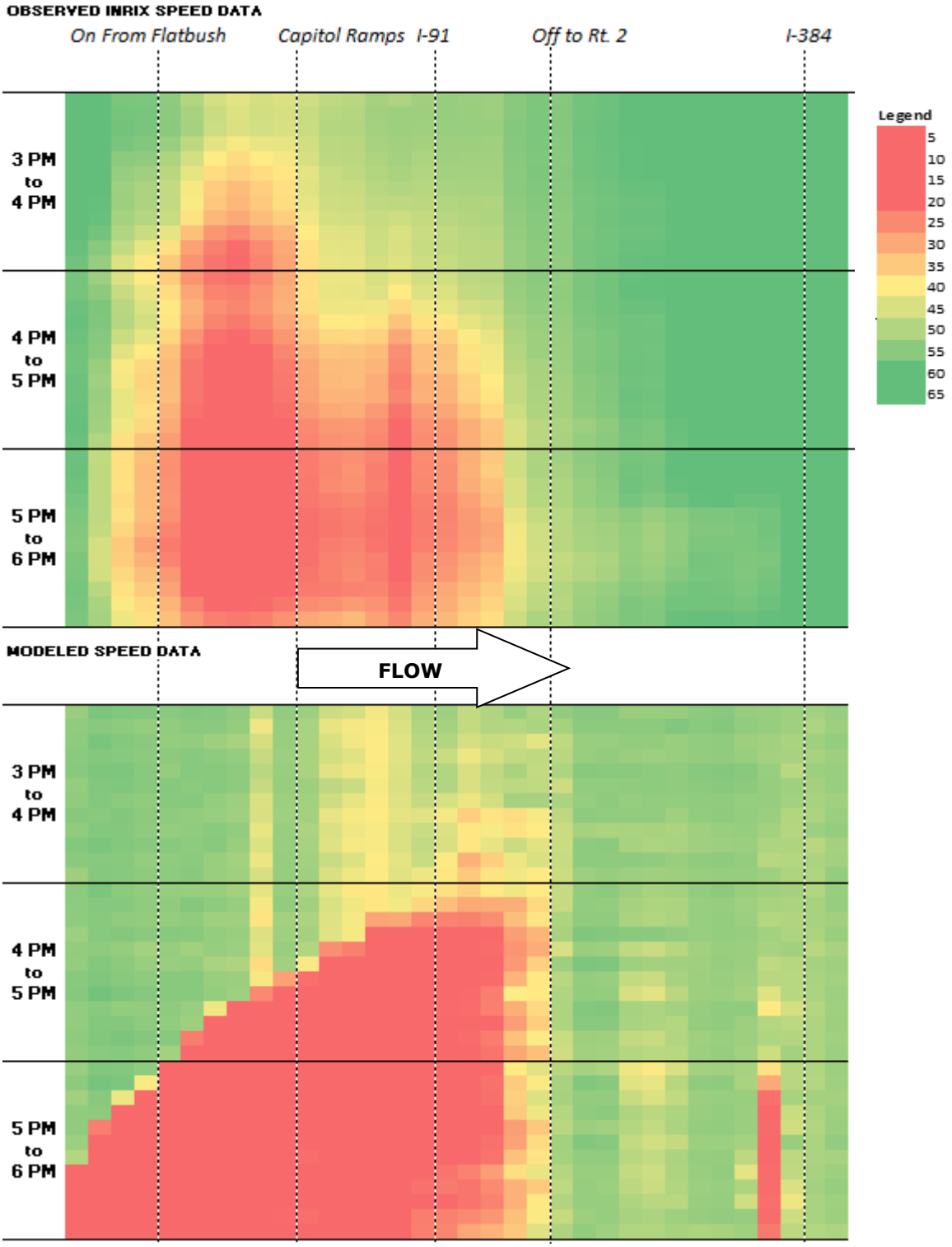


Figure 7-5

Speed Profiles I-84 EB (PM Peak Period) – Observed versus Simulation



Alternatives Operations Analysis

The remaining portions of this chapter present a summary of the future year simulation model development and the findings for the studied alternatives. Specifically, the following sections of this chapter summarize the following alternatives:

- No Tolling: 2012 and 2040 No Build (Alternative 1 Toll Free) and 2012 and 2040 Build (Alternative 3 Toll Free); and
- With Tolling: 2012 Single Point Toll location (Alternative 1 Tolled) and 2012 Two Tolling locations (Alternative 2 Tolled).

2040 No Build Scenario (Alternative 1 Toll Free)

The 2040 No Build models were developed to assess the impact of 28 years of growth in traffic demand in the Hartford area transportation network assuming only committed and funded transportation projects.

Development of 2040 No Build Demands (Alternative 1 Toll Free)

The first step of the future year subarea demand development included extracting subarea demands from the future year (2040) CRCOG time of day travel forecasting model developed for this study. This allows for the regional impacts from the future year committed projects and forecast growth conditions to be overlaid on the calibrated base year model. The final forecasted growth for the TransModeler subarea is summarized in **Table 7-7**.

Table 7-7

Forecasted Subarea Growth in Demand

Time Period	Vehicle Type	Subarea Base Year Demand (trips)	Subarea Future Year Demand (trips)	Growth in Demand
AM Peak Period (7-9AM)	Trucks	8,610	9,117	5.9%
	SOV	110,921	119,306	7.6%
	HOV	6,160	6,415	4.1%
	All Veh.	**125,691**	**134,838**	**7.3%**
PM Peak Period (3-6 PM)	Trucks	11,195	11,875	6.1%
	SOV	184,239	197,314	7.1%
	HOV	6,548	6,732	2.8%
	All Veh.	**201,982**	**215,921**	**6.9%**

2040 No Build (Alternative 1 Toll Free) Operational Analysis

Only relatively minor future committed transportation projects are planned for the subarea roadway network with little addition of capacity. Additionally, the committed projects do not address the major bottlenecks in the existing conditions, and future year conditions can be expected to be worse with additional traffic growth. While the growth forecasted by CRCOG model for the study area is minimal on a per annum basis, the combined impact of the long-term planning horizon (28 years)

with the already heavily congested base year conditions creates significant increases in congestion within the study area, especially in the PM peak period.

The increased demand in the 2040 No Build model causes the operation at the current bottlenecks to worsen. Due to the increase in the modeled project area demands, vehicles try to find new routes through the arterials and even local streets which causes new secondary bottlenecks to form on the arterials and local streets. When these arterial bottlenecks become too large, gridlock conditions start developing on the subarea network, which spill back onto the freeway off-ramps to create system-wide congestion failure. At this level of congestion, the simulated throughput on the freeway drops significantly. Under these highly congested circumstances, a reasonable equilibrium cannot be found and as a result, no meaningfully quantifiable results can be extracted from the simulation model. Therefore, the quantified results from the 2040 No Build simulations are not presented.

From the analyses of the 2040 No Build scenario simulations, it was determined that the existing network could not realistically accommodate even a small level of growth with the limited committed improvements made to the network. The future roadway network would need a system-wide re-evaluation of the arterials and freeway roadways to accommodate the forecasted growth within the existing peak periods. As this level of mitigation was beyond the scope of this study and is in part currently being studied by the parallel I-84 Hartford Project to replace and meet future needs of the corridor, the 2040 No Build scenario analysis was halted and no further possible mitigations were investigated or tested.

2040 Build (Alternative 3 Toll Free)

Parallel to this study, the I-84 Hartford Project was underway to evaluate a replacement for the I-84 Viaduct and the future operations of the I-84 corridor through downtown Hartford. At the time that this analysis needed to proceed, many designs had been discussed, proposed, and were being evaluated for feasibility, however a final recommended design had not yet been selected. Due to conflicting schedules, one of the design alternatives needed to be selected to proceed with this study. At the time of the analysis, one of the alternatives identified included consolidation of four interchanges (High Street, Asylum Avenue, Capital Avenue, and Sigourney Street) into one diamond interchange at Church Street and changing the configuration of Sisson Street interchange into a full diamond interchange. This is labelled Alternative 3 within Chapter 5 of this report.

2040 Build (Alternative 3 Toll Free) Operations Analysis

Similar to the 2040 No Build scenario, generating useful results for the 2040 Alternative 3 Toll Free scenario proved problematic due to the oversaturated demand conditions during the peak hours.

The Alternative 3 design included consolidation of four existing partial interchanges (High Street, Asylum Avenue, Capital Avenue, and Sigourney Street) into one diamond interchange at Church Street and consolidated all the vehicular movements into one new interchange. While this may well suit the operations of the freeway, a diamond interchange by virtue of its design does not handle high demand well, due to restrictions in allowable green time and arterial storage space. In an attempt to make the design function at an acceptable level of operations, the approaches to the new interchange signals on Church Street were widened to through lanes and turn bays to the maximum extent that would be feasible without a major arterial reconstruction effort further away from the new interchange.

Figure 7-6
Alternative 3 Configuration

Source: TranSystems, Inc.

Even after adding the additional arterial approach and storage capacity on the off-ramps and Church Street, the operations of the diamond interchange were not able to reach acceptable levels. Under this design, queues from the new interchange signals during the peak hours cascade outward and create more congestion and gridlock than under the 2040 No Build conditions. Due to the high level of queue spillback onto the highway, the speed contour plots for I-84 have been excluded from this report, as the highway operations are more impacted by the queue failures from the off ramps rather than the operations of the highway merges, diverges, and weaves themselves.

Conclusions for 2040 No-Toll Scenarios

Based on the simulated results of the 2040 No Build (Alternative 1 Toll Free) and 2040 Build (Alternative 3 Toll Free) scenarios, it was recognized that 2040 conditions would see significant increases in congestion far above the already heavily congested conditions of today.

It was also revealed that some design elements of Alternative 3 would need reconsideration as they might not be feasible to provide adequate levels of traffic operation, and in fact could degrade operations levels below those of the No Build conditions network under 2040 demand levels.

Even though the forecasted growth over the 28 years from 2012 to 2040 is limited on a per annum basis, the growth is sufficient to push the existing congestion conditions far beyond the congestion levels of today and create conditions that approach systemic gridlock, particularly in the PM Peak Period. Given the simulated results of the limited forecasted growth in demand to the 2040 No Build

conditions, it became clear that the future year demands would not be able to be accommodated in the existing peak periods. Instead, either peak spreading of demand would need to occur to limit the demands in the peak hours to the existing levels, or the growth may not occur at all without further improvements to the area roadways.

The goal of this Value Pricing Pilot Program Study was not to determine the roadway improvements needed to satisfy 2040 demand conditions, but was to estimate the operations impacts of adding all electronic tolling on I-84 and the impacts of potential diversions onto the surrounding roadways, including onto Hartford's arterial roadways. Given that the 2040 demands cannot be adequately served by the No Build network, the decision was made to examine the tolling impacts under the existing traffic demands conditions (2012 demand levels). As such, all subsequent simulation analyses conducted were simulated using the 2012 demands on the 2040 No Build network. This scenario, called the 2012 No Build scenario was used as the basis for comparison across all tolling scenarios.

2012 Toll Free Scenarios

As discussed in the previous section, the congestion levels of the potential 2040 scenarios led the project team to use the 2012 existing demands to assess the potential operational impacts on the freeway and the surrounding roadways from tolling I-84. However, to assess if Alternative 3 would yield better operations than the No Build (Alternative 1 Toll Free) conditions under 2012 demand, both scenarios were developed and compared. To create the 2012 No Build model, the 2040 version of the AM and PM Peak Period networks were revised to include the 2012 Base Year demands.

2012 Toll Free Operational Analysis

When analyzing the operations of a freeway corridor like I-84, identifying the congestion and bottleneck locations helps to understand the operational problems that exist in the corridor. A useful tool for qualitative analysis of the freeway operations is to use congestion heat maps or speed contour plots. These heat maps present time along one axis and distance on the other, to create a grid of time and space. The color of each cell represents the average speed on that portion of the freeway during that time interval, with green colors indicating free-flow speed and red indicating significantly reduced speed. The following **Figures 7-7 and 7-8** compare the congestion heat maps for the 2012 No Build (Alternative 1 Toll Free) and 2012 Build (Alternative 3 Toll Free) scenarios for the westbound and eastbound direction, respectively, of I-84 for the AM, while **Figures 7-9 and 7-10** present the same comparison for the PM Peak Period. In all figures, the simulated 2012 No Build (Alternative 1 Toll Free) speeds are presented in the top half of the figure, while the bottom half shows the simulated 2012 Build (Alternative 3 Toll Free) speeds.

For the 2012 No Build (Alternative 1 Toll Free) scenario, the congestion on the freeway, arterials and local roadways were observed to be very similar to the 2012 Base Year scenario. This is to be expected given the limited committed improvements included in the 2012 No Build network and the same demands for travel. The major bottleneck in the AM Peak Period remains at the Asylum off-ramp and at the exit ramps to I-91 in the westbound direction. The PM Peak Period major bottlenecks observed in the westbound direction of I-84 at the Flatbush Avenue left exit off ramp and in the eastbound direction of I-84 crossing the Connecticut River both continue as per the 2012 Base Year simulated conditions.

Even with the lower traffic demands through the Viaduct due to the physical characteristics of the 2012 Build (Alternative 3 Toll Free) scenario, the congestion issues and oversaturation conditions seen in the simulated 2040 Build (Alternative 3 Toll Free) remain.

In the AM Peak Period, all the Hartford-bound traffic that would have used the multiple partial interchanges now seeks to exit via the Church Street off-ramp in both eastbound and westbound direction. Because of the increase in demand for the Church Street off-ramp and the east/west roadways connecting Church Street, congestion forms on the arterial network and eventually the off-ramp queues spill back on I-84 and create unsafe and congested conditions on the I-84 mainline approaching the new interchange.

In the PM Peak Period, the congestion heat maps indicate that the freeway operations see some limited improvements under the 2012 Build (Alternative 3 Toll Free) scenario as compared to the 2012 No Build scenario. While the eastbound queue in the PM Peak Period may be shorter than in the 2012 conditions, this improvement is in fact caused by the metering effect that the severe arterial congestion has in limiting the number of vehicles which can access the I-84 eastbound corridor. Therefore, there are fewer vehicles approaching the Bulkeley Bridge crossing the Connecticut River and the existing and unchanged bottleneck sees a shorter queue than under 2012 No Build conditions. However, this apparent improvement to the I-84 eastbound conditions in the PM Peak Period is more than offset by the systemic gridlocking occurring on the arterial network.

Similar to the 2040 No-Toll scenarios, the simulation of the 2012 No Build (Alternative 1 Toll Free) and 2012 Build (Alternative 3 Toll Free) scenarios lead to the conclusion that the 2012 No Build scenario should serve as the basis for comparison of the tolling strategies.

In parallel efforts to this study, the I-84 Viaduct Replacement study team found similar conclusions and when combined with constructability concerns regarding the Alternative 3 subsequently abandoned the Alternative 3 concept design and are seeking other improvement alternatives. Furthermore, this study was aimed primarily at assessing the additional impact (diversion) to the local network that might occur under tolling of I-84 and not to assess and test preliminary physical design concepts.

Figure 7-7

I-84 Westbound Speed Contours for AM Peak Period

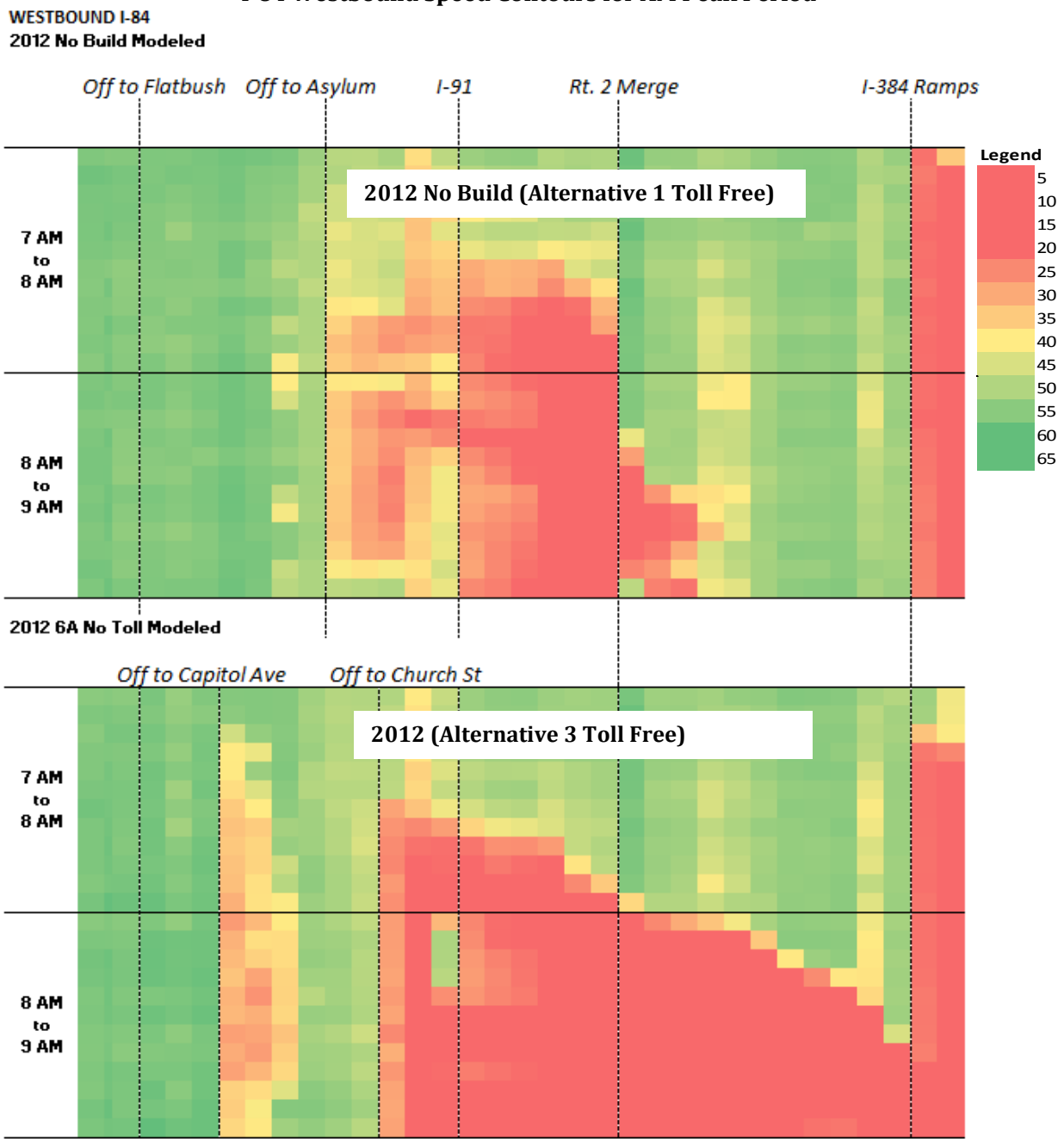


Figure 7-8

I-84 Eastbound Speed Contours for AM Peak Period

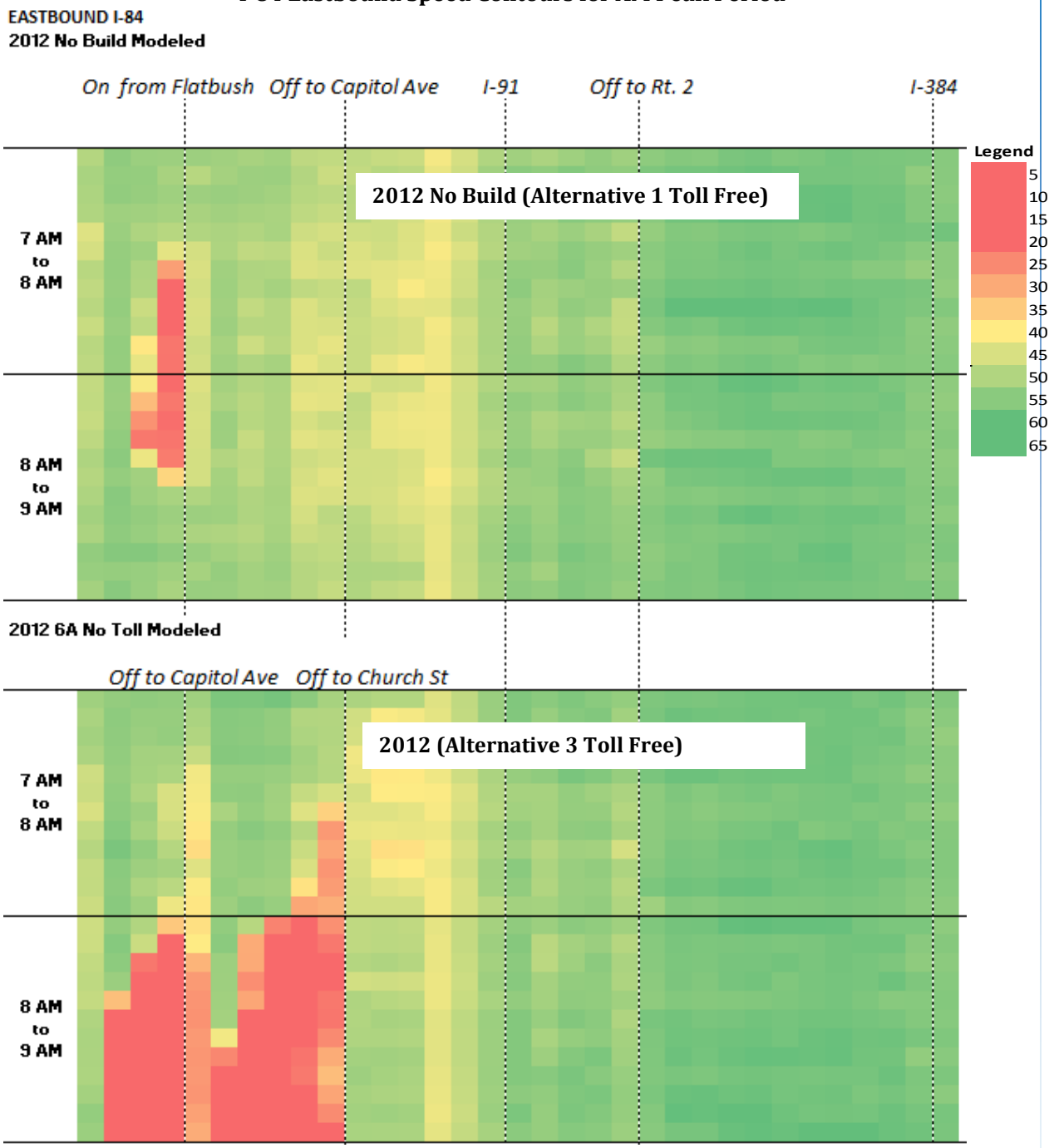


Figure 7-9

I-84 Westbound Speed Contours for PM Peak Period

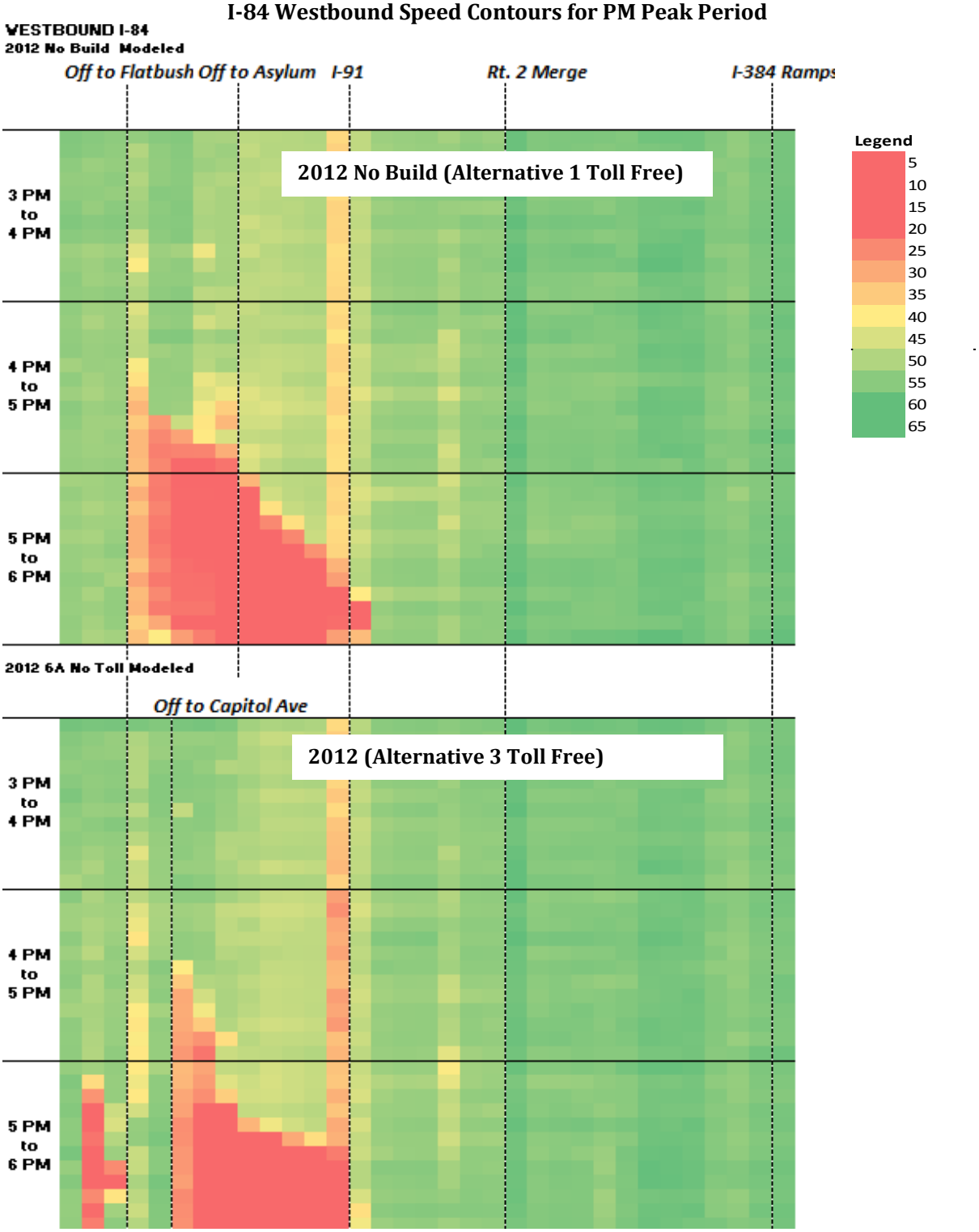
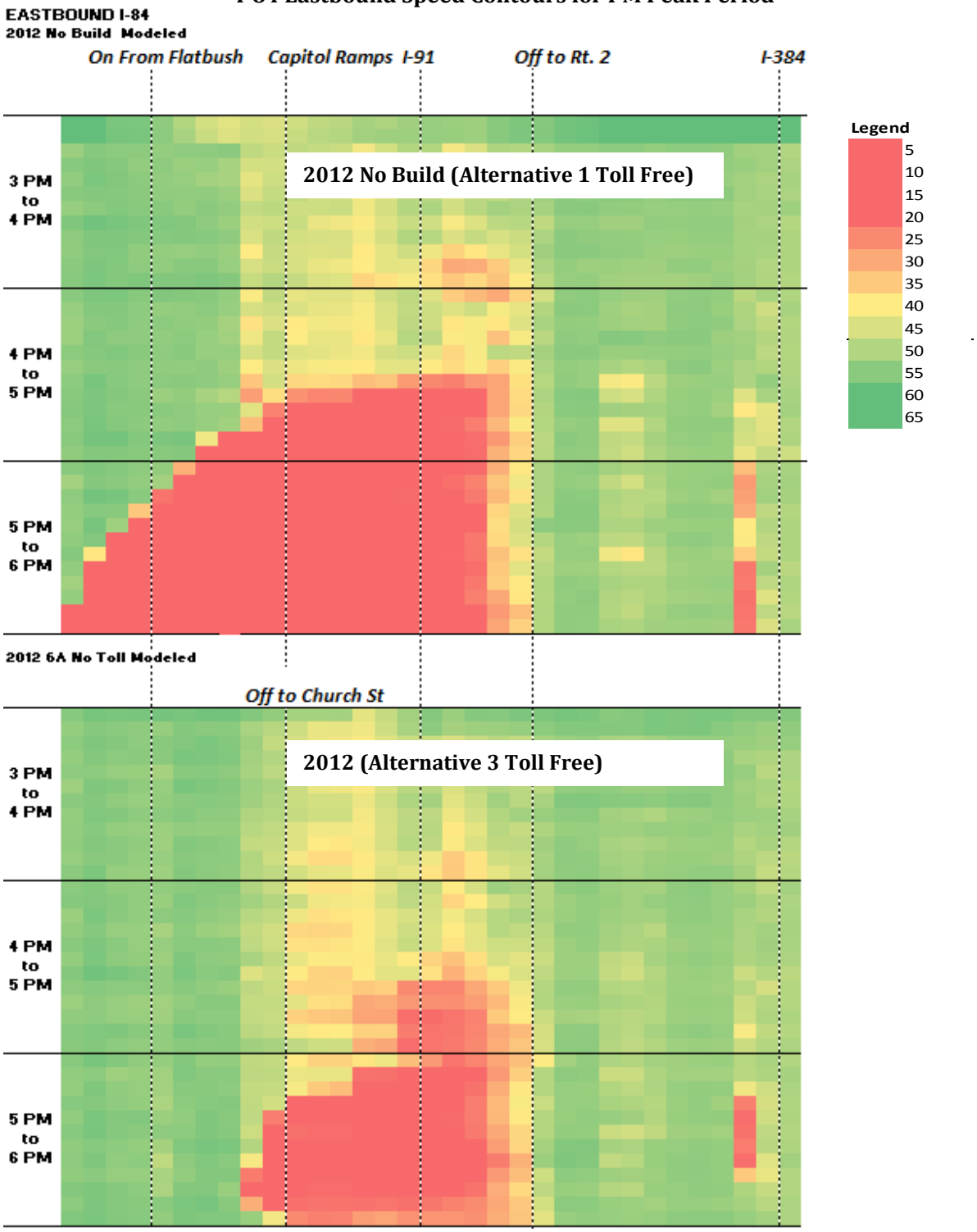


Figure 7-10

I-84 Eastbound Speed Contours for PM Peak Period



Tolling Scenarios

Following the determination of the best non-tolling scenario to be used as a point of comparison, two different tolling scenarios were simulated to assess the potential impact of tolling on operations of I-84 and the adjoining arterial streets in Hartford and West Hartford. It was determined that the 2040 future year demands were too high for the modeled network to analyze the diversions due to tolling without consideration of significant additional arterial roadway capacity. For this reason, all tolling scenario analyses were performed with 2012 Base Year demand level.

Two tolling configurations were analyzed. These included a single point toll (Alternative 1 Tolled) and a scenario with two tolling locations (Alternative 2 Tolled). In both cases, tolling operations would be fully electronic and no toll barriers would exist. Traffic passing under the tolling gantries would either have a transponder (e.g. E-ZPass) in the vehicle, or a photo of the license plate of the vehicle would be captured and a bill for the toll sent by mail. In either case, toll collection would happen at freeway speeds and no slow-down would be needed for the toll collection process.

Alternative 1 Tolled - Single Point Toll Scenario

In the point toll scenario, a single toll gantry would be located along the current Aetna viaduct location between the Sigourney Street and Capital Avenue ramps, approximately as illustrated in **Figure 7-11**. At the gantry location, a peak period toll of one dollar ($1.00) for a passenger vehicle equipped with a transponder would be charged per vehicle passing the gantry in either the eastbound or westbound direction. Vehicles without a transponder were assumed to be assessed a $1.50 toll to account for the additional cost of processing, mailing, and collecting the toll from video toll users. Trucks would be assessed a proportionally higher toll rate.

Alternative 2 Tolled - Two Tolling Locations Scenario

In the two tolling locations scenario, two separate toll gantries would be located approximately as illustrated in **Figure 7-12**. The first gantry would be located east of the westbound I-84 Asylum Street off-ramp, while the second gantry would be located west of the West Boulevard ramps. At each gantry location, a fifty cent ($0.50) peak period toll would be collected in either direction. While the overall toll for a through trip on I-84 would remain the same as for the single point toll scenario, splitting the toll into two collection points could reduce diversion impacts for local Hartford-based traffic.

Figure 7-11

Single Point Toll (Alterative 1 Tolled)

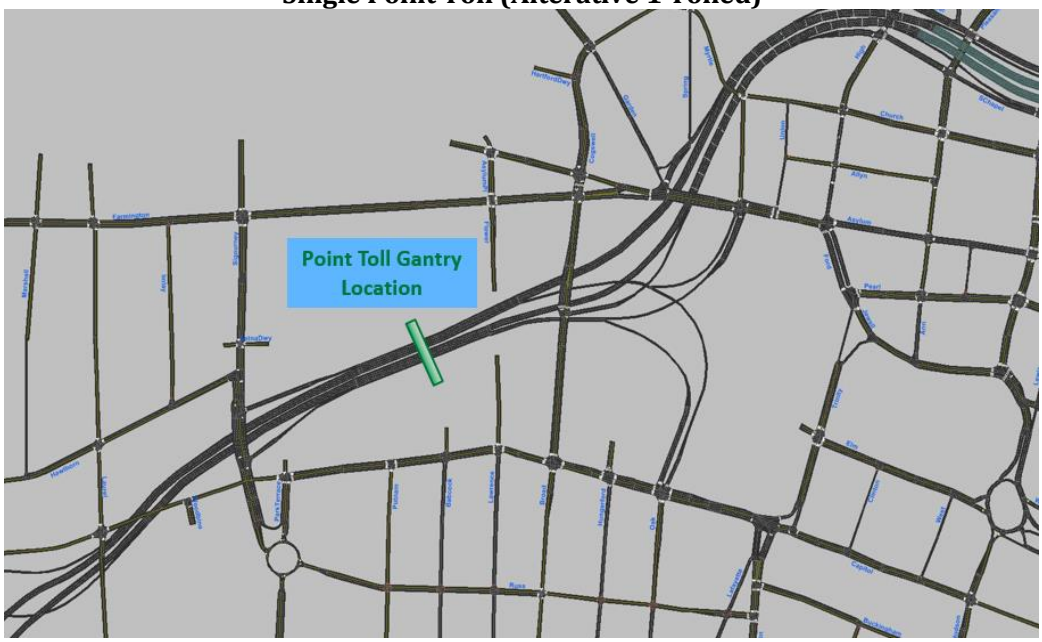
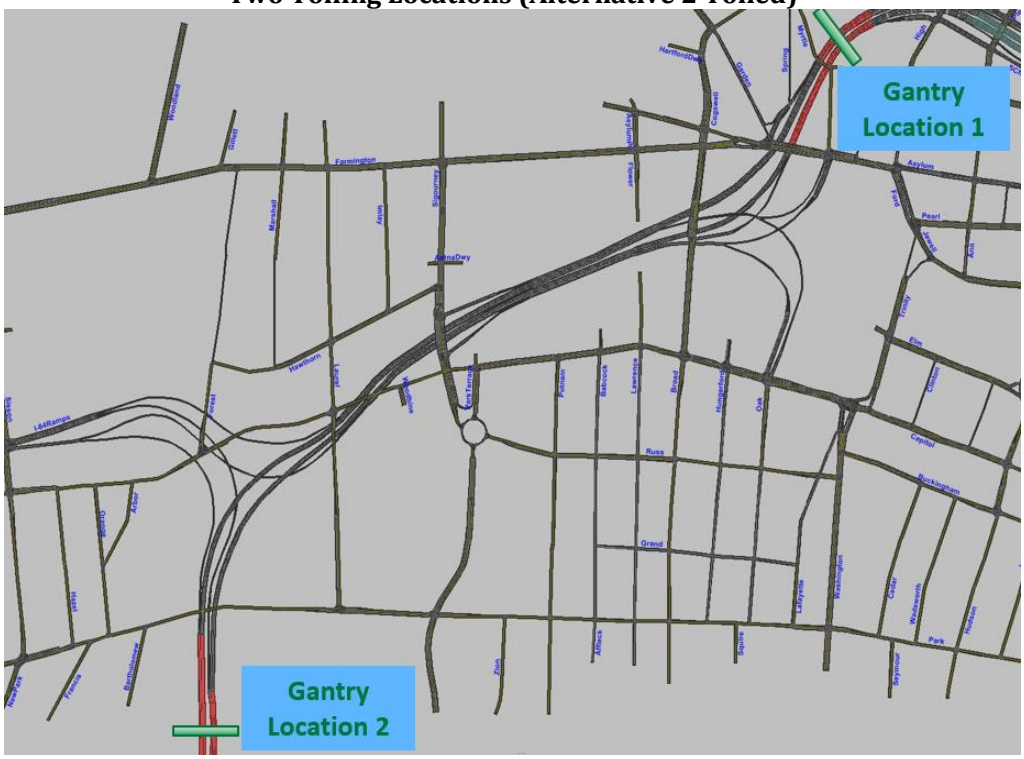


Figure 7-12

Two Tolling Locations (Alternative 2 Tolled)



Tolled Freeway Operations

Alternative 1 Tolled - Single Point Toll Scenario

In the 2012 Alternative 1 point toll scenario, the toll gantry is located at the existing Aetna Viaduct between the Asylum Street and Sigourney Street ramps. Under these conditions, the Asylum Street off-ramp from I-84 Westbound serves as the last exit before the toll gantry, and sees additional traffic demands from those vehicles trying to avoid paying the toll. Under the AM Peak Period Alternative 1 Toll Free conditions, this off-ramp and the resulting signal delays at Asylum Street and Farmington Avenue are the source of a major bottleneck, with the demand frequently exceeding the storage space on the off-ramp and queues can be seen to spill back and affect the mainline operations of I-84 eastbound. In the AM Peak Period Point Toll simulation conditions (see congestion heat map in **Figure 7-13**), the effects of the additional demand for the Asylum Street off-ramp create even more congestion problems along I-84 westbound. While attempts were made to adjust and optimize the modeled signal timings at the intersections of Farmington Avenue, Asylum Ave, and Broad Street, no significant increase in intersection capacity can be gained without considering a major reconstruction of the area. In the eastbound direction during the AM Peak Period (**Figure 7-14**), the pocket of congestion that does exist on I-84 from the Flatbush on ramp westward is alleviated under the tolled condition as overall demand is reduced under tolling.

During the PM Peak Period in the westbound direction (**Figure 7-15**), the Alternative 1 Toll Free condition sees the largest bottleneck in the westbound direction approaching at the left hand exit to Flatbush Avenue. Under the Alternative 1 point toll scenario, the volume of traffic traveling along westbound I-84 is somewhat reduced due to local diversions to arterial streets and long distance diversion to regional alternatives (e.g. I-684). However, despite the reduced traffic demand, the increased demand for traffic exiting I-84 at the Asylum Street off-ramp to avoid paying the toll creates a new bottleneck that is reminiscent of the bottleneck in the same location in the AM Peak Period. Although more minor in nature than in the AM peak, this can still be seen to create slow moving traffic along I-84 westbound as far east as the tunnel on I-84 in the downtown area.

In the PM Peak Period in the eastbound direction (**Figure 7-16**), the severe bottleneck seen in the 2012 Alternative 1 Toll Free conditions at the Bulkeley Bridge over the Connecticut River remains in the 2012 Alternative 1 Point Toll scenario. However, due to the slightly reduced volumes for traffic on I-84 from combined arterial and regional toll diversions, the bottleneck, while still severe and backing up for miles, is reduced over the 2012 Alternative 1 Toll Free conditions.

Figure 7-13

I-84 Westbound Speed Contours for AM Peak Period

Alternative 1 Toll Free Versus Alternative 1 Point Toll

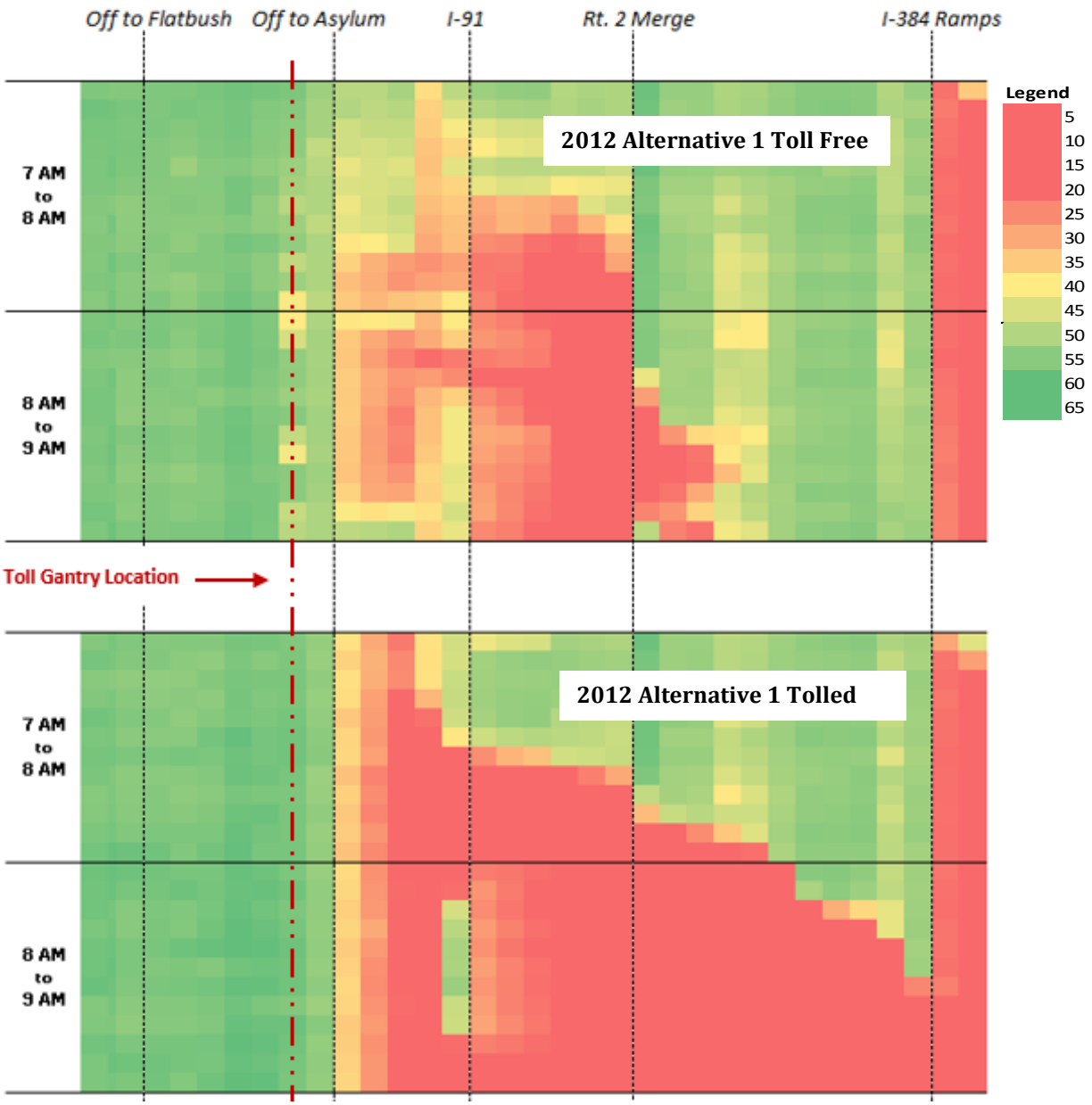


Figure 7-14

I-84 Eastbound Speed Contours for AM Peak

Alternative 1 Toll Free Versus Alternative 1 Point Toll

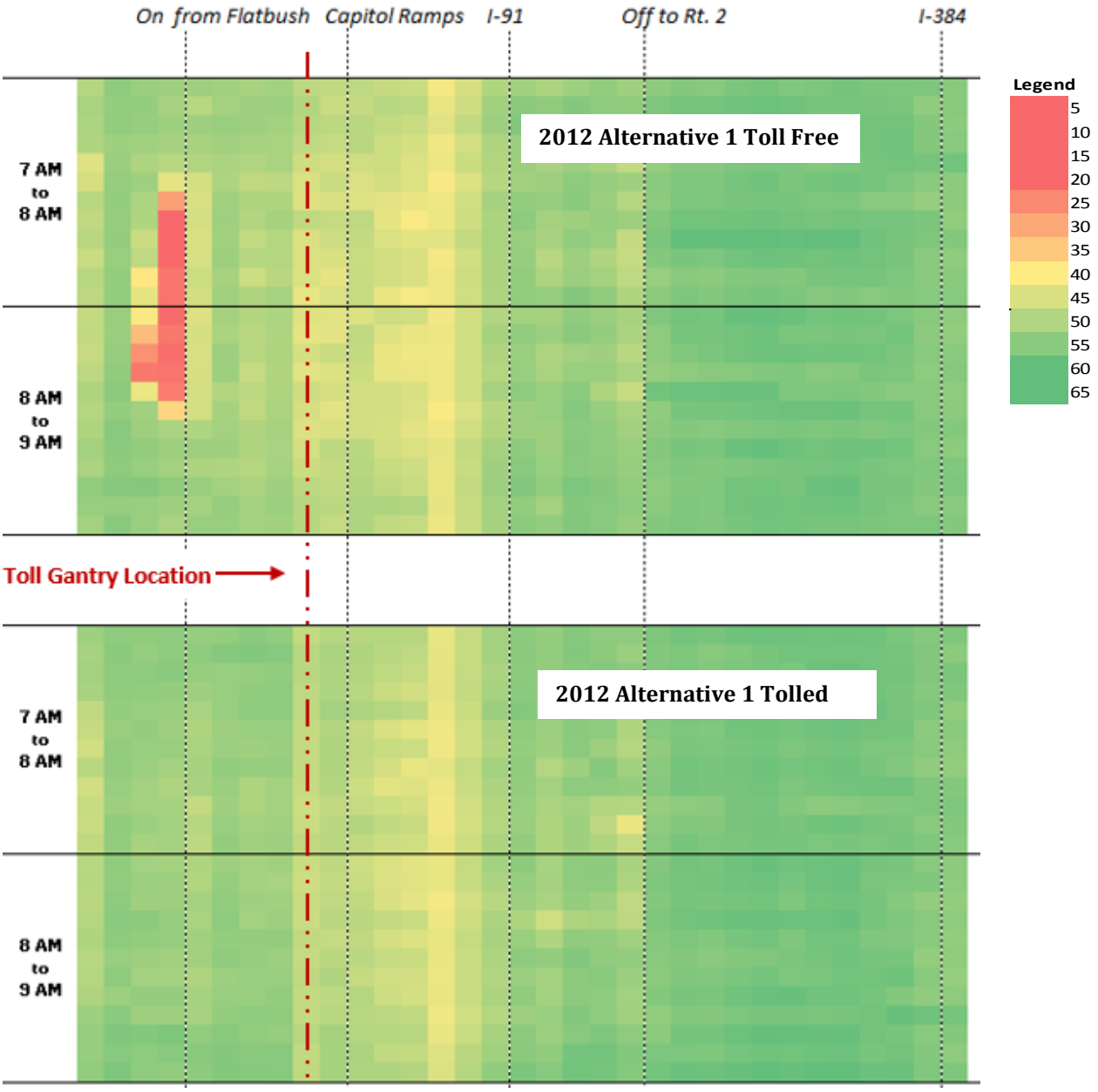


Figure 7-15

I-84 Westbound Speed Contours for PM Peak

Alternative 1 Toll Free Versus Alternative 1 Point Toll

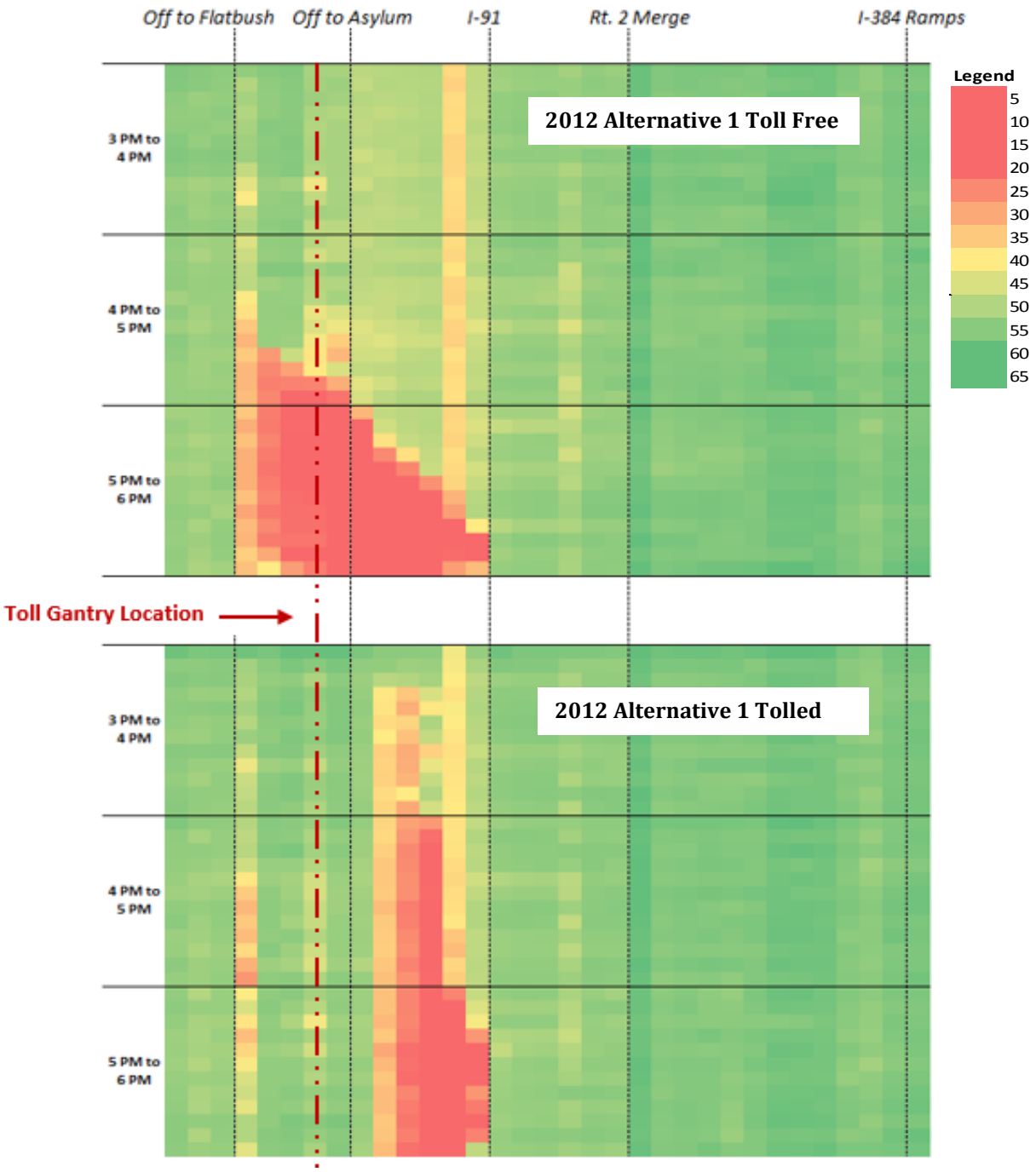
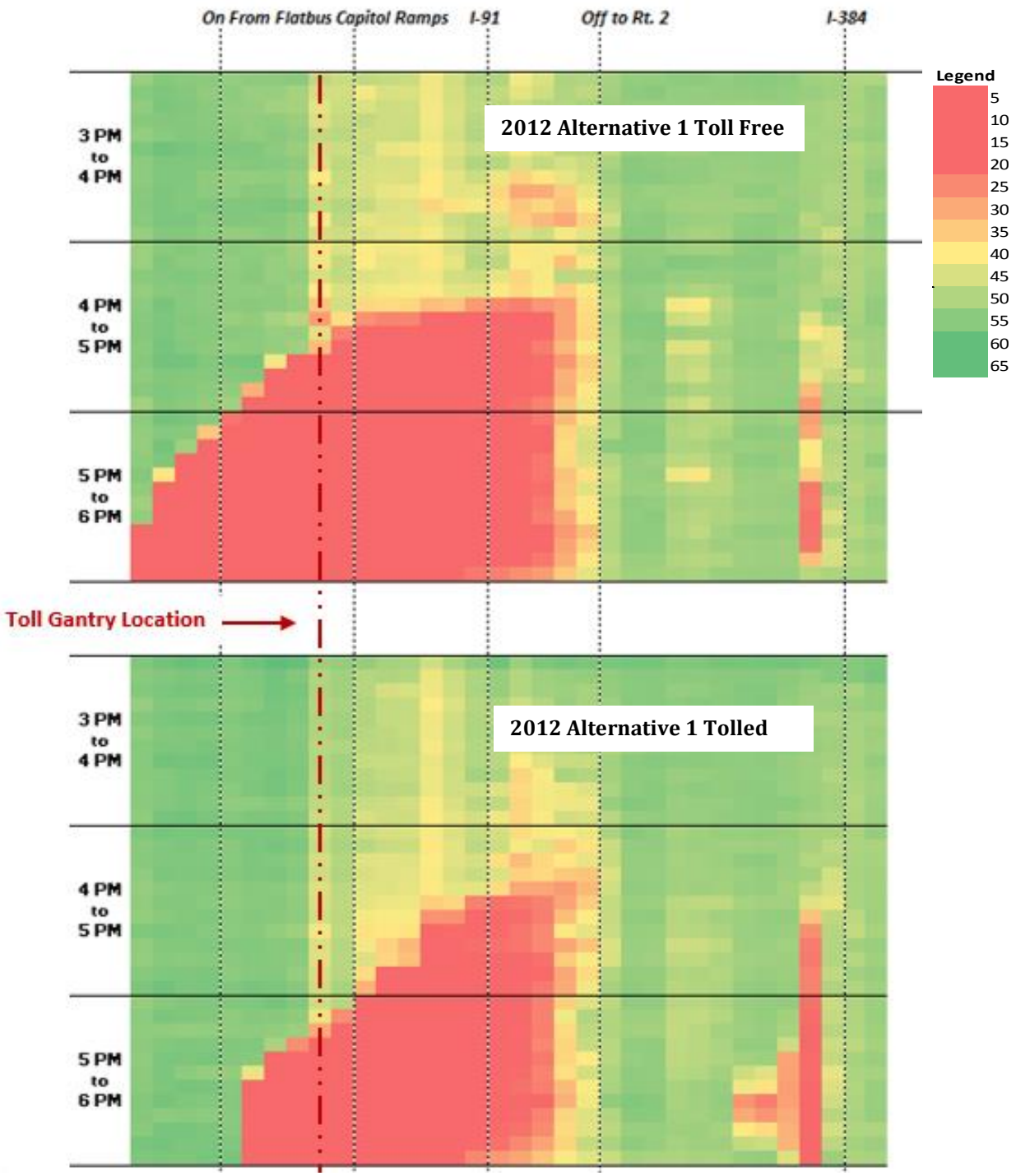


Figure 7-16

I-84 Eastbound Speed Contours for PM Peak

Alternative 1 Toll Free Versus Alternative 1 Point Toll



Alternative 2 Tolled - Two Tolling Locations

In the 2012 Alternative 2 Tolled simulated scenario for the AM Peak Period, the westbound direction of I-84 **(Figure 7-17)** sees large operational improvements at the Asylum off-ramp, with traffic now flowing near free flow conditions throughout the AM Peak Period. This improvement in operations is caused by the combined reduction in the demand from traffic diverting from the toll locations. This diversion traffic takes two forms; first, regional diversions which avoid the I-84 Corridor through Hartford, and second, local diversion traffic. For local diversion traffic, drivers avoid paying the toll at the first gantry location east of Asylum off ramp by exiting at the previous off-ramp to Main Street immediately upstream of the first toll gantry location. Drivers trying to get to the downtown Hartford area use the Main Street off-ramp to Chapel Street, and then have to make a left turn at either Market Street, Main Street or Trumbull Street to reach the downtown area, while more westerly destined trips continue along Chapel Street and then seek to turn left at Pleasant Street or High Street. All these intersections have limited left turn capacity, and even with timing adjustments to increate left turn capacities, the signals are not able to accommodate the additional diversion traffic and eventually queues extend along Main Street and back onto the I-84 mainline. Immediately downstream of the Bulkeley Bridge, the four travel lanes of I-84 split to feed the off-ramp to I-91 Northbound and the Main Street off-ramp, with only two lanes continuing on I-84. These diverges are very closely spaced, and create additional weaving friction as vehicles position themselves in the correct lane. When the Main Street off-ramp queue eventually spills back to the I-84 Mainline, this weaving becomes increasing more difficult, and queues quickly build on I-84.

Eastbound operations in the AM Peak Period **(Figure 7-18)** improve slightly under the tolled condition, as the reduced I-84 demand eliminates the minor 2012 Alternative 1 Toll Free bottleneck approaching Flatbush Avenue, and the entire corridor to operates at or near free flow speed conditions.

In the PM Peak Period in the westbound direction **(Figure 7-19)**, operations at the Flatbush Avenue bottleneck improve as the toll diversions reduce the throughput demand at this location. While the bottleneck does still form, it occurs later in the PM Peak Period and is lessened in its severity.

In the eastbound direction **(Figure 7-20)** in the PM Peak Period, the major bottleneck approaching the Bulkeley Bridge over the Connecticut River continues to form and create severe congestion, although the effects of the congestion are somewhat improved due to the reduction in demand to cross the Bulkeley Bridge. The bottleneck west of the I-384 diverge, which is caused by merging and weaving vehicles approaching the I-384 diverge, is increased in severity. This bottleneck is worsened as diversion traffic joins back onto I-84 after crossing the Connecticut River at the Founders Bridge (local diversion traffic) or the Charter Oak Bridge (regional diversions). The additional demands on merging and weaving along I-84 approaching the I-384 diverge create a moderate increase in the bottleneck severity.

Figure 7-17

I-84 Westbound Speed Contours for AM Peak

Alternative 1 Toll Free vs Alternative 2 Tolled

Figure 7-18

I-84 Eastbound Speed Contours for AM Peak

Alternative 1 Toll Free vs Alternative 2 Tolled

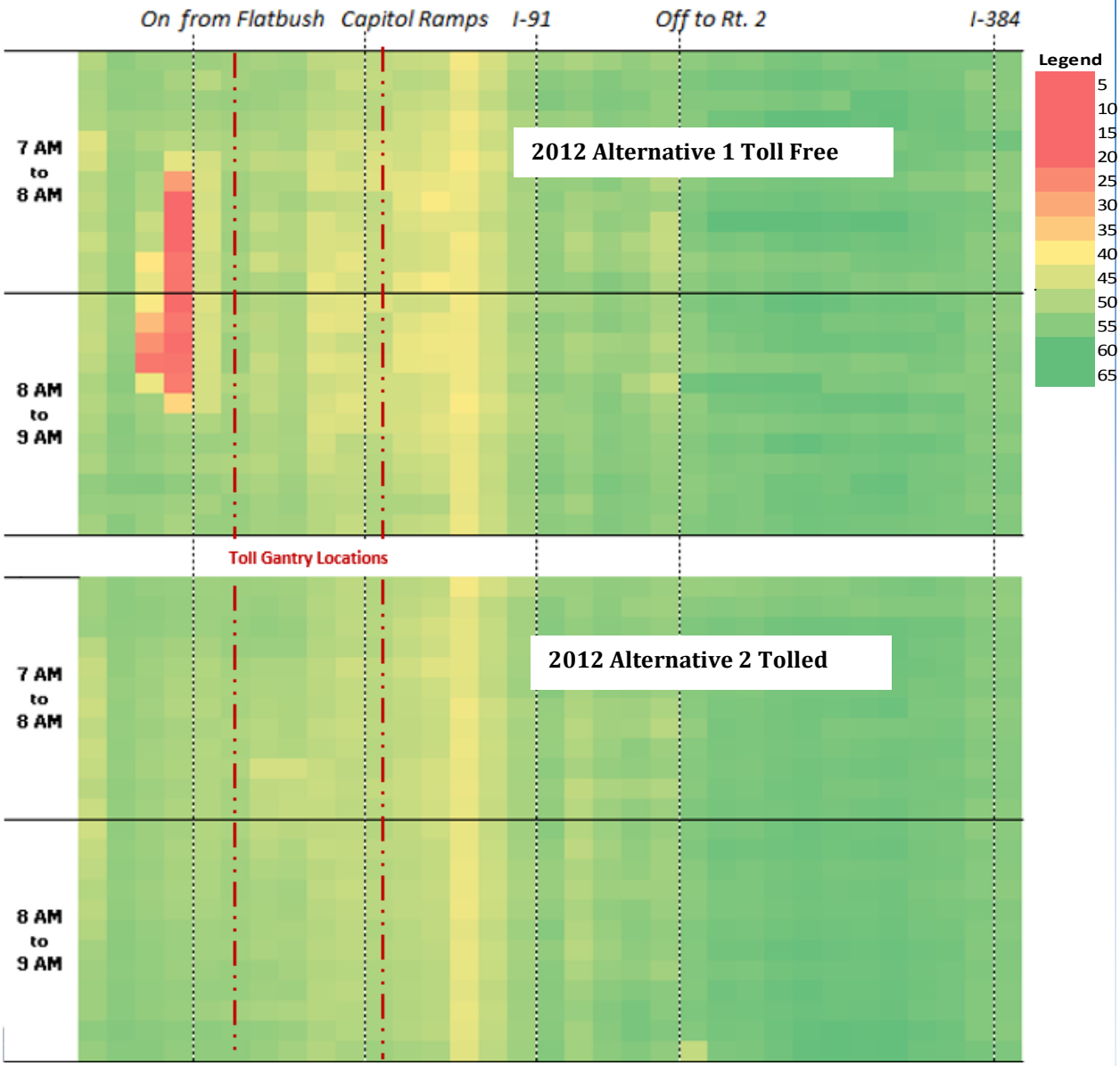


Figure 7-19

I-84 Westbound Speed Contours for PM Peak

Alternative 1 Toll Free vs Alternative 2 Tolled

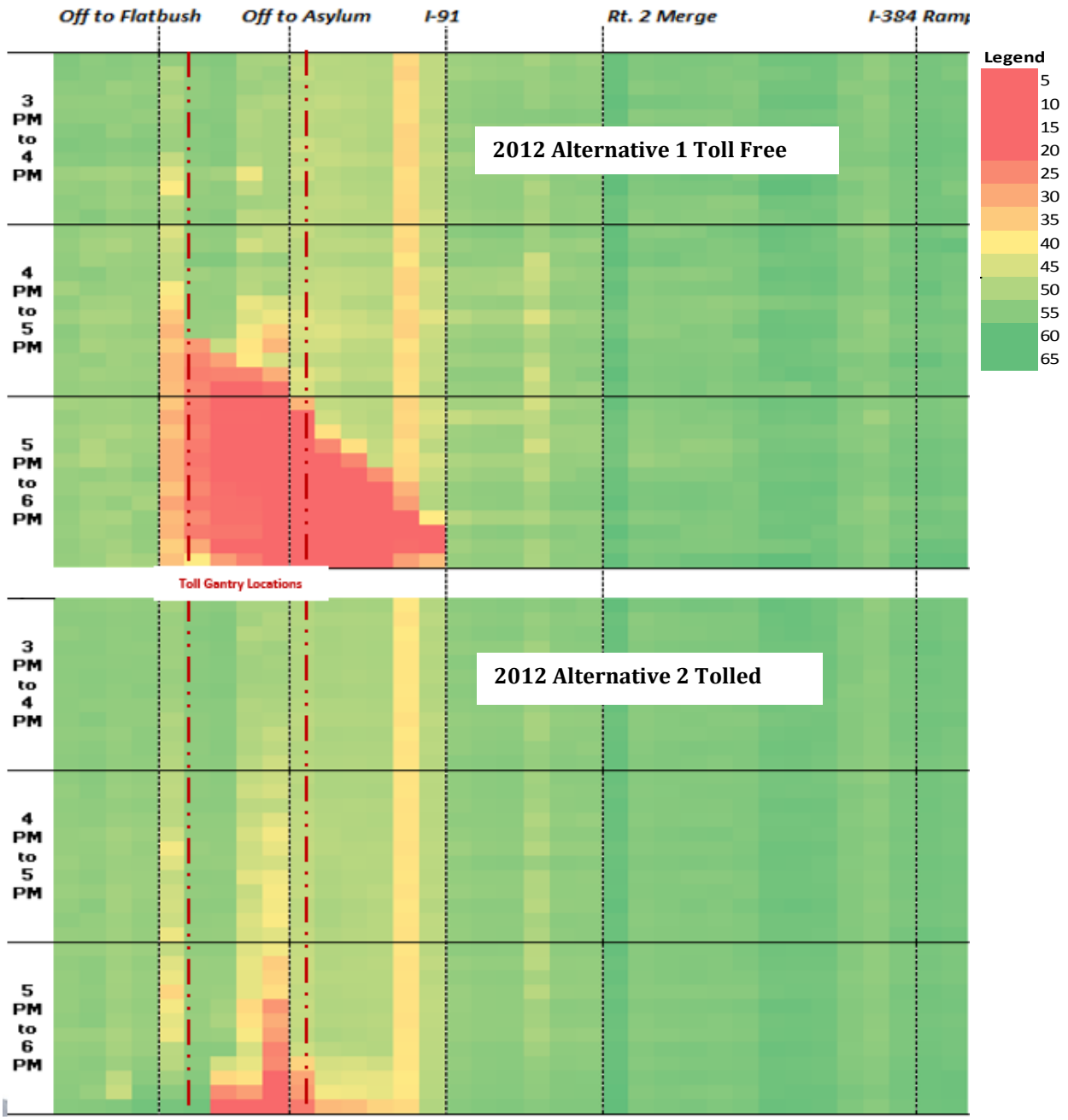
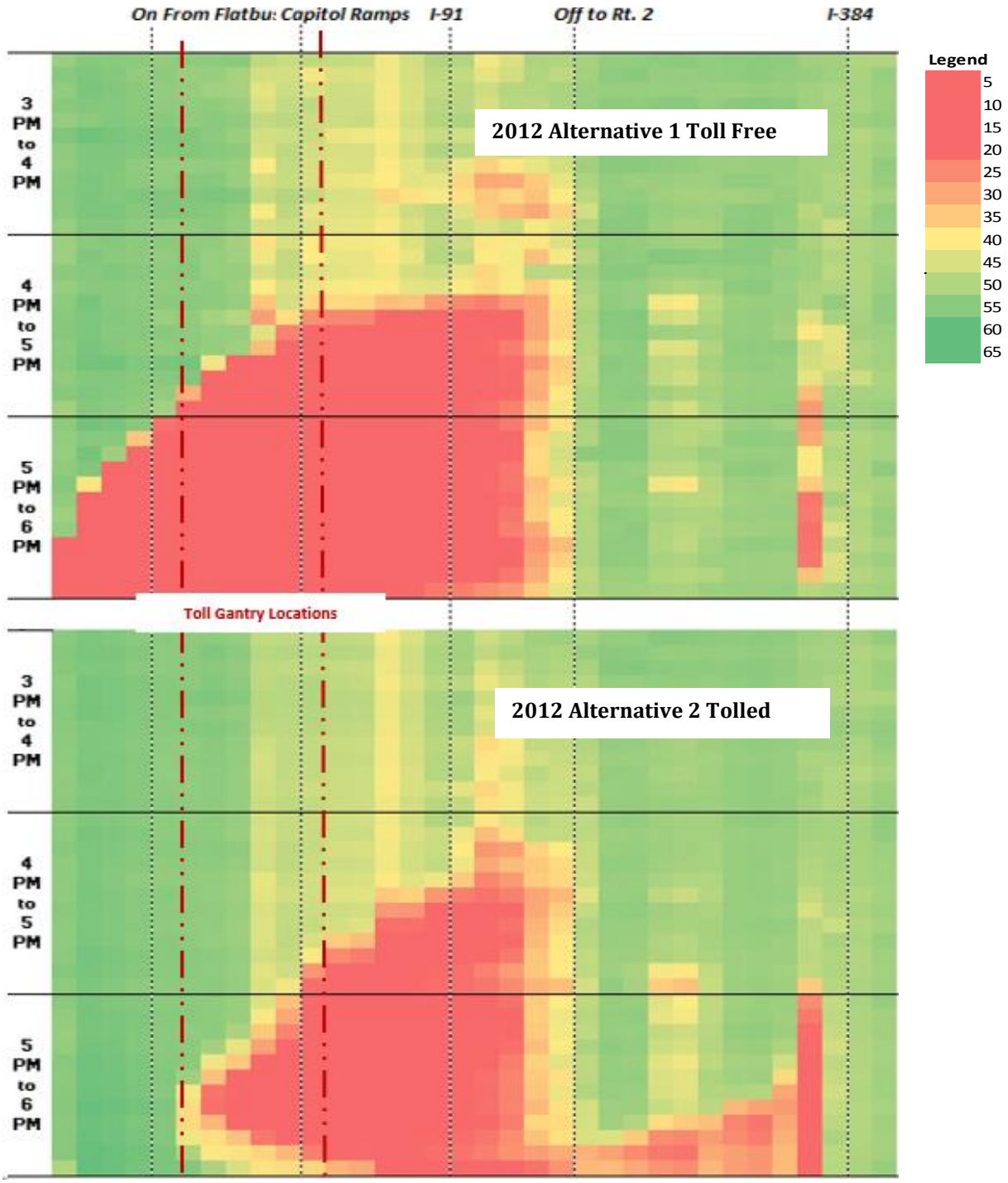


Figure 7-20

I-84 Eastbound Speed Contours for PM Peak

Alternative 1 Toll Free vs Alternative 2 Tolled



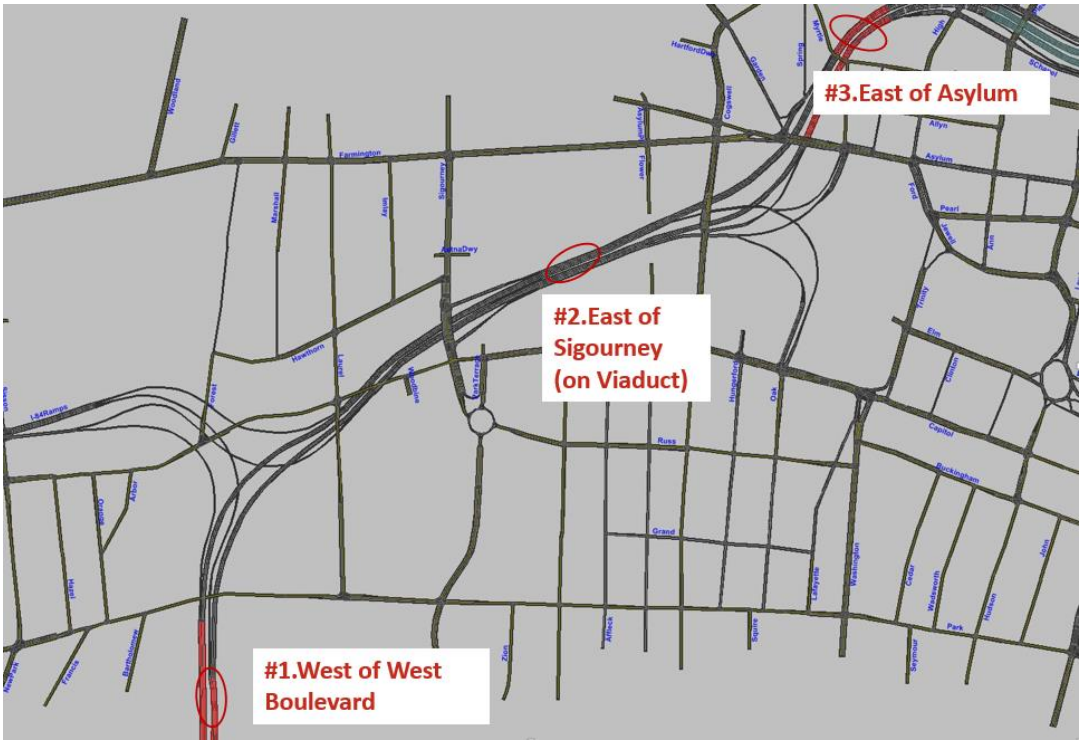
Simulated Throughput on I-84

Following the simulation of the Alternative 1 Tolled and Alternative 2 Tolled scenarios, the simulated throughput at each of the three following possible toll gantry locations (**Figure 7-21**) was measured:

1. West of the West Boulevard interchange
2. Between the Sigourney Street and Capital Avenue interchanges
3. East of the Asylum Street interchanges

Figure 7-21

I-84 Throughput Measurement Locations



Figures 7-22 and 7-23, respectively, report the resulting simulated total throughput volume for the two hour AM Peak Period and the three hour PM Peak Period. The simulated throughput tracks that simulated volume that passes through the potential gantry locations and is reported to understand where and to what degree diversions in traffic is seen in response to tolling and congestion. It is important to note that the throughput may be less than the demand under heavily congested queuing conditions.

Alternative 1 Tolled - Single Point Toll Scenario

In the 2012 Alternative 1 Single Point Toll scenario during the AM Peak Period, the eastbound direction of I-84 sees overall reductions in the throughput along the mainly free-flow I-84 corridor at all locations, but larger reductions at the tolling location along the viaduct, indicative of the local diversion response to avoid paying the toll. The westbound direction of I-84 sees a drop in throughput both east of Sigourney Street and east of the Asylum Street off-ramp. There are slight reductions in the throughput from regional diversions away from the I-84 corridor to avoid tolls, as is evident in the overall reduction in throughput at all three measurement locations. However, the majority of the drop in throughput is caused by local toll diversions to avoid using the now tolled viaduct segment east of Sigourney Street as more traffic tries to exit to the local roadways by using the Asylum Street off-ramp. However, this additional off-ramp demand exacerbates the existing off-ramp congestion and queue spillback issues, creating additional queues and congestion on the mainline. This is evident in both the congestion heat maps presented in the previous section, and also in the reduced volume throughput on I-84 Westbound before the Asylum Street off-ramp.

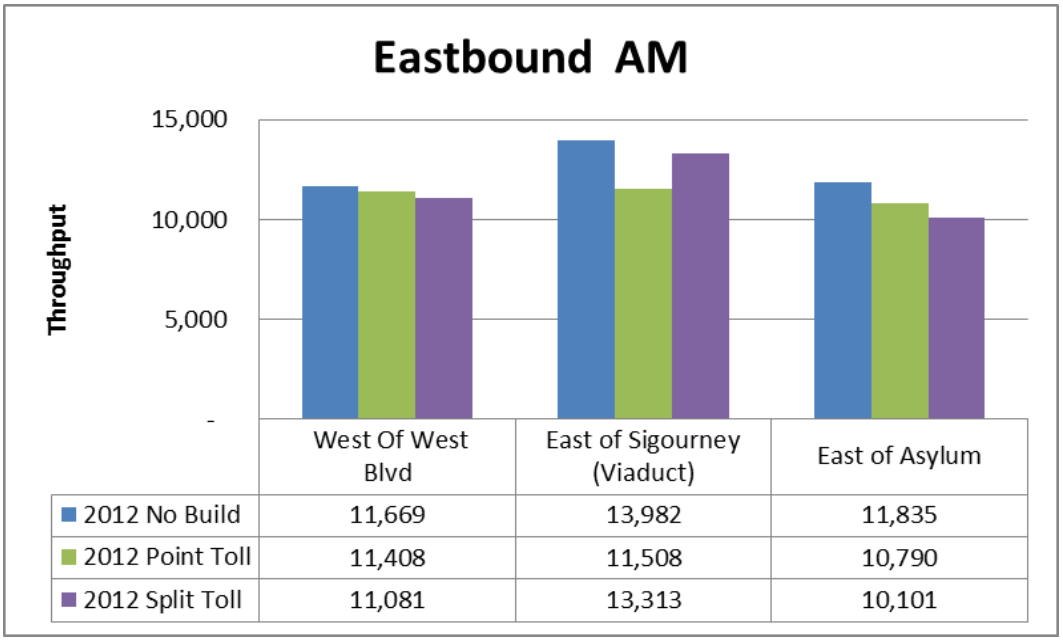
In the PM Peak Period, the eastbound direction of I-84 expectedly sees a reduction in the throughput at the viaduct tolling locations, but also sees an increase in throughput at the western most location (west of West Boulevard). This increase in throughput is created by the improvement in the bottleneck conditions further downstream approaching the Bulkeley Bridge. The overall reduced demand for the I-84 corridor lessens the severity of that existing bottleneck and in turn lessens the metering effect that the bottleneck has on throughput upstream of this location, thus increasing the throughput over the 2012 No Build scenario. In the westbound direction, similar effects are seen in the PM Peak Period as the AM Peak Period, as traffic attempts to avoid the toll on the viaduct and creates a PM Period congestion condition at the Asylum Street off-ramp that is similar in nature to the existing bottleneck seen in the AM Peak Period, although lessened in severity.

Alternative 2 Tolled - Two Toll Locations Scenario

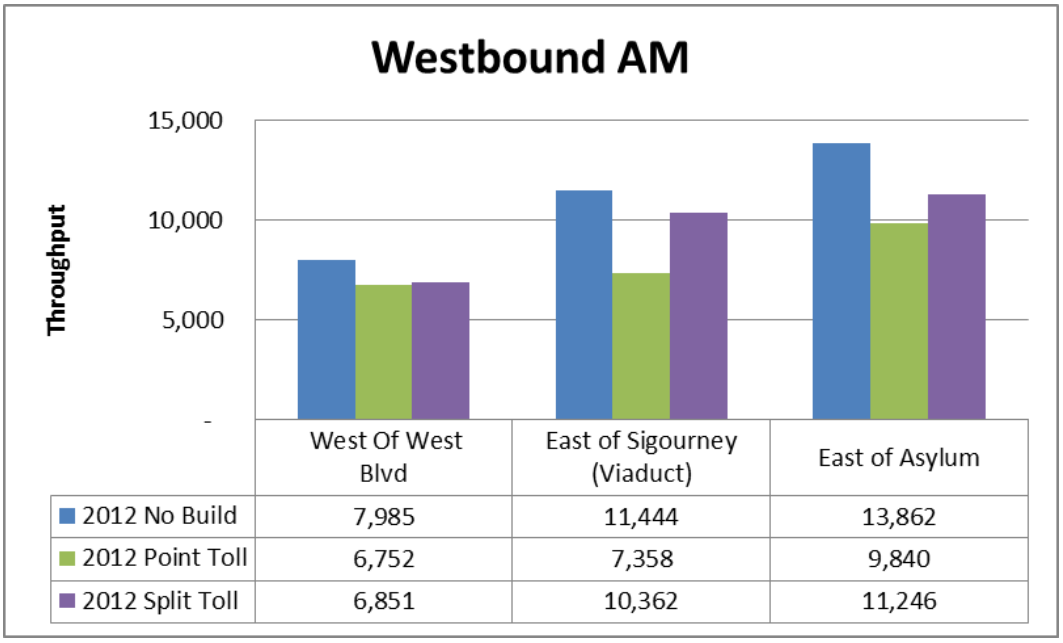
In the 2012 Split Toll (two tolling locations) scenario there is small reduction in throughput at the two split toll gantry locations (west of West Boulevard and east of the Asylum Street off-ramp) in both directions and in each peak period as compared to the 2012 No Build scenario. Overall, the Split Toll scenario retains more traffic along the I-84 corridor than the Single Point Toll scenario does.

As expected, the split toll lessens the severity of the local diversions through the study area by spreading more of the diversions throughout the system instead of concentrating it at a single point. However, there are still diversions that are seen throughout the study area, most notably eastbound traffic exiting at Kane Street to use local arterials to access downtown, and westbound traffic exiting at Main Street (Exit 50).

Figure 7-22
Simulated Throughput on I-84: AM Peak Period (7AM-9AM)

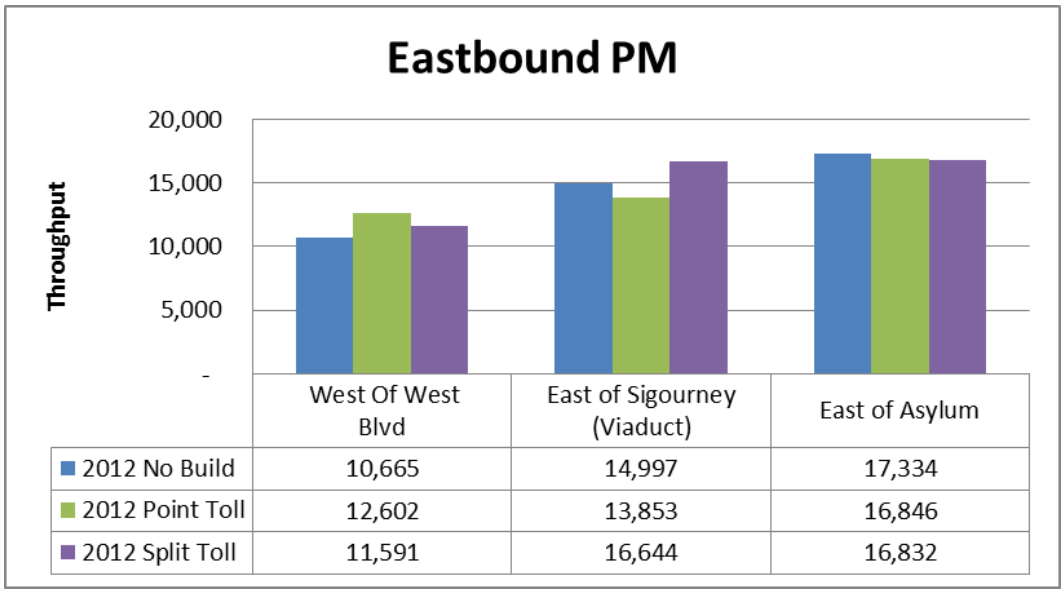


	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	11,669	13,982	11,835
2012 Point Toll	11,408	11,508	10,790
2012 Split Toll	11,081	13,313	10,101

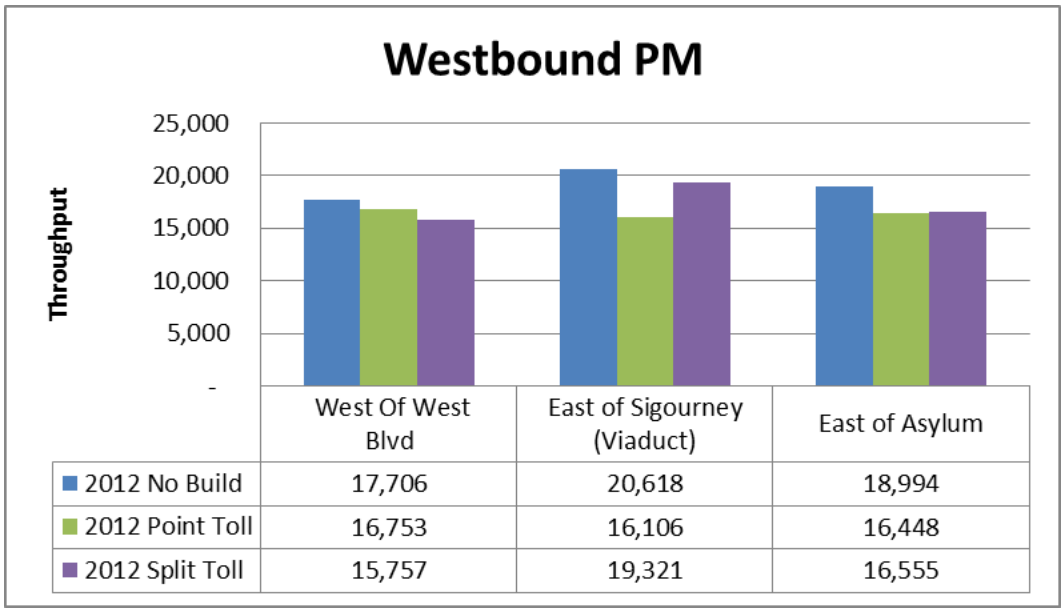


	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	7,985	11,444	13,862
2012 Point Toll	6,752	7,358	9,840
2012 Split Toll	6,851	10,362	11,246

Figure 7-23
Simulated Throughput on I-84: PM Peak Period (3PM-6PM)



	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	10,665	14,997	17,334
2012 Point Toll	12,602	13,853	16,846
2012 Split Toll	11,591	16,644	16,832



	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	17,706	20,618	18,994
2012 Point Toll	16,753	16,106	16,448
2012 Split Toll	15,757	19,321	16,555

System-wide Performance Measures in Tolling Scenarios

While the previous sections quantified the impacts of tolling on the I-84 freeway operations, the operational impacts on the arterials and local roadways of the local diversion traffic must also be examined. **Figures 7-24 thru 7-29** present the VMT, VHT, and average speed for different classes of roadways throughout the AM and PM Peak Periods for the 2012 No Build (Alternative 1 Toll Free), 2012 Single Point Toll (Alternative 1 Tolled), and 2012 Two Tolling Locations (Alternative 2 Tolled) scenarios.

In the 2012 Single Point Toll scenario, westbound traffic seeks to exit from I-84 predominately at the Asylum Street off-ramp and use alternative local diversion routes through the surface street network to avoid paying the toll. Similarly, eastbound traffic on I-84 exits early at Prospect Avenue to avoid the point toll gantry along the viaduct. In the 2012 Split Toll scenario, local diversion traffic is somewhat more dispersed, but the network still sees diversion traffic exiting westbound I-84 onto the Main Street off-ramp and eastbound off-ramp traffic at Prospect Avenue and Capital Avenue. Under both tolling scenarios, from these exit points the local diversion traffic will use the surface street arterial network to complete their trips, with relatively significant increases in traffic seen along the major east-west arterials, including Farmington Avenue, Capital Avenue, Park Street, and Chapel Street.

In both the AM and PM Peak Periods, this local diversion traffic creates additional demand for the arterial and local street roadways, some which are already operating at or near capacity during peak conditions. While the simulation analyses considered minor additional improvements such as re-striping of turn lanes or addition or extension of turn bays which would not likely require right-of-way takings or major construction efforts, the arterial system still operates at capacity in key locations and significant increases in congestion can be seen, to result in the decrease in the arterial and local roadway average speeds. In both conditions, this effect is more impactful in lowering the operational conditions on the arterial in the already more congested PM Peak Period.

These impacts are much more significant in the Point Toll scenario where the diversion vehicles are more concentrated and add to an already oversaturated operating condition at the Asylum Street off-ramp. While these problems may possibly be resolved with a redesign of the Asylum Avenue, Farmington Avenue, and Broad Street intersections, significant improvements would likely be needed. Overall in the AM Peak Period, the total VMT on the study area roadways can be seen to increase on the arterials and local roadways, with more substantial increases in VHT and decreases in the average speed. This effect is even stronger in the PM Peak Period, with average travel speeds across the entire surface street network dropping by more than half during the core of the peak period.

The Two Toll Location scenario operates better that the Single Point Toll scenario as the vehicles avoiding to pay the toll are spread across more exits as compared to the point toll scenario. An additional benefit of the two tolling locations is that it discourages travel on the already congested Asylum Street off-ramp. While that traffic primarily diverts to the Main Street off-ramp (Exit 50), there could be better opportunities to add capacity along Chapel Street to accommodate the increase in demand.

Overall in the AM Peak Period in the Two Tolling Location scenario, the operations on the arterials see more demand, with VHT increases and average speed decreases. However, the local roadways do not see as large of a deterioration of operational conditions, which is an indication that the arterial roadways are better able to serve the additional local diversion traffic without that traffic seeking even lower class roadways to avoid increased congestion. During the PM Peak Period, however, the increase in VHT and decrease in average speeds are relatively close in relative magnitude, indicating that the surface street network is saturated and vehicles are seeking even the lowest local class roadways to attempt to avoid congestion on the arterial network.

Figure 7-24
Vehicle Miles Traveled (VMT) – AM Peak Period

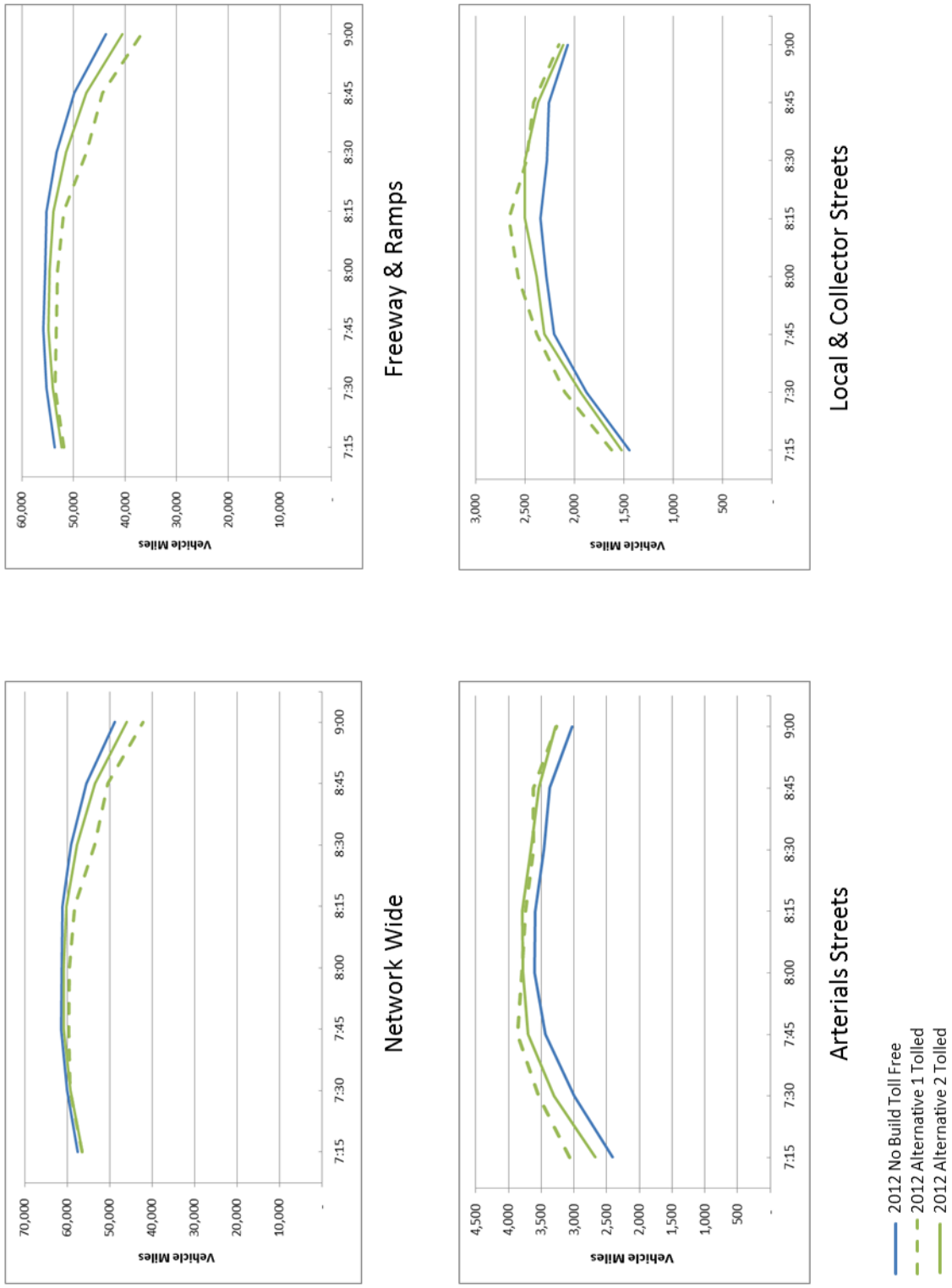


Figure 7-25
Vehicle Hours Traveled (VHT) – AM Peak Period

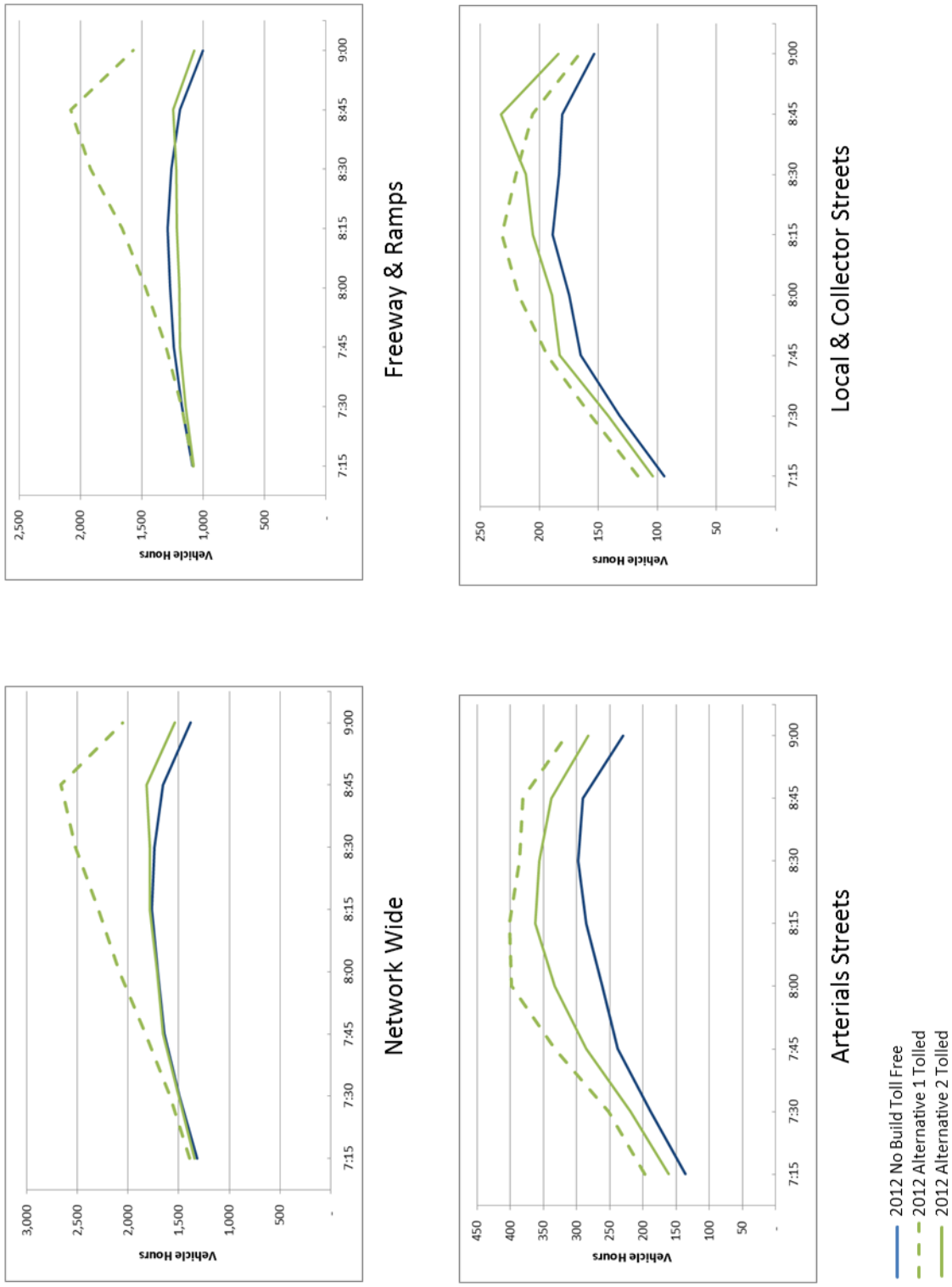


Figure 7-26
Average Speed - AM Peak Period

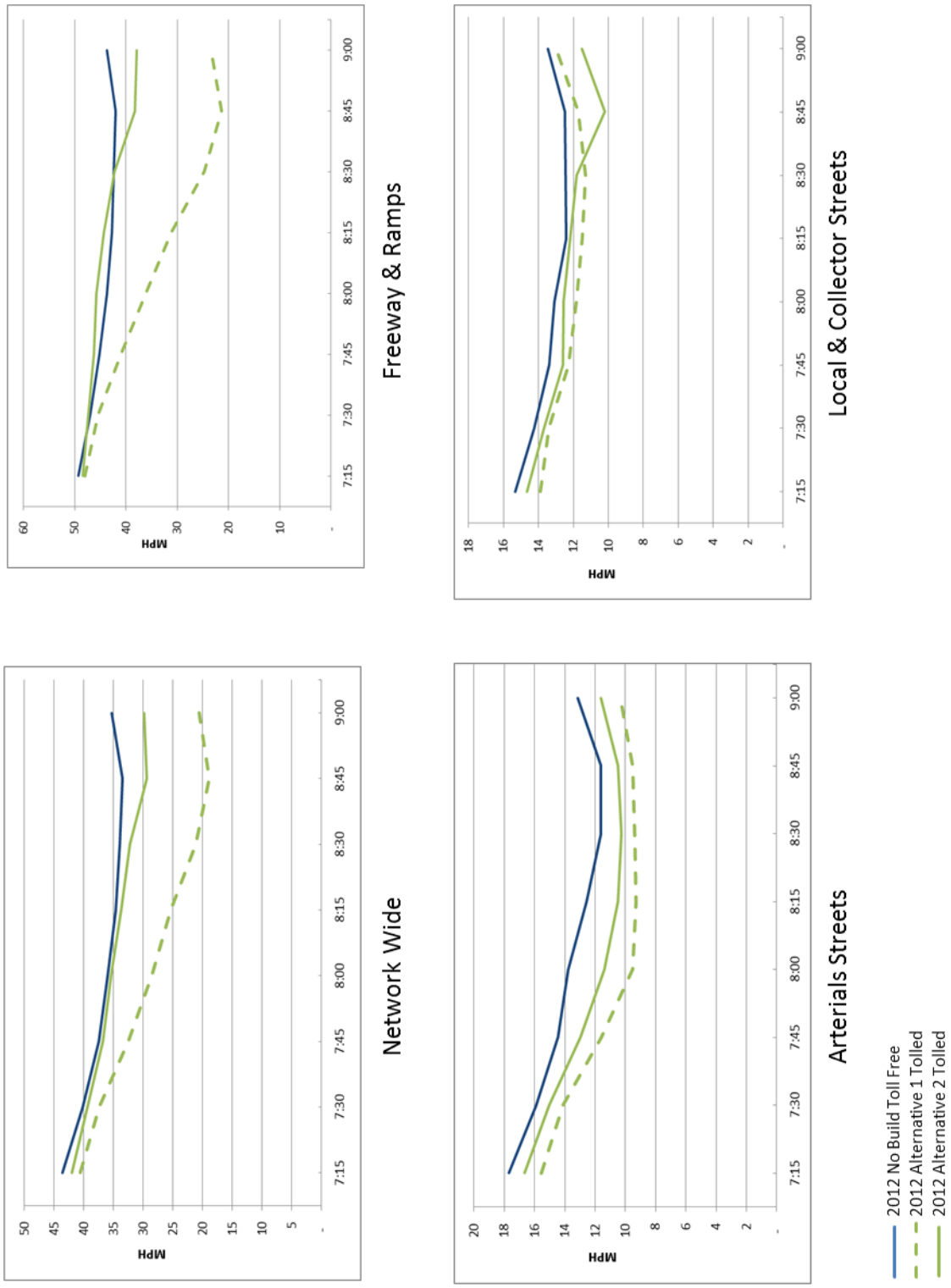


Figure 7-27
Vehicle Miles Traveled (VMT) - PM Peak Period

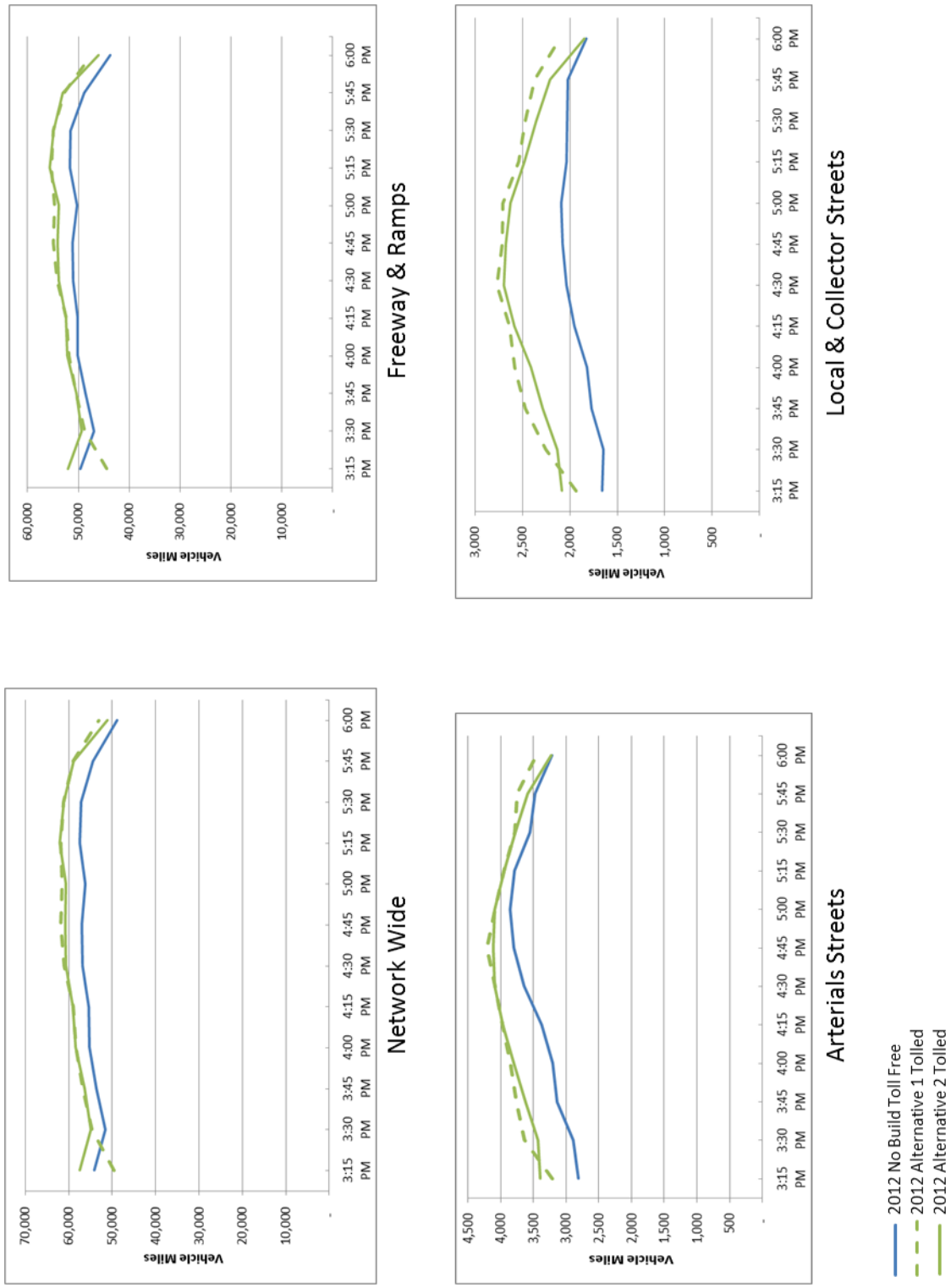


Figure 7-28
Vehicle Hours Traveled (VHT) - PM Peak Period

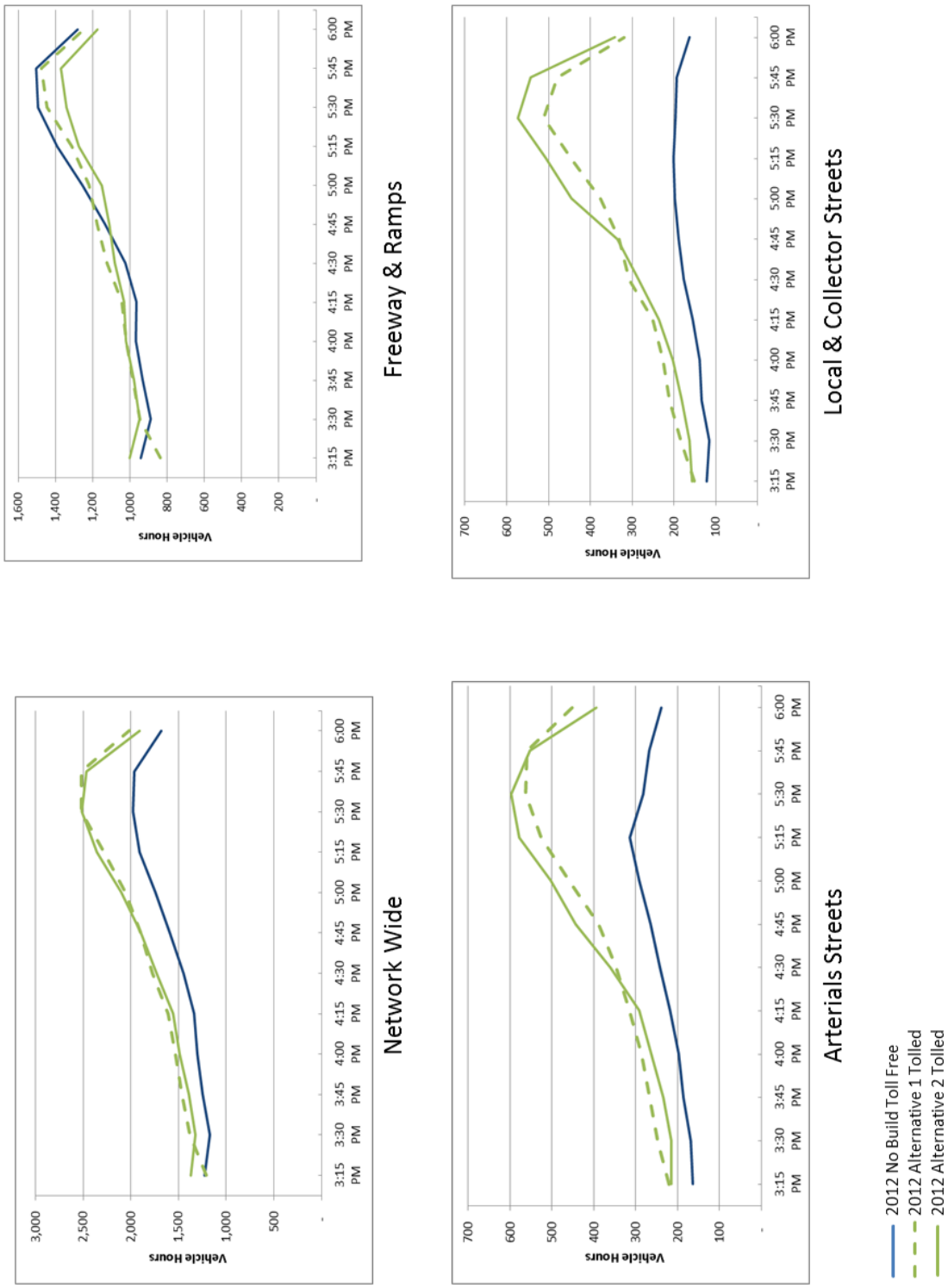
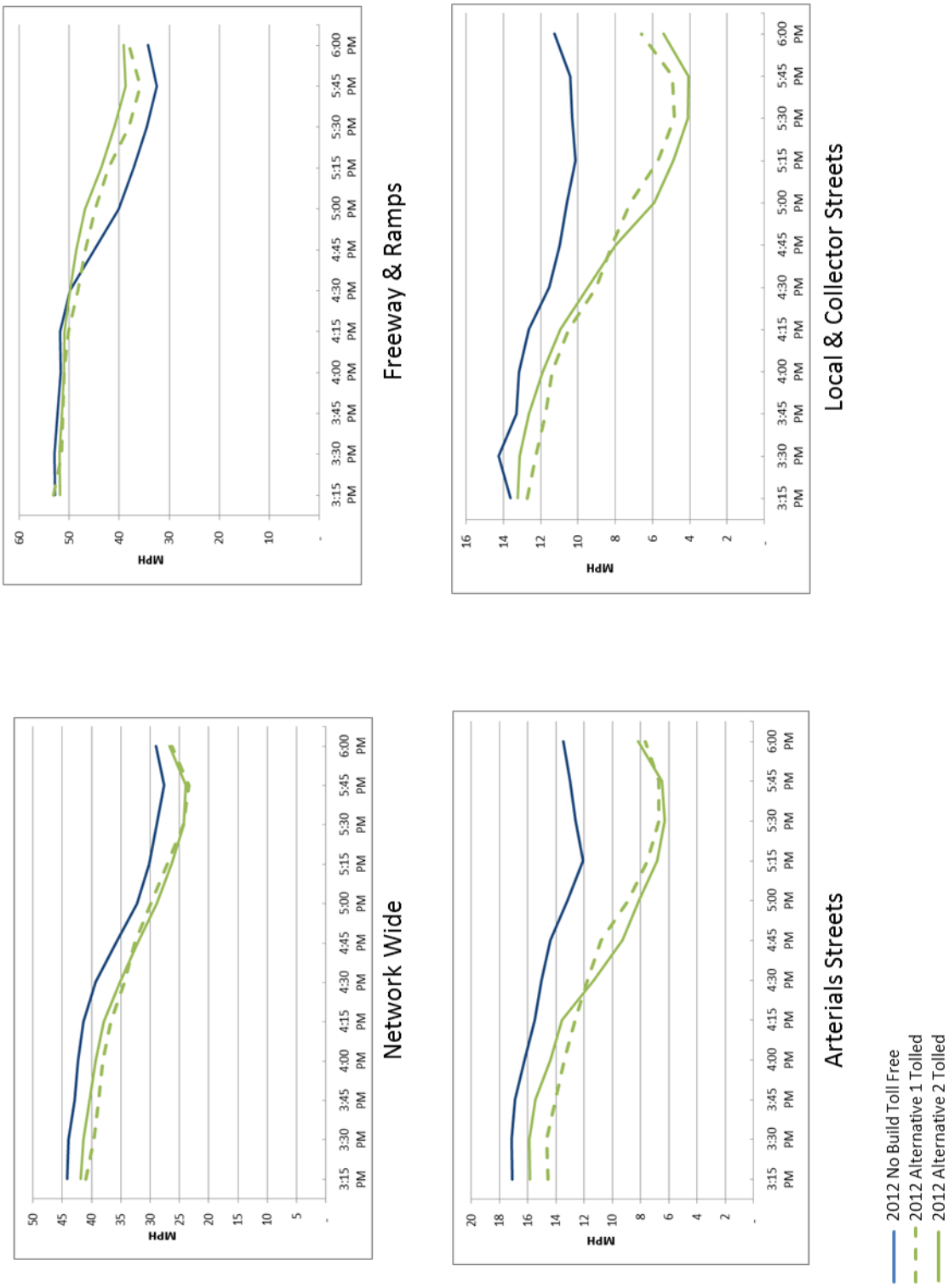


Figure 7-29
Average Speed - PM Peak Period



Conclusions

The purpose of the microsimulation components of the I-84 Corridor Congestion Relief Study was to estimate the impacts of tolling on the operations of both I-84 and the adjoining surface street roadways in Hartford and its surrounding communities. Based on the microsimulation modeling analysis completed for this project, significant insight was gained in terms of probable impacts of the viaduct tolling scenarios.

Even with a slight per annum increase in demand over 28 years it was noticed that the current committed projects would not be enough to handle the transportation demand in the Hartford region under the forecasted 2040 conditions. In a separate and larger study of the I-84 Viaduct, a project team under contract with the CTDOT is actively considering multiple designs to replace the aged existing viaduct infrastructure with one that improves corridor operations to meet future needs. This congestion relief study which focused on evaluating tolling was on a shorter schedule and was able to use some of the preliminary designs that the Viaduct study team had conceptualized early on in their work. However, even the best available build alternative (Alternative 3) available at the time of this analysis was shown to be insufficient in addressing the future traffic needs of the corridor. Because of this finding, the simulation model utilized 2012 demand levels across the various alternatives in order to have a model that was capable of distinguishing the impact on congestion levels from tolling.

Should tolling be included in those future development plans, the findings of this analysis can shed light on how the tolling diversion impacts may affect the future corridor needs. The tested toll scenarios have a potential to improve the operation of the freeway, but the toll gantry location(s) should be carefully considered keeping in mind the possible locations of diversions to the arterial network. Even with moderate toll rates and a limited number of local diversion trips, the existing capacity of the Hartford surface street system may not be able to accommodate those drivers who avoid the toll.

Of the two tested tolling scenarios, Alternative 2 (or similar tolling approach) is the better candidate for further study with improved operations of the freeway. The westbound direction of I-84 in the AM peak period experiences significant congestion under current conditions extending back from the Asylum Street off-ramp. Under Alternative 2, large operational improvements are experienced with traffic now flowing near free flow conditions throughout the AM Peak Period. Other time periods and travel directions see moderate improvements in congestion as compared to the westbound AM period. Utilizing two tolling locations both minimizes and better distributes the local toll diversion traffic onto the surrounding arterial street system.

However, there are still several areas and intersections of the Hartford street network that may need additional capacity improvements to accommodate the toll traffic diversion to keep Hartford's roadways operating at acceptable levels of operations. For example, In Alternative 2, for local diversion traffic, drivers avoid paying the toll at the first gantry location east of Asylum off ramp by exiting at the previous off-ramp to Main Street immediately upstream of the first toll gantry location. Drivers trying to get to the downtown Hartford area use the Main Street off-ramp to Chapel Street, and then have to make a left turn at either Market Street, Main Street or Trumbull Street to reach the downtown area, while more westerly destined trips continue along Chapel Street and then seek to turn left at Pleasant Street or High Street. All these intersections have limited left turn capacity, and even with timing adjustments to increate left turn capacities, the signals are not able to accommodate the additional diversion traffic and eventually queues extend along Main Street and back onto the I-84 mainline. Immediately downstream of the Bulkeley Bridge, the four travel lanes of I-84 split to feed

the off-ramp to I-91 Northbound and the Main Street off-ramp, with only two lanes continuing on I-84. These diverges are very closely spaced, and create additional weaving friction as vehicles position themselves in the correct lane. When the Main Street off-ramp queue eventually spills back to the I-84 Mainline, this weaving becomes increasing more difficult, and queues quickly build on I-84.

The arterials and intersections being impacted will ultimately depend on the configuration of the replacement project as this alone could affect the patterns in and out of Hartford. If tolling is to be considered in the future, the local Hartford network would need further analysis once a final build alternative is selected by the I-84 Viaduct Study Team.

Connecticut I-84 Corridor Congestion Relief Study

Appendix A – Stated Preference Reports

RSG INC.
TRANSPORTATION

Connecticut I-84 Value Pricing Stated Preference Survey

September 2013

DATA ■ ANALYSIS ■ SOLUTIONS

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1.0 INTRODUCTION

In June and July of 2013, Resource Systems Group, Inc. (RSG) conducted stated preference (SP) surveys for passenger and commercial vehicle drivers who travel on I-84 through downtown Hartford, Connecticut. I-84 through Hartford is the busiest section of highway in the state of Connecticut, carrying more than 175,000 vehicles daily despite an original design capacity of 50,000 vehicles per day. The majority of this 50-year-old highway was built on viaducts which are reaching the end of their useful life and must be replaced. The SP survey is part of a larger study being conducted by the Connecticut Department of Transportation (CTDOT) to assess plans to address the deteriorating condition of the highway between Hamilton Street and the I-91 interchange (Figure 1-1). Plans are currently being evaluated to replace the elevated structure or modify the design of the highway to make operational and safety improvements while also creating a long term travel solution through downtown Hartford that can be embraced by all stakeholders.

RSG developed and implemented two stated preference survey questionnaires—one for passenger car drivers and one for commercial vehicle drivers—that gathered information from travelers who recently made a trip through downtown Hartford using I-84. The questionnaires collected data on current travel behaviors, presented respondents with information about the proposed changes to I-84, and used stated preference experiments to collect data that were used to estimate travelers' willingness-to-pay and propensity to use the proposed I-84 replacement under a range of possible future conditions.

Figure 1-1: I-84 Hartford Study Corridor

The survey approach employed a computer-assisted self-interview (CASI) technique developed by RSG. The stated preference survey instrument was 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.

The passenger vehicle survey was administered to respondents through in-person intercepts at selected locations in and around downtown Hartford, through a local employer outreach effort to organizations and businesses located in downtown Hartford, and to a panel of respondents residing in and around the Hartford region through coordination with an online market research firm. The commercial survey was administered entirely through in-person intercepts at two truck stops east and west of Hartford on I-84. In total, 2,900 valid passenger survey and 244 valid commercial vehicle surveys were obtained. Data from these travelers were analyzed using advanced statistical methods to estimate travelers' value of time and propensity to use I-84 in downtown Hartford under a variety of potential future conditions.

This report documents the development and administration of the survey questionnaire, presents survey results, and summarizes the discrete choice model estimation methodology and findings. The complete set of survey screen captures, response tabulations, and respondents' comments about the project are provided as appendices to this report.

2.0 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 travelers' sensitivities to travel time and toll cost across different market segments of interest.

At the beginning of each survey questionnaire, respondents were presented with an introduction to the purpose of the survey, the estimated time required to complete the questionnaire, and instructions for how to navigate through the computer-based instrument. A project email address was included on this and all subsequent screens to provide online respondents with a way to contact the survey team with any technical questions about the survey.

Following the introduction, both questionnaires had questions grouped into 5 main sections:

1. Screening questions
2. Trip detail questions to collect details about a recent trip in or through the study area.
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)

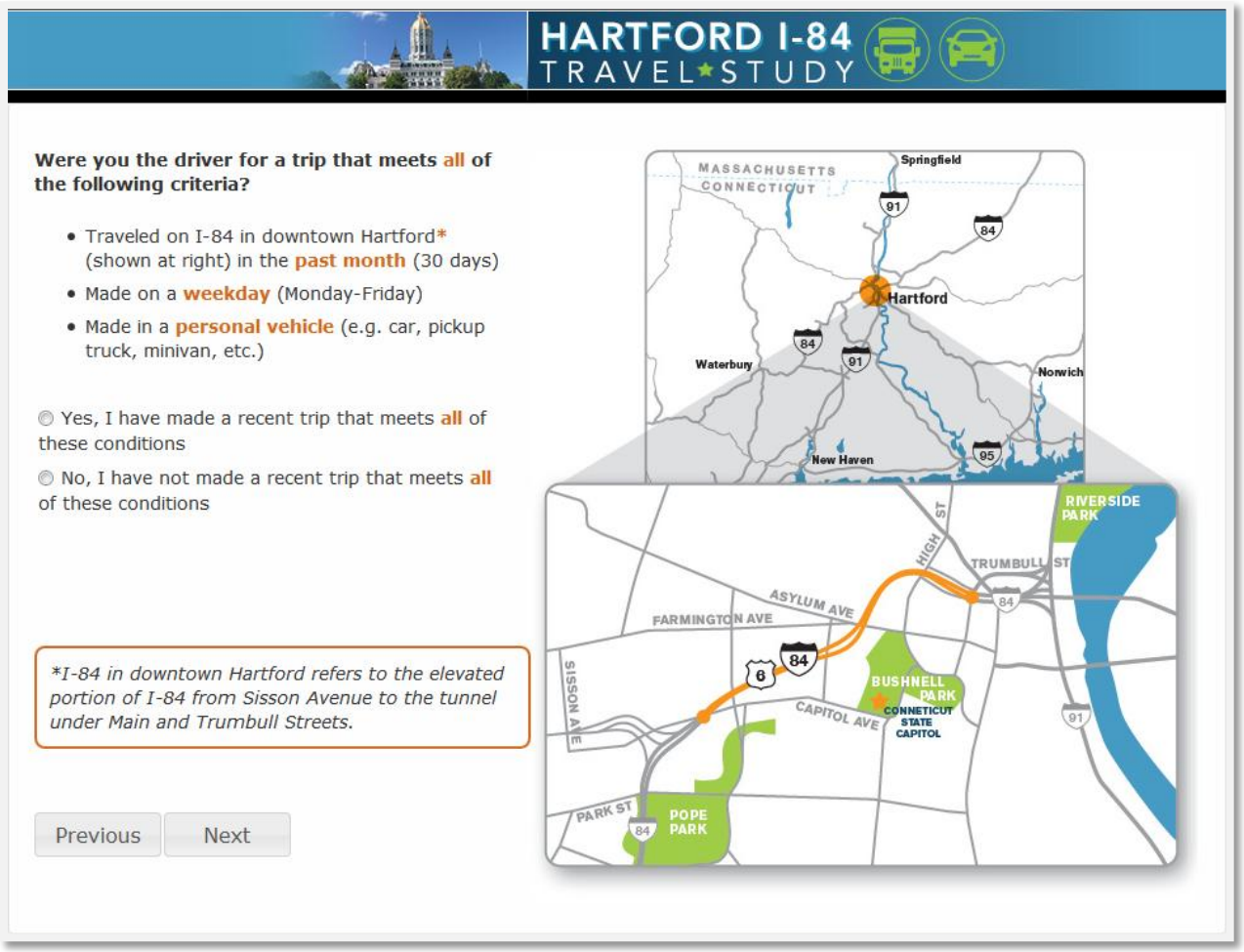
The complete set of survey questions as they appeared to respondents on-screen can be found in **Appendix A**.

2.1 Passenger Vehicle Questionnaire

2.1.1 Screening Questions

After being presented with basic instructions about how to navigate the computer-based instrument and a brief introduction to the purpose of the study, respondents were asked if they had made a qualifying trip to continue the survey. In order to construct credible stated preference scenarios, it is necessary for respondents to have recent and personal experience using the study portion of I-84. To participate in the survey, respondents must have traveled on I-84 through downtown Hartford in a personal vehicle within the last month (Figure 2-1). Respondents who indicated that they had not made a trip that met any of the stated criteria were thanked for their time and terminated from taking the remainder of the survey.

Figure 2-1: Sample Survey Screen: Trip Qualification



2.1.2 Trip Detail Questions

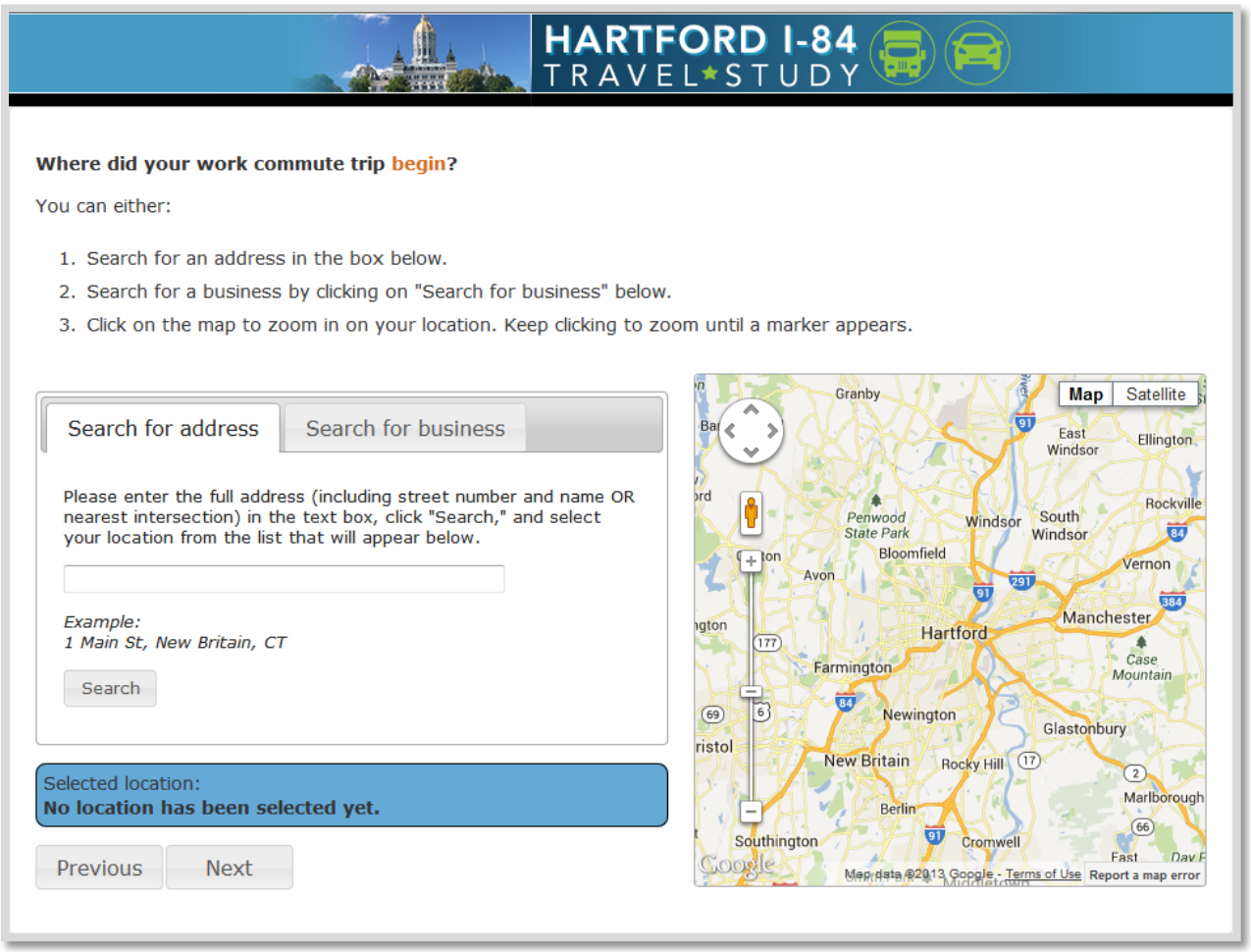
Respondents proceeded to answer a series of questions about their most recent qualifying trip in the study area. This most recent trip, referred to as the respondent's reference trip, formed the basis for the rest of the questions in this section of the survey.

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:

- Travel date
- Trip purpose
- Origin and destination locations
- Trip departure time
- Preferred departure time
- Travel time
- Travel delay due to traffic congestion
- Flexibility in arrival time
- Parking cost and parking egress mode
- Vehicle occupancy
- Alternate routes to I-84
- Trip frequency
- Transit familiarity and ridership frequency
- Ownership of electronic toll collection (ETC) transponders

Respondents were first asked to report the date their trip took place and the primary purpose for making their trip. Respondents were then asked to indicate the general locations their trips began and ended at; either home, a regular work place, or another place. Next, the precise geographic beginning and ending locations for the trip were collected using a Google Maps™ interface. Respondents had the option of entering a full address, street intersection, or business name to identify the location or to select the location using an interactive map (Figure 2-2).

Figure 2-2: Sample Survey Screen: Origin Location Address and Map Interface

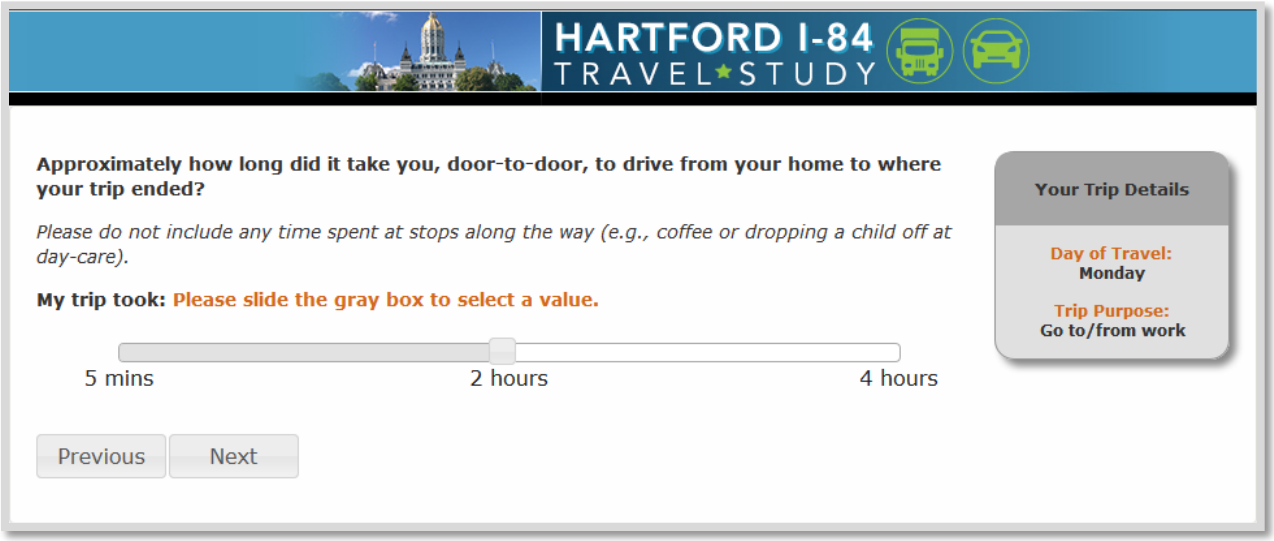


The location information was geocoded using a Google Maps™ application programming interface (API) that provided the latitude and longitude for the trip origin and destination. Estimates of the total trip distance and travel time were also calculated within the application.

If a respondent entered a trip that started and ended in the same location, they were asked if they needed to correct the origin or destination. Respondents who reported 'yes' were brought back to the origin location page. Respondents who reported 'no' were brought back the screener page and asked if they had made another recent qualifying trip.

After the origin and destination questions, respondents entered their trip departure time and if they started their trip at their reported time specifically to minimize time spent in traffic. If respondents had adapted their departure time to account for traffic, they were asked the time they would have preferred to start their trip if there was not any congestion. All respondents were then asked to enter their travel duration. When reporting travel time, respondents were instructed to only include time spent driving, and to not include time spent at any stops made along the way, as shown in Figure 2-3. If a respondent entered a trip duration that was significantly shorter or longer than the travel time calculated by the Google Maps driving directions algorithm, the respondent was shown a warning screen stating that the travel time they reported for their trip appeared to be too short or too long. The respondent was then given the option of changing their travel time or continuing with the survey without changing their travel time.

Figure 2-3: Sample Survey Screen: Travel Time

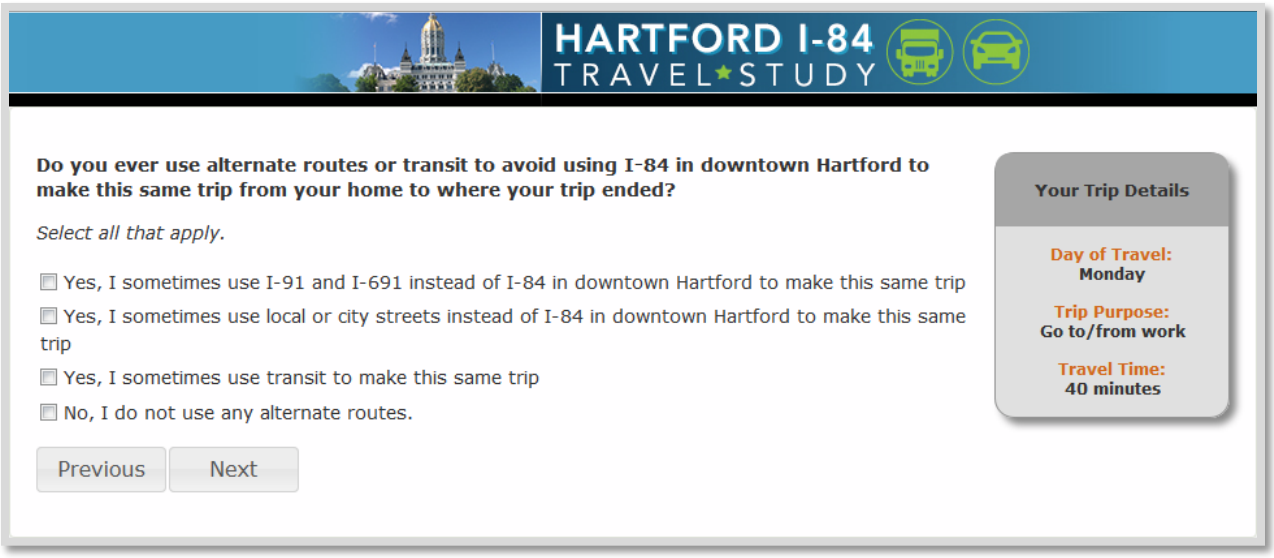


Next, respondents were asked if they experienced any delays as a result of traffic congestion on I-84 in downtown Hartford. Respondents who experienced delay were asked a follow-up question to indicate how long the trip would take without congestion on I-84. The survey then asked all respondents how much flexibility they had in the time they needed to arrive at their destination.

Respondents who made a work commute trip were asked if they paid to park their vehicle at their destination and, if so, how much they paid to park. Work commute respondents were then asked if they walked or used another mode to arrive at their final destination after parking their vehicle.

All respondents were asked how many people were in the car during their trip, the approximate frequency they had made their reference trip in the last ninety days, if they own a transponder such as E-ZPass for electronic toll collection, and which alternate routes, if any, they use instead of I-84 to make their same trip.

Figure 2-4: Sample Survey Screen: Alternate Routes



To conclude this section of the survey, respondents were asked about their familiarity with transit in the Hartford area and how often, if ever, they use transit in the region.

2.1.3 Stated Preference Questions

The purpose of the stated preference section of the survey was to estimate travelers' preferences and potential behavioral response under hypothetical future travel conditions on I-84 in downtown Hartford. At the start of the stated preference questions, respondents were presented with a description of the proposed I-84 improvements (Figure 2-5) and the concept of Value Pricing (Figure 2-6).

Figure 2-5: Sample Survey Screen: Project Description

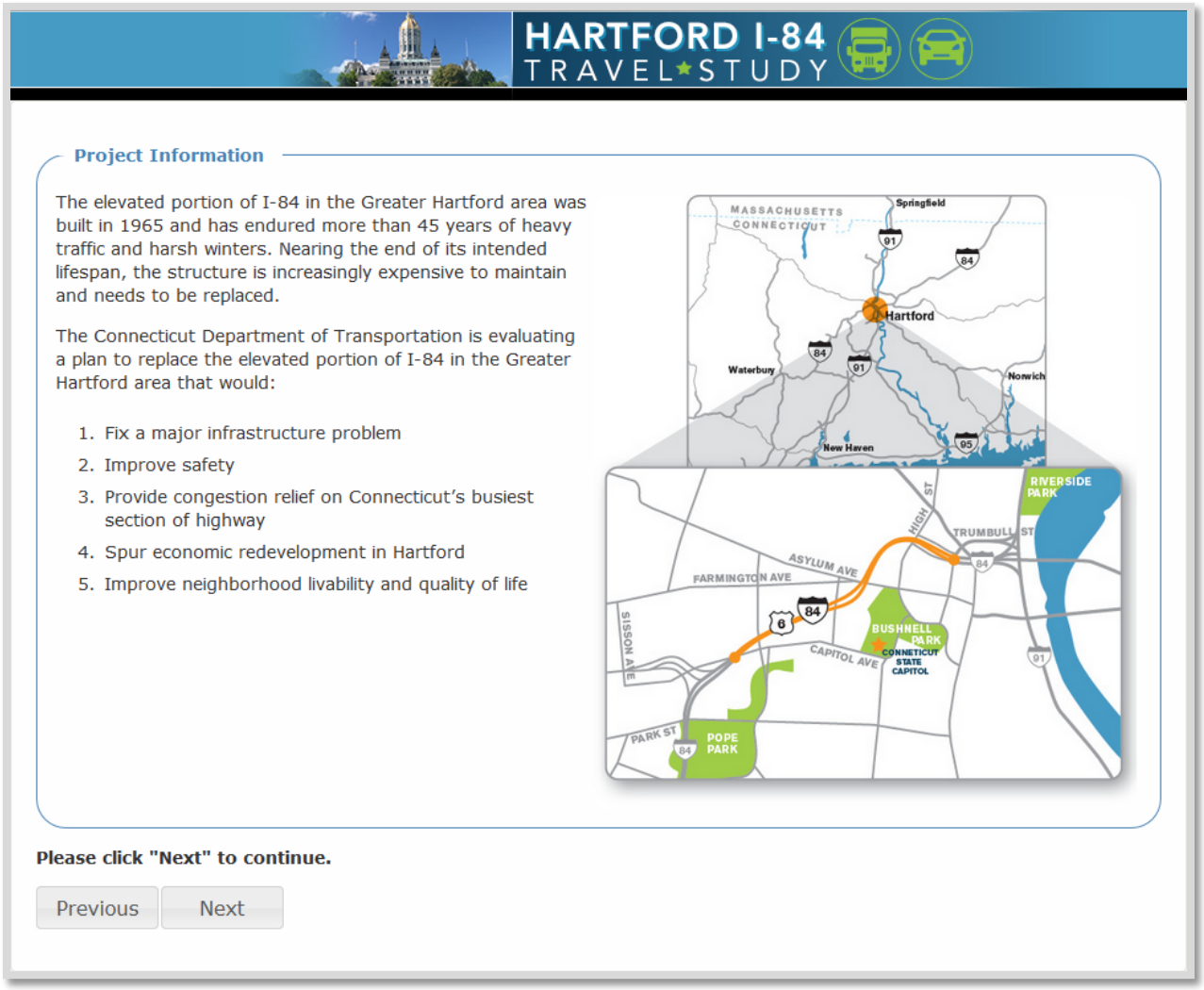
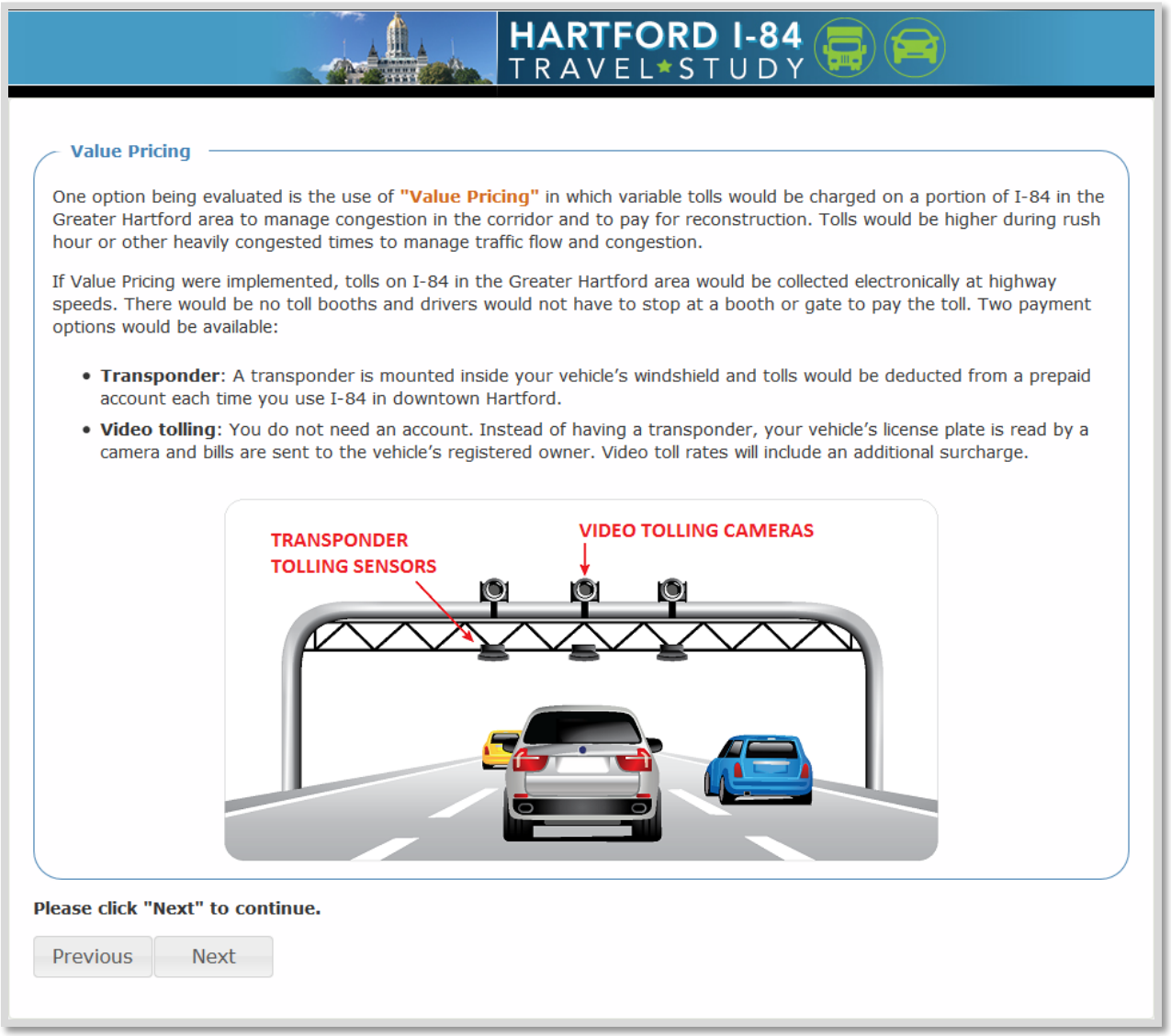
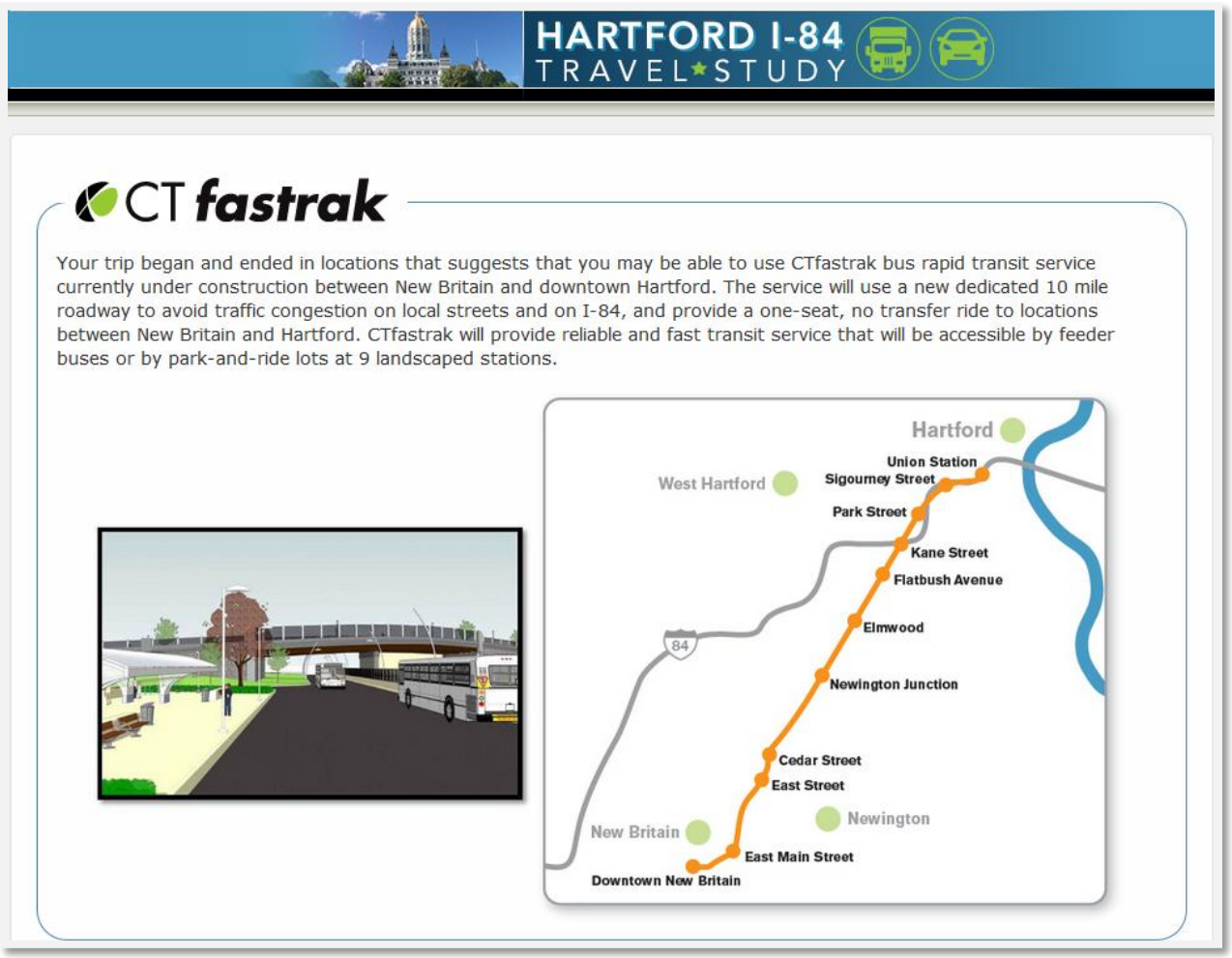


Figure 2-6: Sample Survey Screen: Value Pricing Description



Respondents whose trip origin locations were within the catchment area of the proposed CTfastrak light rail system were shown an additional slide that provided a brief introduction the CTfastrak rail service (Figure 2-7).

Figure 2-7: Sample Survey Screen: CTfastrak Information



Next, the respondents' reported travel times, departure times, and origin and destination location coordinates were used to generate ten hypothetical stated preference experiments that contained at least two and as many as four possible choice alternatives:

- **Alternative 1**: Use I-84 at current departure time – This alternative was shown to all respondents and was described by two attributes: travel time and toll cost.
- **Alternative 2**: Use I-84 at a different departure time – This alternative was shown only to respondents who indicated they began their trip during a peak travel period (Defined in the survey as weekdays between 6:00AM and 9:59AM or 3:00PM and 6:59PM). This option was described by three attributes: travel time, toll cost, and departure time. The travel time was always equal to or less than the time presented in Alternative 1 to reflect the improved travel conditions in off-peak times. Similarly, the toll cost for Alternative 2 was always equal to or less than the cost shown in Alternative 1 to reflect the proposed tolling policy of discounted toll rates during off-peak times.
- **Alternative 3**: Use an alternate route (toll-free) at current departure time: This alternative was shown to all respondents and was described by a single attribute of travel time. The travel times shown in Alternative 3 were always longer than the times shown in Alternative 1 to reflect the additional time required to divert to local city streets or other routes that are more congested.

- **Alternative 4**: Use CTfastrak at current departure time **<u>or</u>** a local bus at current departure time: This alternative was presented to respondents who reported a trip that could have reasonably used either the CTfastrak system or the local Hartford city bus system. The presented mode (CTfastrak or bus) shown in this alternative depended on the trip origin and destination locations reported by the respondent. Respondents whose trip began and ended approximately one mile from the CTfastrak route or whose trip began in or west of New Britain, CT and ended within one mile of the CTfastrak route were presented with CTfastrak for this alternative. Respondents who reported a trip that did not begin or end within one mile of the CTfastrak corridor but did begin and end within a ten mile radius of downtown Hartford were presented with a local bus for this alternative. If a respondent did not meet any of these conditions, they were not presented with Alternative 4.

The attribute values presented in each experiment varied around a set of base values according to an experimental design. The experimental design ensures the statistical independence of the variation of the attributes within each experiment and from one experiment to the next. It also ensures that each respondent sees an appropriate range of tradeoffs over their 10 experiments.

With the exception of departure time in the second alternative, the values of the attributes varied independently across the 10 experiments. For the departure time attribute, each respondent was assigned to a peak period with duration of 60, 90, 120, or 150 minutes that included their actual departure time. In this way, the amount of time required to shift out of the peak period varied among respondents, but remained constant for any given respondent.

To make the scenarios as realistic as possible to respondents, the 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 or adding one of several factors to give the level required by the experimental design for that particular scenario. By varying the travel time and toll cost shown in each experiment, the respondent was faced with different time savings for different costs, allowing them to demonstrate their sensitivities to travel time and toll cost across a range of values.

Respondents were asked to select the alternative they preferred the most under the conditions presented in presented in each scenario. Figure 2-8 shows an example stated preference experiment with all four alternatives available where Alternative 4 shows the CTfastrak mode. The orange text in each alternative represents the attributes that systematically varied from one experiment to the next. In order to avoid potential bias associated with the layout of the alternatives, the order of these alternatives was randomized for each respondent. Additional examples of the stated preference exercises are presented in Appendix A.

Table 2-1 details the formulas that were used to calculate the attribute values.

Figure 2-8: Sample Survey Screen: Stated Preference Experiment with Four Alternatives

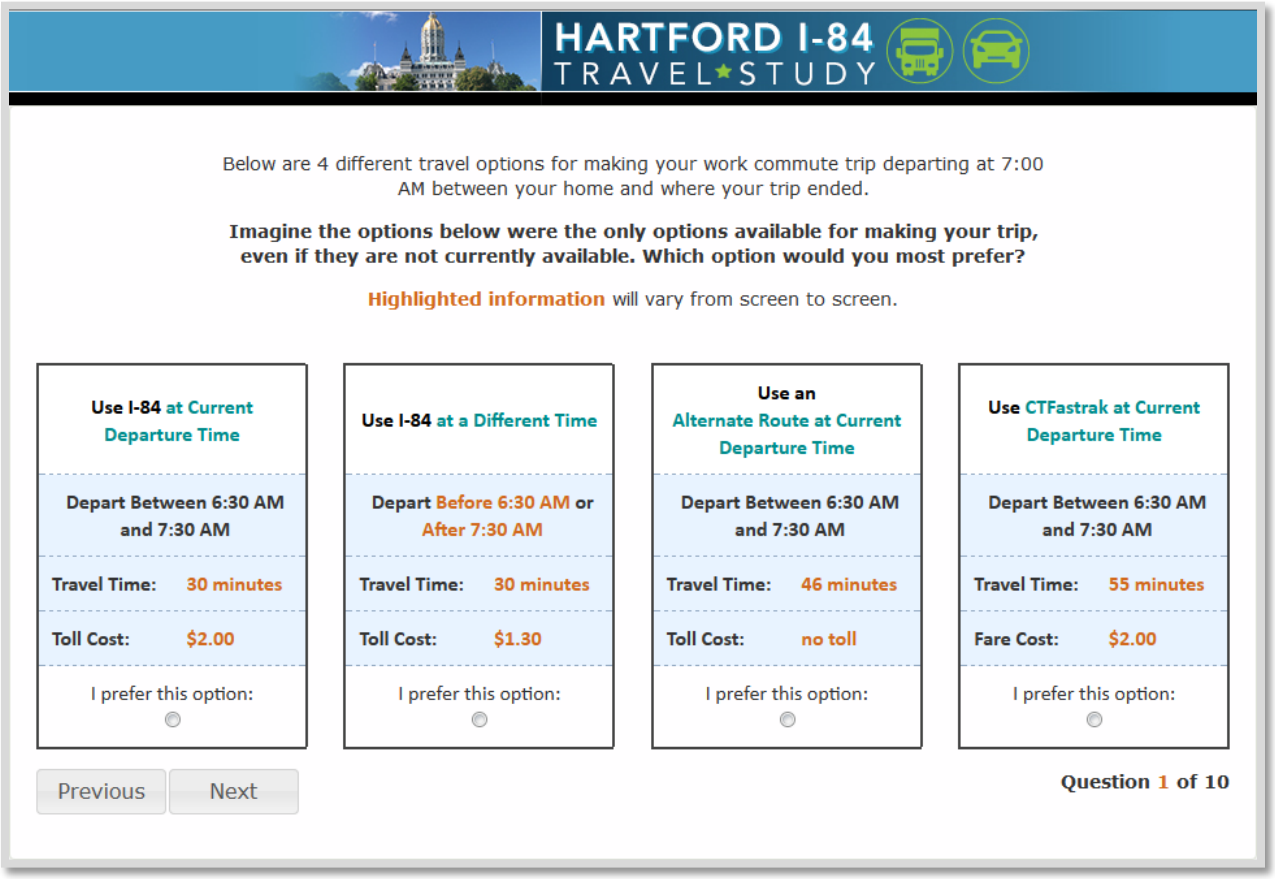


Table 2-1: Passenger Vehicle Stated Preference Attribute Level Calculations

Attribute	Alt 1		Alt 2		Alt 3		Alt 4		
	Use I-84 (at current time)		**Use I-84 at different time** *(if applicable)*		**Alternate Route**		**Use Transit at Current Departure Time** *(If origin and destination permits transit)*		
								CTfastrak	Local Bus
	Description	Level	Description	Level	Description	Level	Description	Level	Level
Travel Time	Current Travel Time + Level	-10	Alt 1 Travel Time + Level	-5	Current Travel Time + Level	2	Current Travel Time + Level	0	10
		-8		-4		4		5	15
		-5		-3		6		10	20
		-2		-2		8		15	25
		0		0		10		20	30
Travel Cost	Level	$ 0.25	Alt 1 Cost * Level	0.45	Toll Free		Level	$ 1.00	$ 0.50
		$ 0.50		0.55				$ 2.00	$ 1.00
		$ 0.75		0.65				$ 3.00	$ 1.50
		$ 1.00		0.75				$ 4.00	$ 2.00
		$ 1.25		0.85				$ 5.00	$ 2.50
		$ 1.50							
		$ 2.00							
		$ 2.50							
		$ 3.00							
		$ 3.50							
Peak Period Duration			Level	1.0					
				1.5					
				2.0					
				2.5					

The specific levels used in each stated preference experiment were determined by using an orthogonal experimental design. The experimental design used to generate the stated preference experiments in the survey included 100 total experiments divided into 10 blocks of 10. A respondent was randomly assigned to one of the 10 blocks and then shown each of the 10 experiments from that block in a random order. Orthogonal designs are commonly used for this type of research to ensure that the attribute values vary independently and to minimize correlation between attribute values.

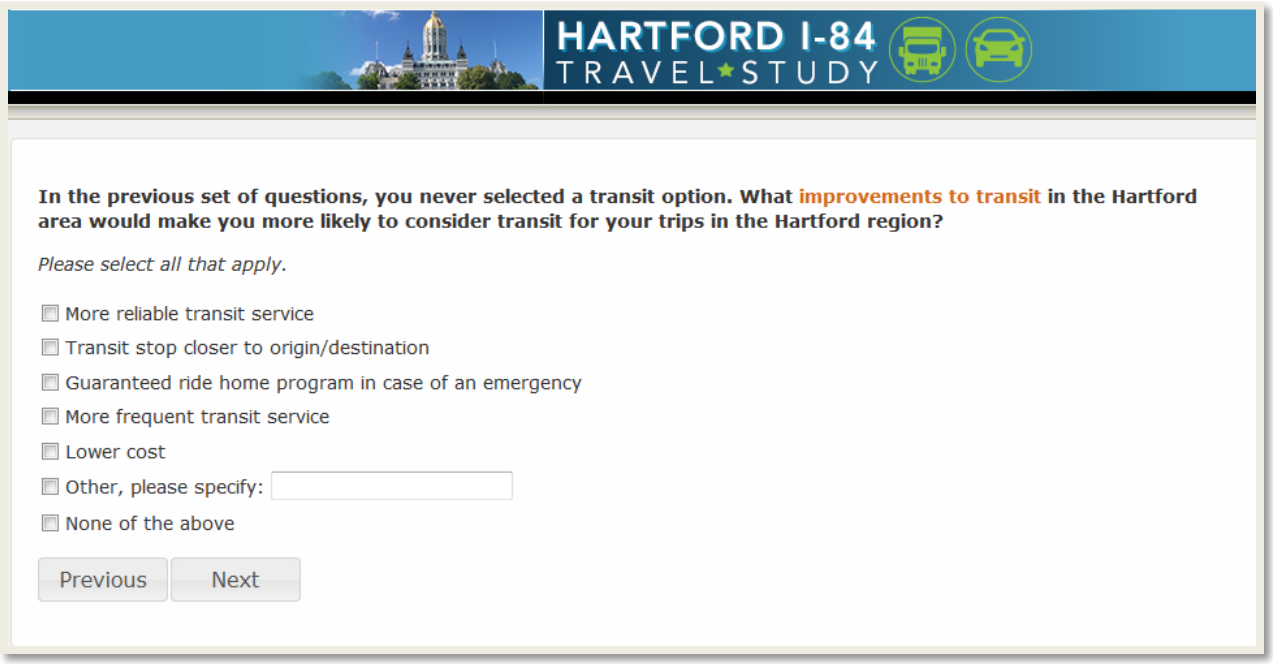
2.1.4 Debrief and Opinion Questions

After completing the set stated preference experiments, respondents answered a series of questions to assess the underlying rationale for their choices and to identify any potential strategic bias in their responses.

Respondents were shown a number of debrief questions depending on their answers in the stated preference scenarios. First, if a respondent was shown and selected Alternative 2 (to use I-84 at a different departure time) they were asked if they would be more likely to travel before or after the peak period. Alternatively, if a respondent was shown but never selected Alternative 2, they were

asked to indicate why they never chose to shift their departure time. Respondents who always selected Alternative 3 (an alternate toll-free route other than I-84) in the stated preference scenarios were asked to indicate the primary reason for never choosing to travel on I-84. A follow-up question was also asked of respondents who saw but never selected Alternative 4 (use transit) from one of the 10 experiments. These respondents were asked to indicate what potential improvements to transit in the Hartford area would make the more likely to consider transit for their trips in the future (Figure 2-9).

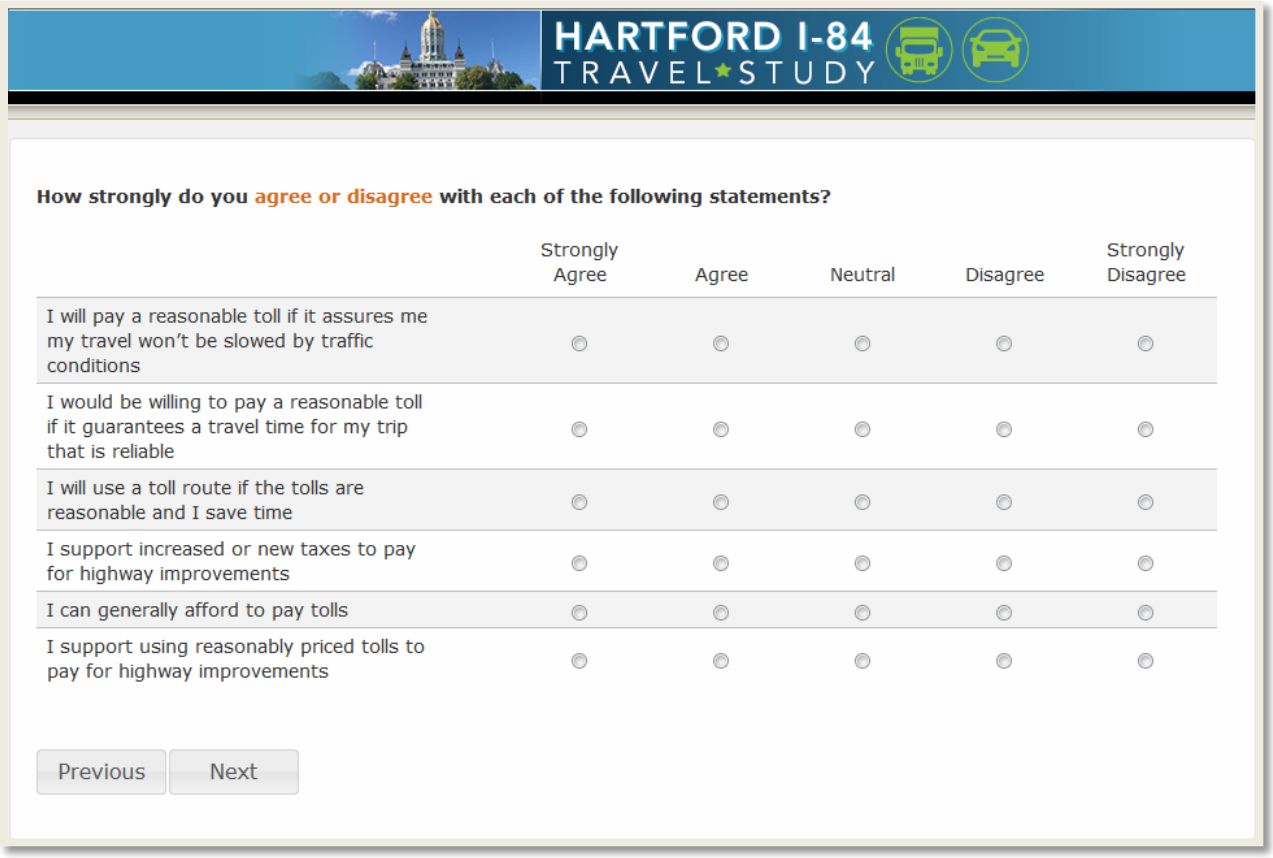
Figure 2-9: Sample Survey Screen: Factors to Increase Transit Use



To better understand preferred payment methods and ETC acquisition if all electronic tolling were implemented in the corridor, respondents who stated they did not own an ETC device but selected at least one I-84 alternative in the stated preference questions were asked how likely they would be to acquire an ETC device to pay the toll instead of video license plate tolling with an additional surcharge. If the respondent indicated that they were unlikely to use an ETC device they were asked in a follow-up question to better understand their preferences.

Respondents were then asked whether they favor or oppose the use of Value Pricing on I-84 in downtown Hartford. Those with a non-neutral opinion were asked a follow-up question to identify why they favored or opposed Value Pricing. Finally, respondents were asked to indicate the degree to which they agree or disagree with a set of statements about tolling and value pricing (Figure 2-10).

Figure 2-10: Sample Survey Screen: Toll Attitude Questions



2.1.5 Demographic Questions

To conclude the survey, several demographic questions were asked to identify differences in responses among traveler segments and to verify that the sample contained a diverse cross section of the population that would be served by the I-84 improvements. Respondents were assured that their responses would be kept confidential and that any personal information they provided would not be shared or sold to a third-party. All respondents were asked to provide the following:

- Home zip code
- Gender
- Age
- Employment status
- Number of people in the household
- Number of vehicles in the household
- Annual household income
- If they are of Latin, Hispanic or Latino origin
- Race

Finally, respondents were given the opportunity to leave comments about the survey and/or the proposed Value Pricing plan in Hartford. These open-end comments are provided in **Appendix C**.

2.2 Commercial Vehicle Questionnaire

2.2.1 Screening Questions

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 trip in a commercial vehicle within the past 30 days that traveled on I-84 in downtown Hartford as shown in Figure 2-11. Qualifying respondents were instructed to think of their most recent commercial trip that used I-84 in downtown Hartford. For the purposes of this study, a commercial trip was defined as travel from the last commercial stop (for pickup or delivery) before using I-84 in downtown Hartford to the first commercial stop after using I-84 in downtown Hartford in one direction only (Figure 2-12). This trip, referred to as the respondent's reference trip, formed the basis for the next set of questions in the survey.

Figure 2-11: Sample Survey Screen: Trip Qualification

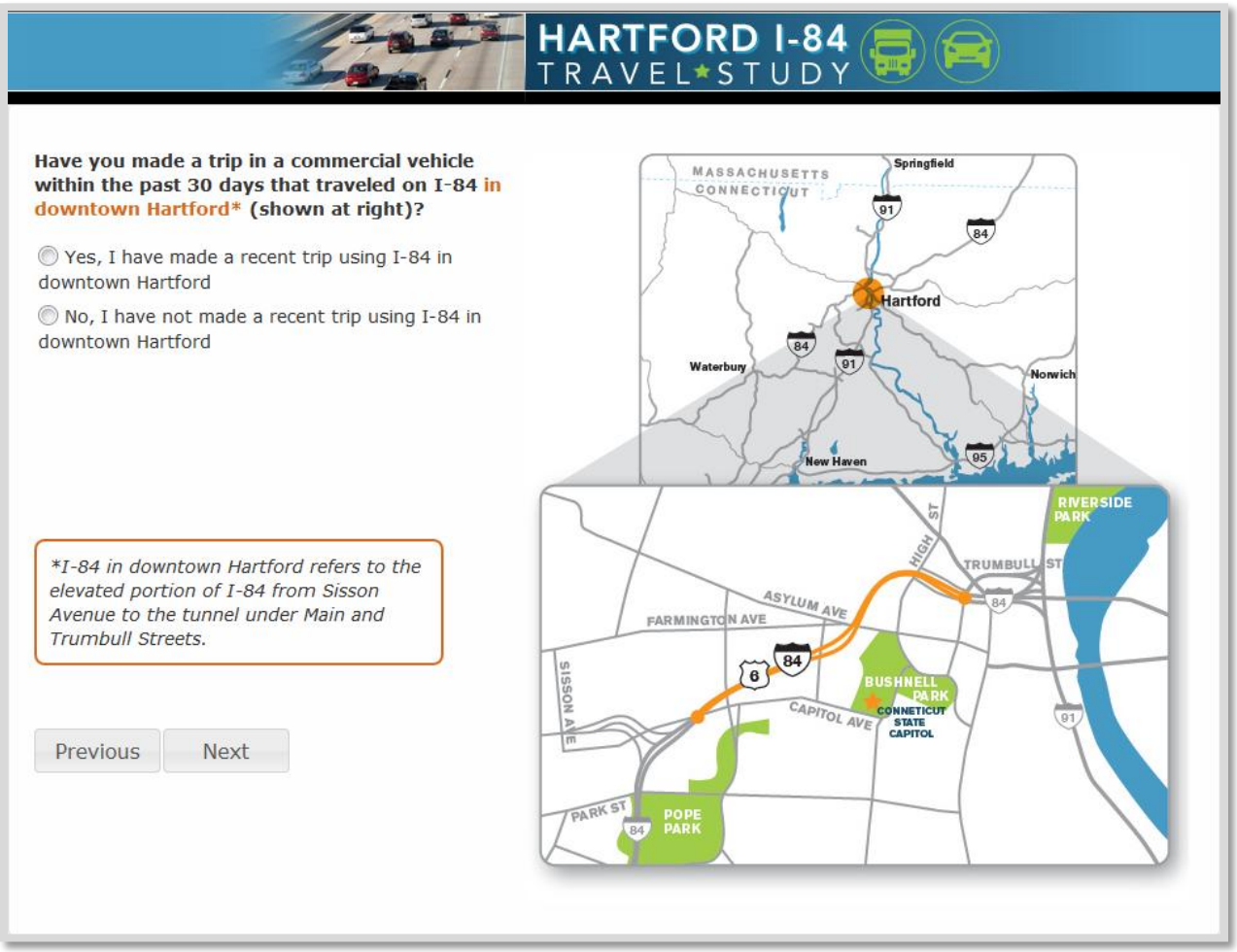
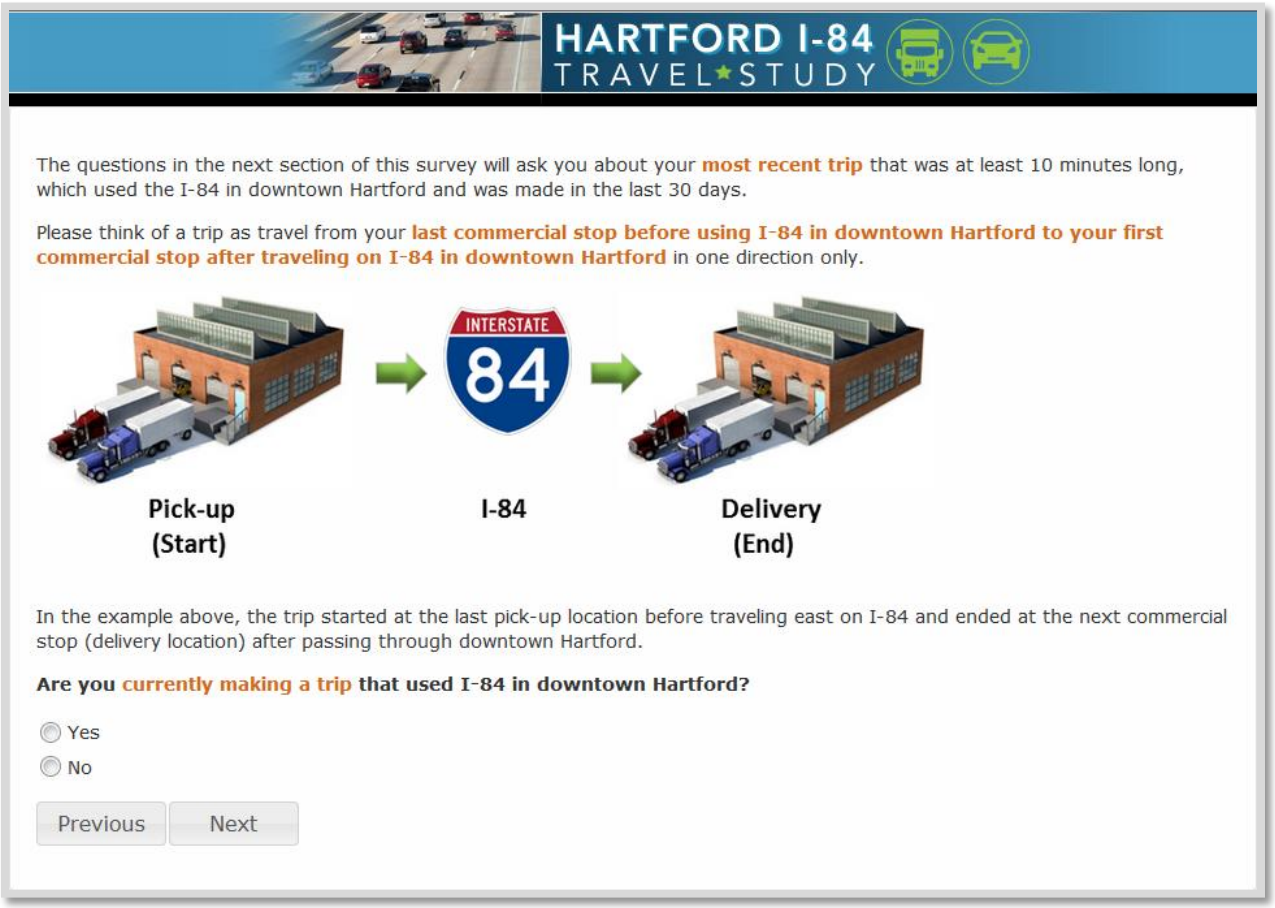


Figure 2-12: Sample Survey Screen: Trip Definition



2.2.2 Trip Detail Questions

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:

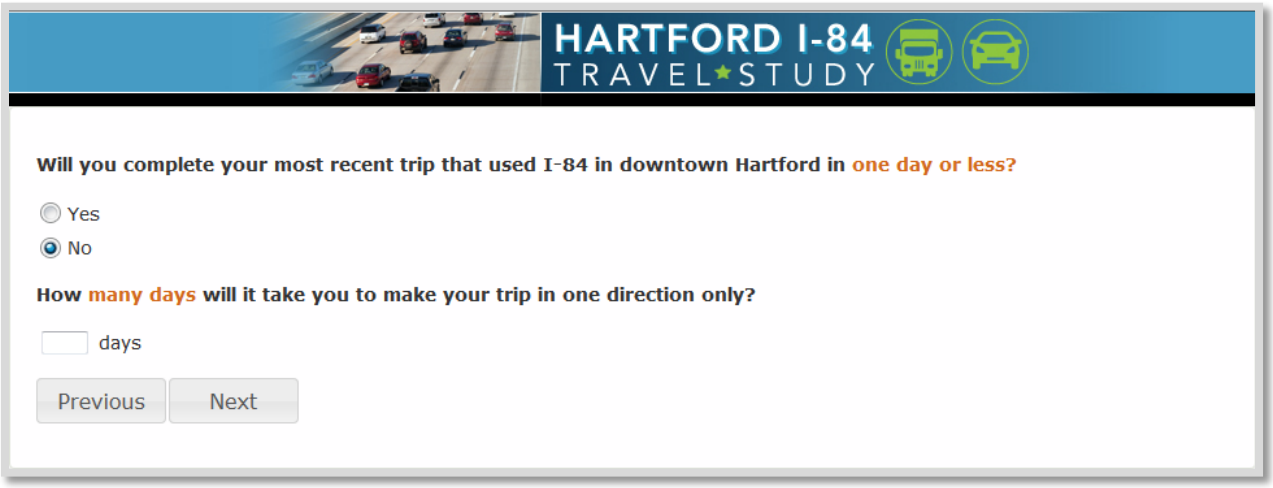
- Single or multi-day trip
- Travel date
- Origin and destination (city and state)
- Trip distance
- Arrival time in downtown Hartford
- Travel time
- Travel delay due to traffic congestion
- Tolls paid and toll amount
- Vehicle size (number of axles)
- Trip frequency
- Alternate routes to I-84
- Ownership of electronic toll collection (ETC) transponders

Because all commercial vehicle respondents were intercepted on I-84 to participate in the survey, it is likely that the trip that they were currently making qualified as their most recent trip that used I-

84 in downtown Hartford. The first question in this section of the survey confirmed whether this was the case and the wording of subsequent questions was changed depending on whether they were describing their current trip or a trip that was made sometime in the past. Respondents who were not describing their current trip were asked to report the date they made their most recent commercial trip that used I-84 in downtown Hartford.

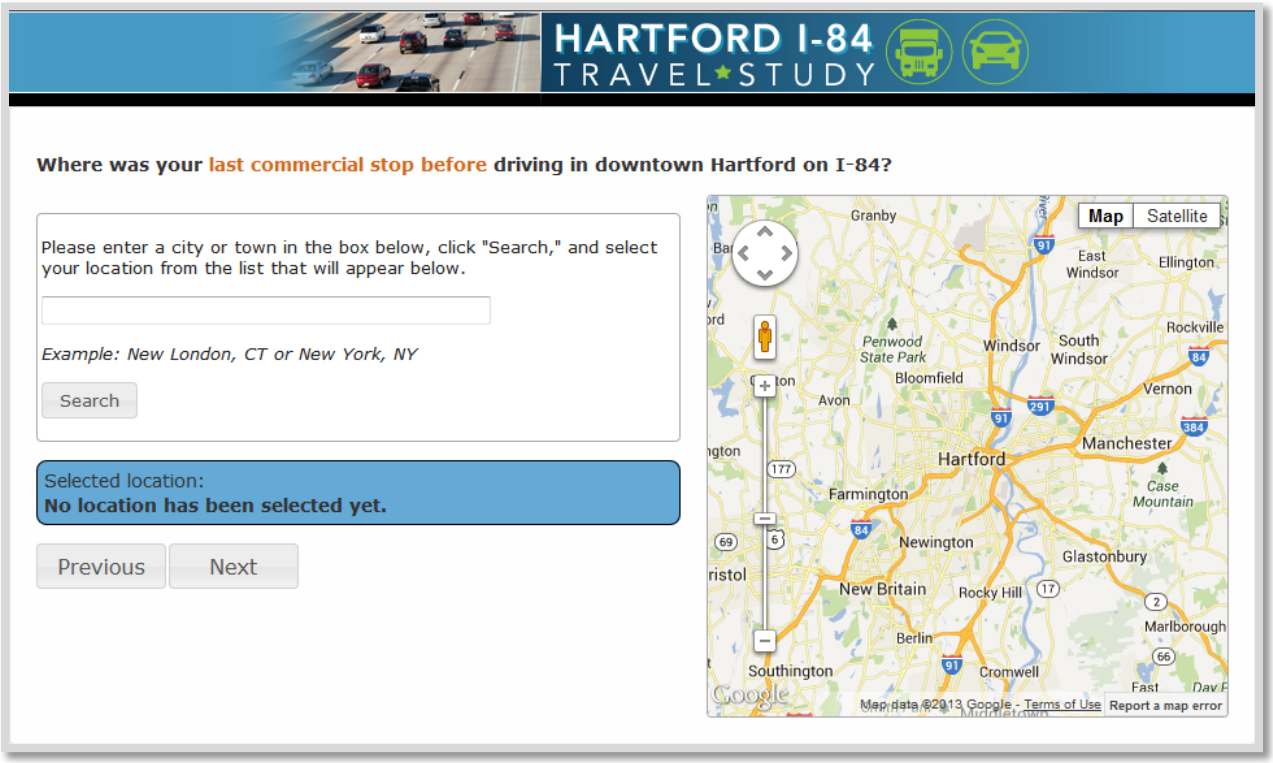
Next, because commercial vehicle trips vary greatly in distance and travel time, respondents were asked whether they completed or will complete their reference trip in one day or multiple days. Respondents who were describing a multi-day trip reported the total number of days it would take to make that trip (Figure 2-13). Subsequent questions (such as total travel time) were revised to allow for greater ranges of responses depending on whether respondents reported a single-day or multi-day trip.

Figure 2-13: Sample Survey Screen: Trip Duration



Using a Google Maps™ interface, respondents entered the city and state of their last commercial stop before traveling on I-84 in downtown Hartford and the city and state of their next commercial stop after traveling on I-84 in downtown Hartford. These locations were geocoded to provide a latitude and longitude for the origin and destination cities and to calculate a rough travel distance for the trip.

Figure 2-14: Sample Survey Screen: Trip Origin



Next, respondents were asked to report the travel time and distance details of their trip, including the time they entered downtown Hartford on I-84, the total duration of their trip, and the approximate distance of their trip. As in the passenger vehicle survey, respondents were also asked if they experienced any delays because of traffic congestion on I-84 in downtown Hartford and how long the trip would take if there were no delays.

Respondents then reported whether they paid or will pay any tolls for their reference trip and, if so, the approximate toll amount they paid. Next, respondents reported their vehicle size (number of axles), how often they make their same reference trip, and if they have an electronic toll collection (ETC) transponder for their vehicle. To conclude this section, respondents were asked if they ever use I-91 or other alternate routes to avoid using I-84 in downtown Hartford to make this same trip.

2.2.3 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-84 in downtown Hartford.

At the start of the stated preference questions, respondents were presented with a description of the proposed improvements to I-84 and the concept of Value Pricing. These descriptions were identical to those presented to the passenger vehicle respondents (see Figure 2-5 and Figure 2-6).

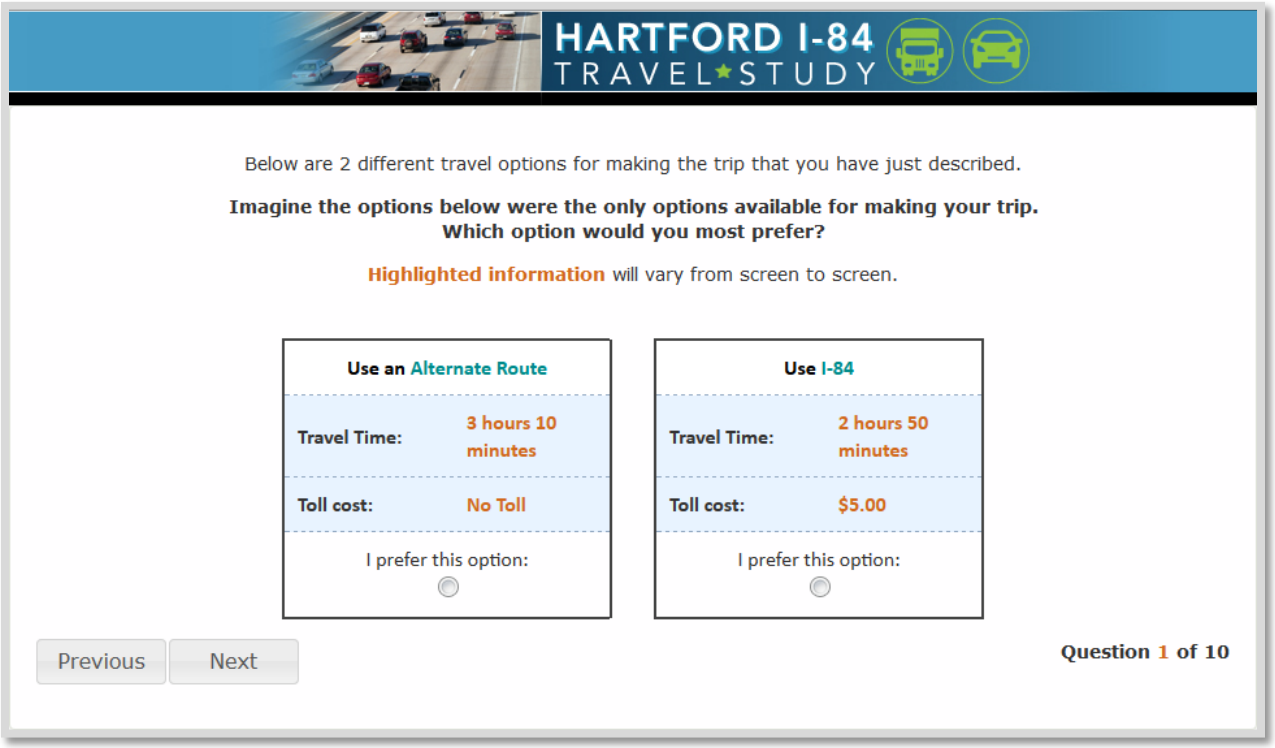
Next, the respondents' reported travel times from their reference trip were used to generate a custom set of ten hypothetical stated preference experiments that included two travel alternatives:

- **Alternative 1**: Use I-84 (tolled) – This alternative was shown to all respondents and was described by two attributes: travel time and toll cost.

- **Alternative 2**: Use an alternate route (toll-free) – This alternative was shown to all respondents and was described by a single attribute of travel time. The travel time presented was always longer than the time presented in Alternative 1 to reflect the time required to divert to local city streets or other routes that are more congested.

The travel time and toll cost attributes for each alternative varied independently across the set of 10 experiments and respondents were asked to select the alternative they preferred the most under the conditions presented. By varying the travel time and toll cost, the respondent was faced with different time savings for different costs, allowing them to demonstrate their sensitivities to travel time and toll cost across a range of values. (Figure 2-15).

Figure 2-15: Sample Survey Screen: Stated Preference Experiment



The attribute values presented in each alternative varied independently over the set of 10 experiments according to an orthogonal experimental design. The travel time values shown on-screen were generated by combining the respondents' reported travel time with one of five values provided by the experimental design. Similarly, the I-84 toll cost was generated by multiplying the number of axles by one of the 10 levels in the experimental design. Table 2-2 provides the specific equations and levels used to generate the attribute values for commercial vehicle respondents.

Table 2-2: Commercial Vehicle Stated Preference Attribute Level Calculations

Attribute	Alternative 1: Use I-84		Alternative 2: Use Alternate Route	
	Description	Level	Description	Level
Travel Time	Current Travel Time + Level	2	Current Travel Time + Level	-10
		4		-8
		6		-5
		8		-2
		10		0
Toll Cost	Toll Free		Number of Vehicle Axles * Level	$0.25
				$0.50
				$0.75
				$1.00
				$1.25
				$1.50
				$1.75
				$2.00
				$2.25
				$2.50

The experimental design used to generate the stated preference experiments in the survey included 50 total experiments divided into five groups of 10. A respondent was randomly assigned to one of the five blocks and then shown each of the 10 experiments from that block in a random order.

2.2.4 Debrief and Opinion Questions

As in the passenger vehicle survey, the stated preference experiments were followed by a set of debrief and opinion questions to understand the underlying rationale behind respondents' choices and to identify any potential strategic bias in their responses. After completing the stated preference exercises, commercial vehicle respondents who never selected the tolled I-84 option were asked to provide their primary reason for doing so. Respondents were then asked whether they favor or oppose Value Pricing on I-84 based on the information provided to them in the survey along with the reason(s) for their opinion. Finally, respondents were asked to indicate the degree to which they agree or disagree with a set of statements about tolls. These statements were identical to the list of statements used in the passenger vehicle survey (Figure 2-10).

2.2.5 Company Background Questions

To identify company characteristics that may have an impact on travel preferences and willingness to pay tolls, the final section of the survey included a set of questions related to company policies and details. All respondents reported the following information:

- Location of company headquarters
- Fleet size
- Average trip length
- Flexibility in delivery schedule
- Timeframe structure (penalty or incentive)

- Toll costs responsibility
- Toll charging mechanism
- Sources of information for routing decisions

The survey concluded with an opportunity to leave comments about the survey and/or the proposed Value Pricing plan in Hartford. These open-end comments are provided in **Appendix C.**

3.0 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 include a sufficient range of travelers and trip types to support the statistical estimation of the coefficients of a choice model 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 model.

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

- In-person intercepts at selected locations in and around downtown Hartford.
- Email invitations through outreach to local employers
- Email invitations to members of an online market research panel residing in the greater Hartford area

Commercial vehicle travelers were recruited exclusively through in-person intercepts at travel centers along I-84 in the greater Hartford region.

Each recruitment method is described in greater detail below.

3.1.1 In-Person Intercept

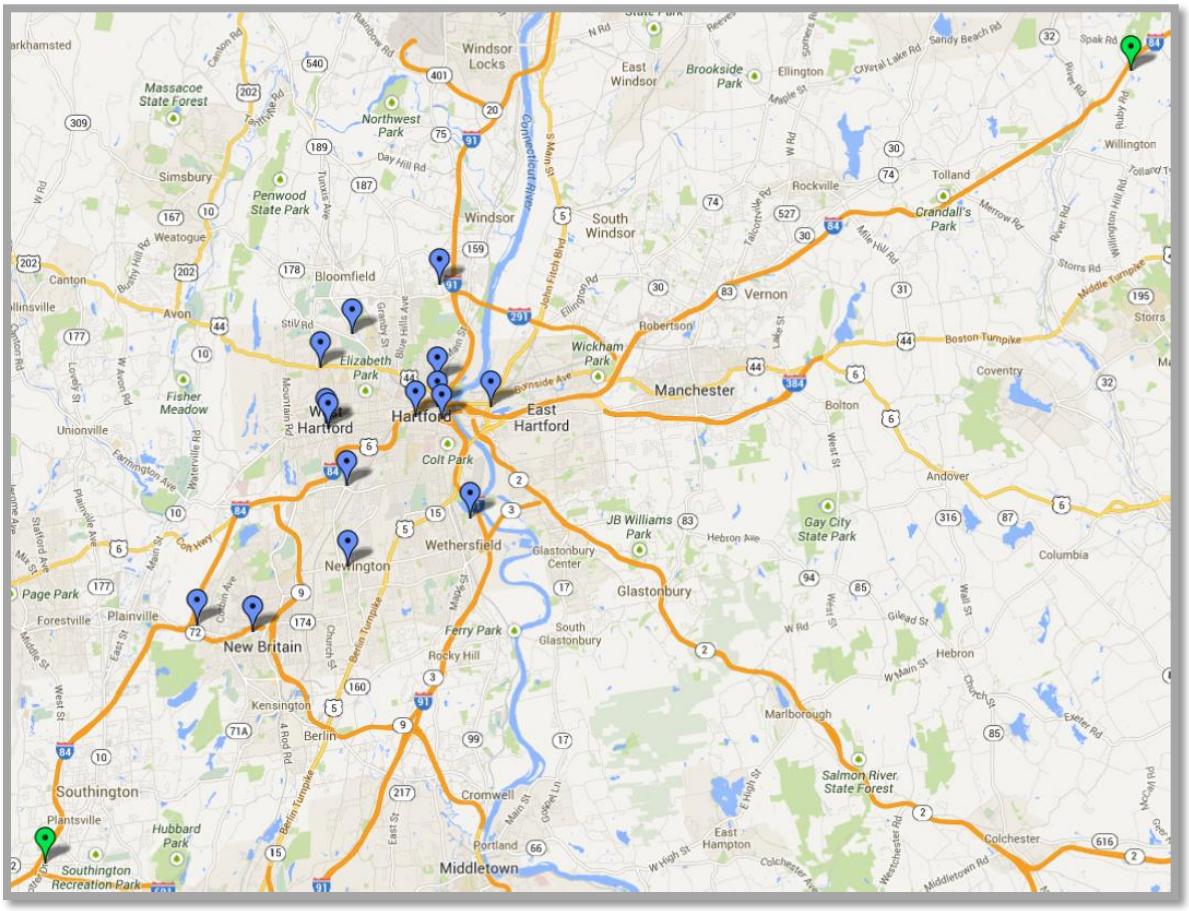
Passenger vehicle drivers were recruited in-person at intercept locations in and around downtown Hartford. RSG assembled a team that traveled to Connecticut to intercept drivers to take the stated preference survey at a variety of sites such as libraries, cafes, community centers, and DMV/government offices. Sites were chosen in and around downtown Hartford as well as in Newington, West and East Hartford, and New Britain where commuters and potential CTfastrak customers could be intercepted. Locations were selected not only for their viability to obtain completed surveys, but also to offer a diverse sample of Hartford's population the opportunity to participate in the survey, including low income residents or those without internet access. RSG administered the passenger vehicle driver survey in-person over seven days, from June 10 through June 16, 2013, during which time 510 responses were collected.

Commercial vehicle drivers were recruited at two large TA Travel Centers on I-84, each approximately 25 miles east and west of downtown Hartford, respectively. These locations were chosen to afford teams the ability to reach drivers who were using I-84 and who were going into or out of Hartford from either direction (Figure 3-1). Rest stops were also considered as potential intercept locations for commercial drivers, but the available locations closely mirrored those of the travel centers, and RSG's experience has shown that rest areas tend to yield fewer interested respondents. RSG administered the commercial vehicle driver survey over three days, from Monday, June 10 through Wednesday, June 12, 2013. Commercial vehicle respondents who qualified for and completed the survey were offered a $10 gift card as an incentive. A total of 290 respondents completed the commercial vehicle stated preference survey during the field effort.

At both the passenger and commercial vehicle intercept locations, the survey was loaded onto laptop computers for administration and survey staff at each site recruited and pre-qualified potential respondents. Staffers also assisted respondents as needed in completing the questionnaire. To help ensure a diverse cross section of Hartford's population was given an opportunity to take the survey, a Spanish speaking staff member was available at some downtown locations to assist Hispanic residents who may otherwise have trouble completing an all English language survey.

Figure 3-1 shows a map where both the passenger and commercial field intercept sites were located while Table 3-1 shows more detailed information about the intercept sites.

Figure 3-1: Field Intercept Site Locations



Commercial vehicle intercept site

Passenger vehicle intercept site

Table 3-1: Passenger and Commercial Vehicle Field Intercept Sites with Number of Complete Surveys

Survey Type	Location	# of Days	# of Completes
Passenger	Lucy Robbins Welles Library	2	88
	DMV Wethersfield	2	64
	DMV New Britain	2	57
	Noah Webster Library	1	49
	Mandell Jewish Community Center	2	40
	East Hartford Public Library	1	36
	La Paloma Sabanera Coffee House	1	35
	West Hartford Town Hall	1	32
	Hartford City Hall	1	31
	YMCA--Downtown	1	28
	New Britain Public Library	1	24
	LP Wilson Community Center	1	17
	Hartford Library - Ropkins branch	1	5
	Elmwood Community Center	1	4
Commercial	TA Travel Center - Willington	3	152
	TA Travel Center - Mildale	3	138

3.1.2 Outreach to Local Employers

Additional passenger vehicle responses were obtained through the cooperation of local businesses, chambers of commerce, community groups, and other Hartford-based organizations. RSG worked closely with the project team to reach out to a variety of businesses and institutions situated in downtown Hartford to ask their employees to participate in the stated preference survey. RSG, in coordination with TranSystems and Fitzgerald & Halliday, Inc. (FHI) provided each organization with a unique survey link and email invitation text, which was then distributed to the employees and/or organization members. Eighteen separate employers or organizations recorded at least one complete travel survey for a total of 1,972 completed surveys as detailed in Table 3-2.

Table 3-2: Complete Surveys from Employer Outreach

Employer	# of Complete Surveys
AETNA	1240
Saint Francis Hospital and Medical Center	369
Connecticut Department of Administrative Services	113
Farmington Avenue Wire	35
Central Connecticut State University (CCSU)	33
Hartford Courthouse	33
Metro Hartford Alliance	31
i84Hartford.com Open Link	29
Asylum Hill Neighborhood Association	28
Hartford 2000	28
Charter Oak State College	13
Newington Chamber of Commerce	7
Blue Hills Civic Association	4
Hartford Preservation Alliance	2
Hype	2
New Britain Chamber of Commerce	2
East Hartford Chamber of Commerce	2
Hartford Hospital	1
Total	1972

3.1.3 Email Invitations to Online Market Research Panel Members

The passenger vehicle responses were supplemented with additional responses through email invitations to a selection of Connecticut residents using an online market research panel. RSG contracted Research Now, an online market research panel, to provide a suitable sample of individuals who met the basic criteria to take part in the research. Panel members were targeted who resided in one of the following Connecticut counties:

- Hartford
- Tolland
- New Haven
- Fairfield

Qualifying members were sent an email invitation to the survey that contained a link with a unique identifier. Respondents completed the survey on RSG's server before being redirected back to the panel provider's website. A total of 513 completed surveys were collected from residents in these counties through coordination with Research Now.

4.0 SURVEY RESULTS

The analysis presented in this section summarizes the characteristics of the passenger and commercial vehicle samples, including trip characteristics, debrief and opinion responses, and demographics and company information collected from both surveys. The details of the stated preference exercises and analysis are summarized in Section 5.0 below. A complete set of survey question tabulations for both surveys can be found in **Appendix C**.

When evaluating the sample characteristics, it is important to note that each survey was designed to produce a generally representative sample of travelers who currently drive on I-84 in a personal vehicle. This population is not necessarily reflective of the general population of Hartford or the surrounding areas. This is because the respondents in the I-84 traveling population by definition have at least one household vehicle and have made one or more weekday trips on I-84 in downtown Hartford, and both vehicle ownership and vehicle travel are highly correlated with income and other socioeconomic indicators.

4.1 Passenger Vehicle Results

A total of 2,995 passenger vehicle travelers completed the stated preference survey during the administration period in June and July of 2013. The number of records was reduced to 2,900 after completing data checks and outlier analysis during the model estimation work, which is described in more detail in Section 5.0 (Model Estimation). The descriptive analysis of the data presented here is based on the 2,900 respondents who were included in the model estimation and is provided in four sections: trip detail questions, stated preference questions, debrief and opinion questions, and demographic questions.

Much of the analysis in this section is presented for four market segments that were used for the choice model estimation:

- Peak work trips
- Peak non-work trips
- Off-peak work trips
- Off-peak non-work trips

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 time periods (Table 4-1 shows the segment definitions). Work trip segments include both commute and business-related trips, while non-work trip segments include all other purposes. A complete set of tabulations of the survey questions by segment is shown in **Appendix B**. The majority of respondents to the survey reported a peak work trip (63%).

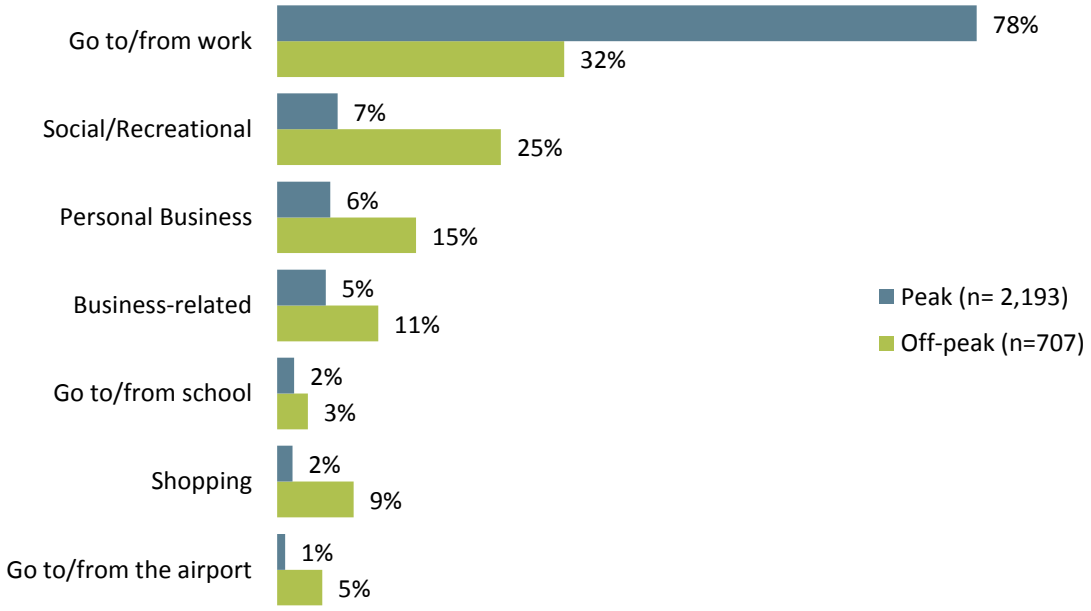
Table 4-1: Passenger Vehicle Market Segments

Market Segment	Trip Departure Time	Trip Purpose
Peak Work - **63%** (n=1818)	1. Weekdays 6:00 AM to 9:59 AM 2. Weekdays 3:00 PM to 6:59 PM	1. Work commute trips 2. Business-related trips
Off-peak Work- **10%** (n=304)	1. Weekdays 10:00 AM to 2:59 PM 2. Weekdays 7:00 PM to 5:59 AM 3. Weekends	1. Work commute trips 2. Business-related trips
Peak Non-work - **13%** (n=375)	1. Weekdays 6:00 AM to 9:59 AM 2. Weekdays 3:00 PM to 6:59 PM	1. School trips 2. Shopping trips 3. Social/recreational trips 4. Other personal business trips
Off-peak Non-work – **14%** (n=403)	1. Weekdays 10:00 AM to 2:59 PM 2. Weekdays 7:00 PM to 5:59 AM 3. Weekends	1. School trips 2. Shopping trips 3. Social/recreational trips 4. Other personal business trips

4.1.1 Trip Detail Questions

Overall, a majority of respondents reported a work commute or work-related business trip (66%). The distribution of trip purposes by time period is shown in Figure 4-1. The figure notes that the majority of trips reported by respondents occurred during the peak hours (76%). About three quarters of trips in the peak period (78%) were commute or work related, while another 7% were business-related trips. The most-commonly reported trip purpose in the off-peak was also to travel to work (32%), and a significant proportion of travelers in this segment reported a social/recreational or business trip.

Figure 4-1: Trip Purpose by Trip Departure Time



The latitude and longitude coordinates for each respondent's origin-destination pair were used to calculate the trip distance using a Google Maps travel direction driving algorithm. Mean and median trip distances, as well as respondent-reported travel times, are displayed in Table 4-2 by market segment. Off-peak non-work trips tended to be longer in both median time and median distance compared to other segments, but not by a wide margin. Overall, median trip time for the entire sample was 21 minutes and median trip distance was 15 miles.

Table 4-2: Travel Time and Distance by Market Segment

Market Segment	Travel Time (min)		Distance (miles)	
	Mean	Median	Mean	Median
Peak Work	24	21	19	15
Off-Peak Work	26	21	20	15
Peak Non-work	33	22	28	16
Off-peak Non-work	36	23	30	17
Total	27	21	22	15

Trip origins and destinations, stratified by distance traveled, are displayed in Figure 4-2 and Figure 4-3. Figure 4-2 shows that respondents' trip origins are scattered in and around Downtown Hartford, with many trips originating in East Hartford, West Hartford and New Britain, reflecting the fact that many respondents were commuters traveling from surrounding communities to their regular jobs in downtown Hartford. The trip destinations presented in Figure 4-3 show that most respondents reported trip destinations that tend to terminate within downtown Hartford and only a short distance from the study portion of I-84.

Figure 4-2: Map of Trip Origins by Trip Distance

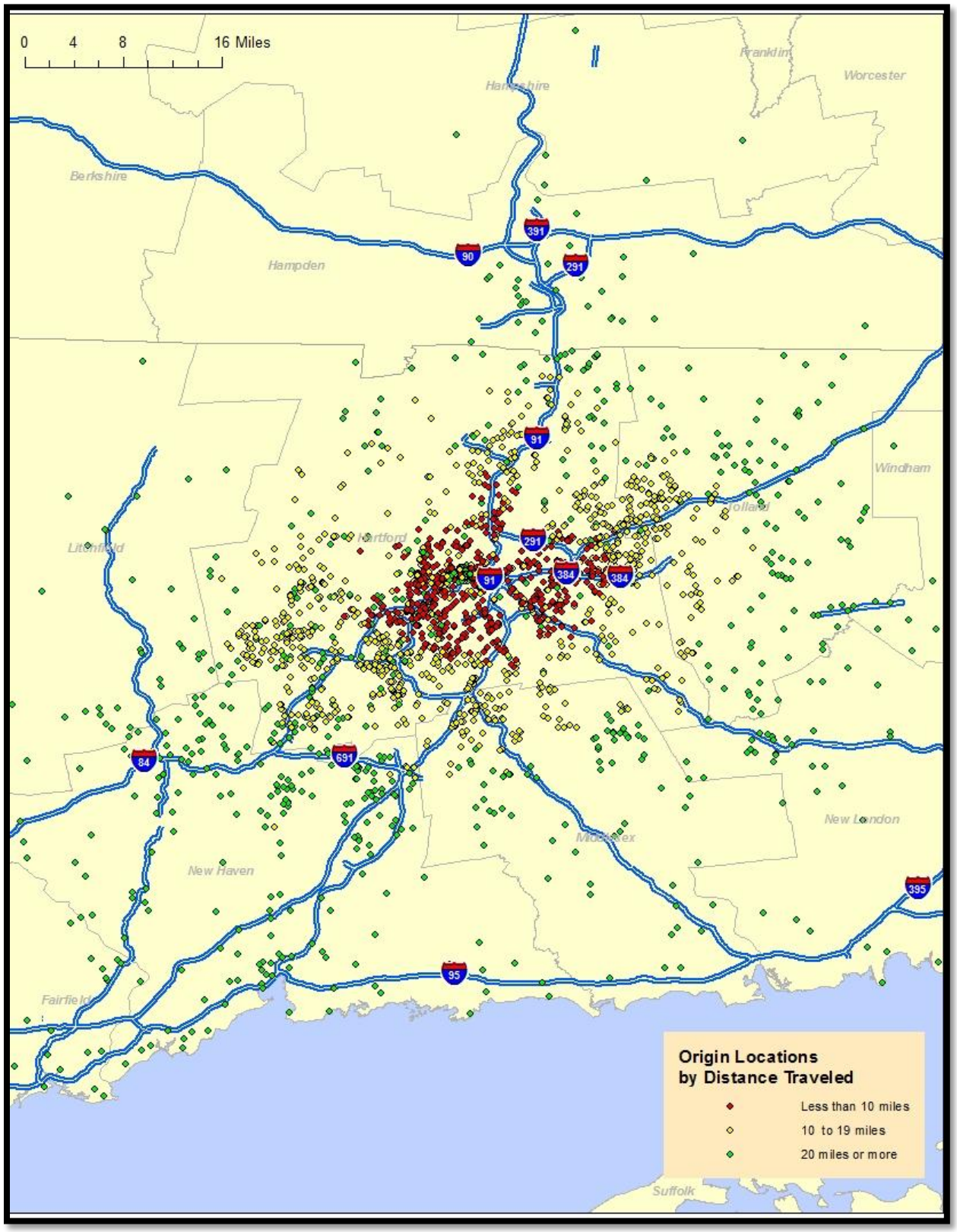
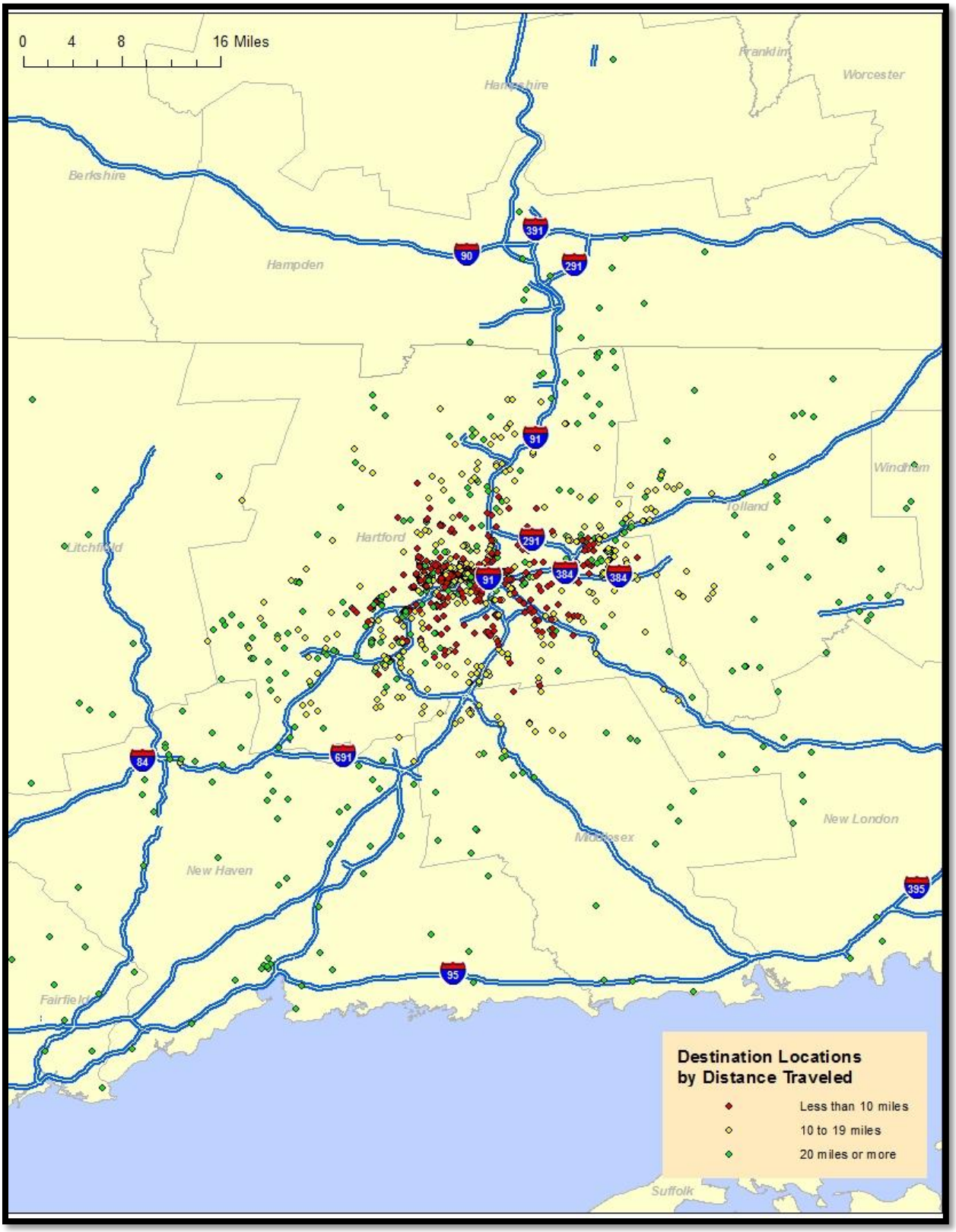


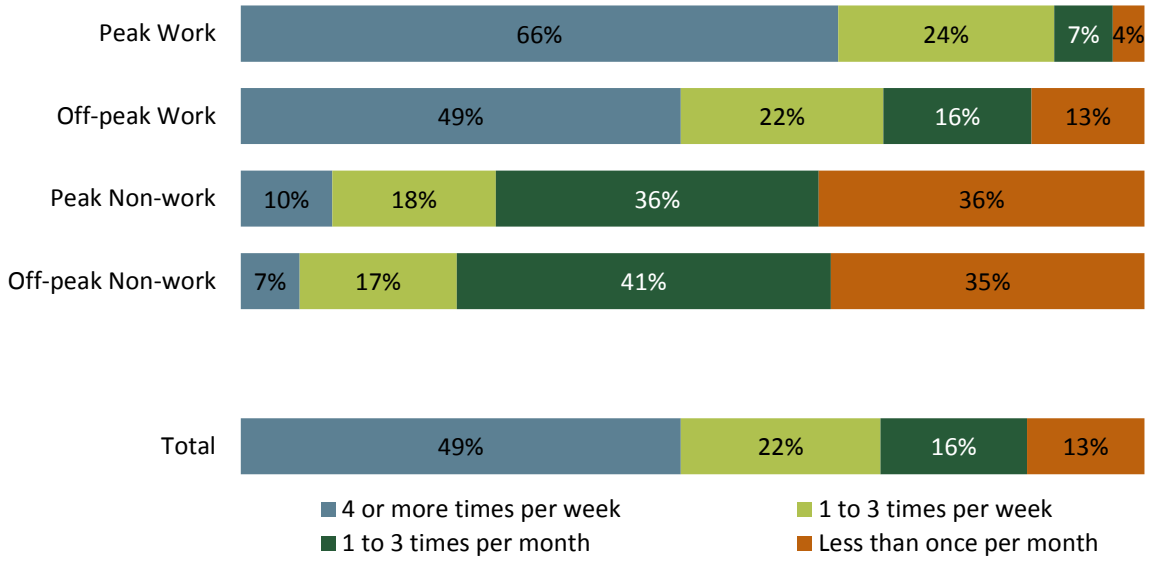
Figure 4-3: Map of Trip Destinations by Trip Distance



After being asked to report the time their trip began, respondents were then asked if they started their trip at a certain time to minimize the impact of congestion. Forty-five percent of respondents indicated they change their departure time to avoid delays on the road.

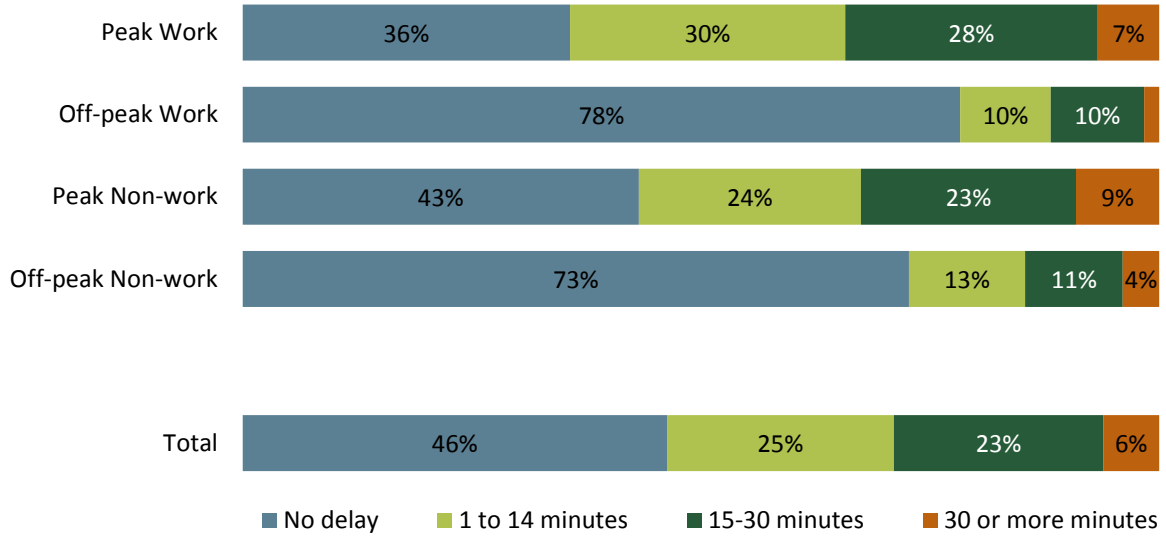
The frequency of trips is illustrated in Figure 4-4. Forty-nine percent of all reported trips are made four or more times per week, although there are significant variations across the different trip purposes. As expected, peak work trips were the most frequent with 66% percent travelers in this segment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

Figure 4-4: Trip Frequency by Market Segment



Respondents were asked to report the amount of traffic congestion they experienced on I-84 through downtown Hartford on their reference trip. The amount of delay due to traffic congestion is presented by market segment in Figure 4-5. Overall, about one-half (46%) of respondents did not experience any delay during their trip; however, a majority of respondents who traveled during peak periods reported at least some delay. Twenty-eight percent of peak work trips reported 15 to 29 minutes of delay and 7% reported more than 30 minutes of delay caused by traffic.

Figure 4-5: Amount of Reported Delay Due To Traffic Congestion by Market Segment



When asked if they used any alternate routes to I-84 to make their reference trip, more than one-half of all respondents indicated they used at least one alternate route. Table 4-3 shows the alternate routes used by market segment.

Table 4-3: Use of Alternate Routes by Market Segment (Select all that apply)

Alternate Routes	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
I-91 and I-691	279	15%	54	18%	73	19%	90	22%
Local or city streets	834	46%	128	42%	152	41%	141	35%
Transit	63	3%	9	3%	6	2%	18	4%
No, I do not use any alternate routes	791	44%	135	44%	166	44%	189	47%
Total respondents	1818	N/A	304	N/A	375	N/A	403	N/A

Finally, forty-four percent of the respondents reported owning an electronic toll transponder with the majority of those indicating they owned an E-ZPass. Figure 4-6 shows E-ZPass ownership by market segment.

Figure 4-6: E-ZPass Ownership by Market Segment

4.1.2 Stated Preference Questions

After completing the trip details 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, which consisted of 66% of the total 29,000 choices made. Thirty-one percent of respondents (n=909) always chose the toll free alternate route while only three percent (n=95) always chose to use I-84 at their current travel time. Table 4-4 shows the number of times each alternative was presented in the stated preference experiments and the number of times each alternative was selected. As detailed in Section 2.1.3, if the respondent's trip details indicated they may be able to use transit for their trip, they were presented with a transit alternative. The mode of transit presented in Alternative 4 could either a local bus or CTfastrak, depending on where respondents reported their trip began and ended. Table 4-5 shows the number of times each transit mode was shown and selected. Overall, 63% of respondents were shown a transit option (45% were shown a local bus and 18% saw CTfastrak) but this option was only selected in approximately 3% of experiments. As shown in Table 4-5 respondents were somewhat more likely to select CTfastrak when it was presented compared to the local bus.

Table 4-4: Stated Preference Choices by Alternative

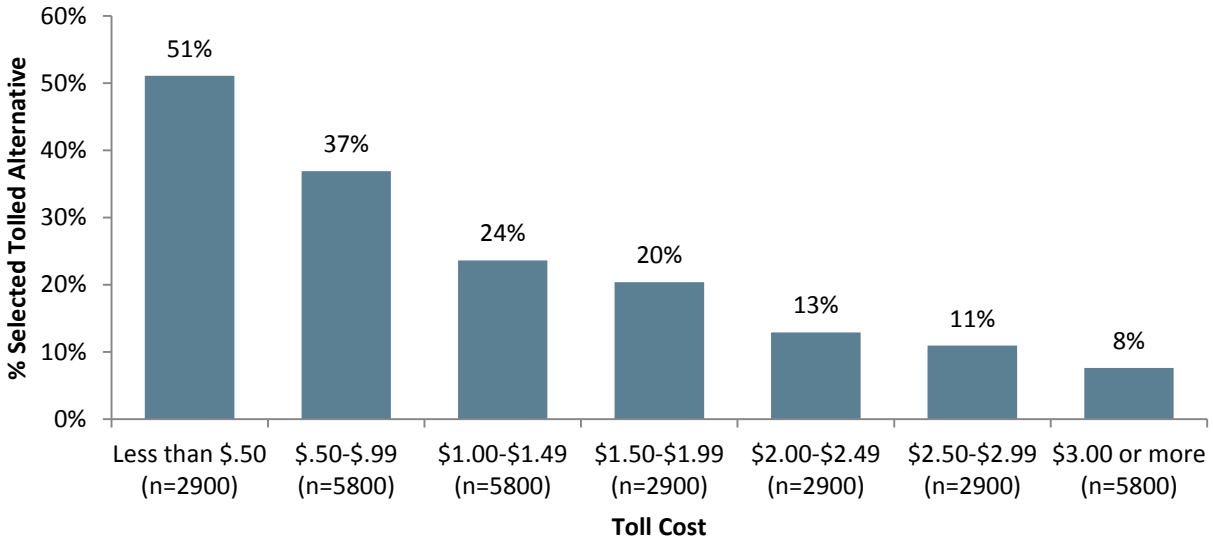
Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1: I-84 at Current Time	29,000	6,713	23%
Alternative 2: I-84 at Different Time	20,080	2,526	13%
Alternative 3: Alternate Toll-Free Route	29,000	19,247	66%
Alternative 4: Transit	18,320	514	3%

Table 4-5: Stated Preference Transit Choices by Mode Presented

Transit Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Local Bus	12,920	239	2%
CTfastrak	5,400	275	5%

Respondents' likelihood to choose the tolled I-84 option at their current travel time (Alternative 1) decreased as the toll cost increased. Figure 4-7 shows the percent of the time Alternative 1 was selected at different increments of cost. The first bar on the left in Figure 4-7 shows that when the toll cost for Alternative 1 was less than $0.50 (a total of 2,900 experiments), it was selected 51 percent of the time. Alternatively, when toll costs were $3.00 or more, Alternative 1 was selected only 8% of the time.

Figure 4-7: Percent of Times I-84 at Current Time Alternative Selected by Toll Cost



4.1.3 Debrief and Opinion Questions

Upon completing the stated preference scenarios, respondents were asked to answer a series of debrief questions to understand the underlying reasons for their choices. The opinion questions and attitude statements were included to help identify those respondents in the sample who may be strategically biasing their responses to make a point and not necessarily answering the survey in a way that reflects how they would actually behave if Value Pricing was implemented on I-84.

First, respondents who indicated their trip began during a peak travel period and selected Alternative 2 (use I-84 at a new departure time) at least once in the SP questions were asked if they would be more likely to change their departure time to travel before or after the peak travel period. Respondents were split, with 41% indicating they prefer to travel earlier, 39% later and 20% were unsure.

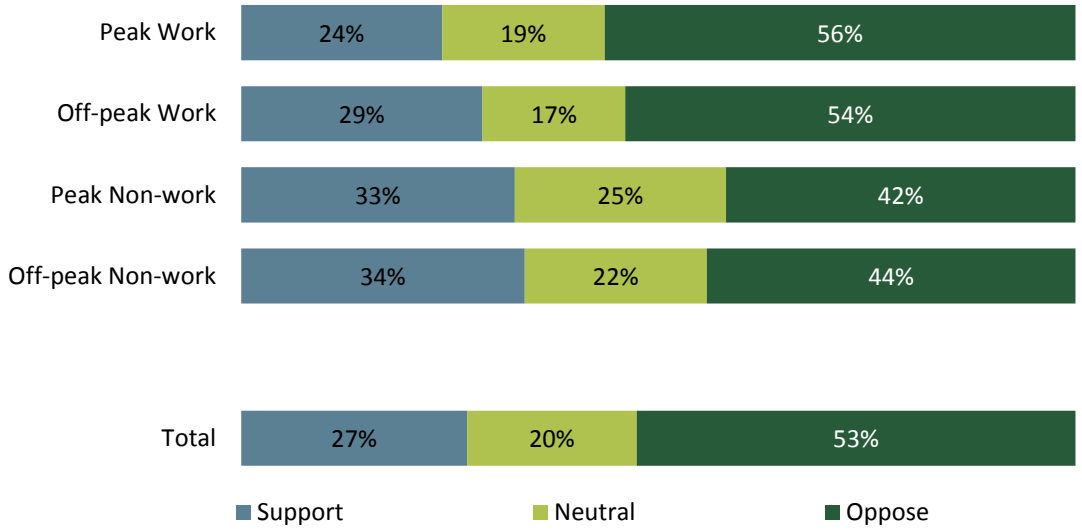
Respondents who traveled in the peak period but chose not to shift their departure time by not selecting Alternative 2 in any of the SP experiments were asked to select the main reason for their choices. Twenty-four percent and 26% indicated that their arrival or departure times were respectively fixed by obligations and 22% indicated they preferred their current departure time.

Next, the 31% of respondents who never chose the tolled route where asked to provide an explanation for their choices. Of these respondents over half (58%) said they were opposed to paying tolls and 24% never chose the toll route because they said the time savings presented were not worth the toll cost.

Respondents who were shown the transit option but never selected to use transit were asked to select what types of improvements would make them more likely to consider transit as an option for future trips in the Hartford region. Thirty-one percent of these respondents indicated that nothing would make them consider transit in Hartford, while 30% indicated that transit stops that are more closely aligned to their origins and destinations would help, and 28% indicated more frequent service as factor that would encourage transit use.

Next, respondents provided their opinion of the proposed Value Pricing on I-84. Opposition to the plan was relatively high with 53% overall opposing the project and 27% indicating support. Twenty percent indicated a neutral opinion. Support was highest (but still modest) among the off-peak non-work segment and lowest for peak work respondents (Figure 4-8).

Figure 4-8: Opinion of Value Pricing on I-84 by Market Segment



Respondents were next asked to select the main reasons why they support or oppose Value Pricing on I-84. Of the 27% who indicated support for the project, most felt the improvements made possible by Value Pricing would lead to less congestion, generate revenue for other transportation improvements, and would increase the safety of using I-84. The results of this question are shown in Table 4-6. Respondents who indicated opposition to Value Pricing on I-84 indicated that they are either opposed to paying tolls on I-84 or opposed to paying tolls in general. While somewhat high, the rate opposition to Value Pricing in this project is not all together surprising. Public opinion tends to be lower in communities or regions where toll facilities do not exist and the population has little experience using tolled facilities, as is the case in Hartford. The results of this question are presented in Table 4-7.

Table 4-6: Reason(s) for Favoring Value Pricing on I-84 (Select all that Apply)

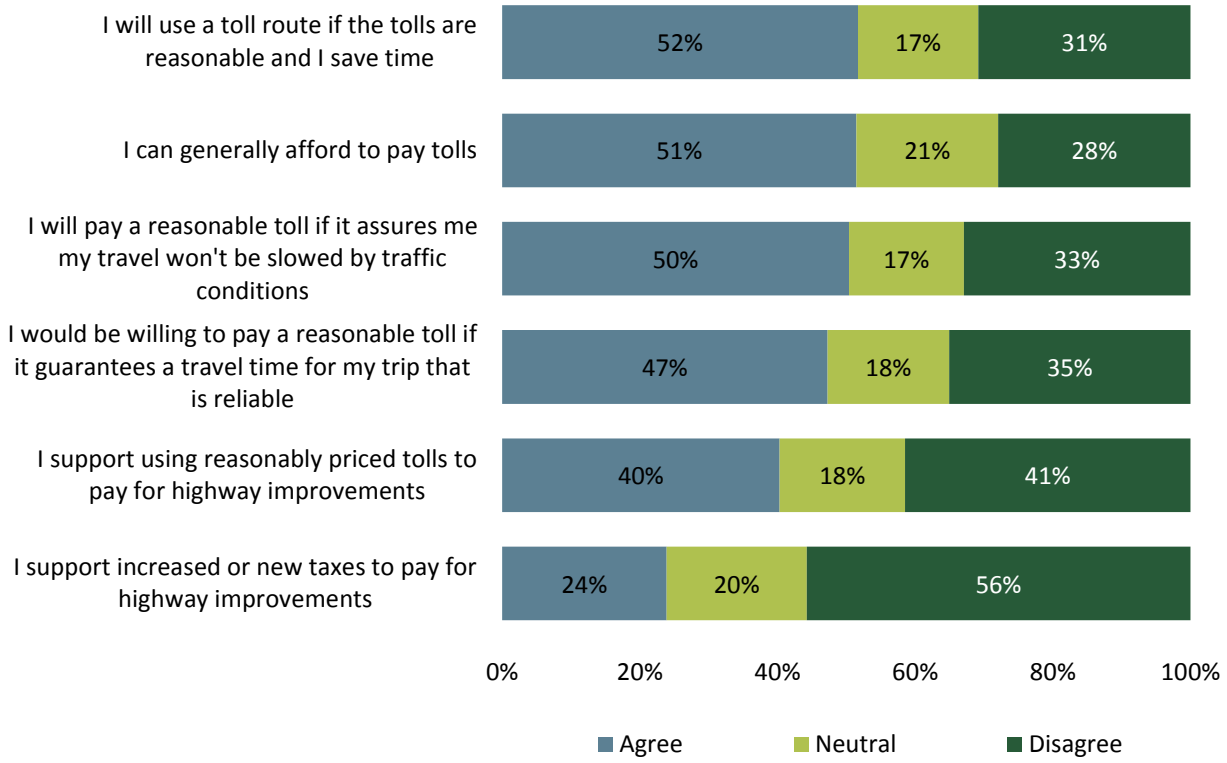
Reasons	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Shorter travel time	225	51.4%	45	51.1%	42	34.1%	60	43.8%
More reliable travel time	192	43.8%	38	43.2%	41	33.3%	50	36.5%
Less congestion	268	61.2%	54	61.4%	68	55.3%	77	56.2%
Improved roadway conditions	248	56.6%	58	65.9%	71	57.7%	81	59.1%
Safer road conditions	201	45.9%	42	47.7%	59	48.0%	66	48.2%
Generates revenue for transportation improvements and maintenance	238	54.3%	57	64.8%	65	52.8%	98	71.5%
Reduced emissions and improved air quality	118	26.9%	25	28.4%	26	21.1%	51	37.2%
Other, please specify:	22	5.0%	4	4.5%	10	8.1%	16	11.7%
Total Respondents	438	N/A	88	N/A	123	N/A	137	N/A

Table 4-7: Reason(s) for Opposing Value Pricing on I-84 (Select all that Apply)

Reason	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Opposed to paying tolls in general	415	40.4%	65	39.6%	54	34.4%	77	43.3%
Opposed to paying tolls on I-84	447	43.6%	75	45.7%	84	53.5%	81	45.5%
Toll costs are too high	267	26.0%	33	20.1%	39	24.8%	40	22.5%
Do not like electronic toll collection	72	7.0%	14	8.5%	17	10.8%	28	15.7%
Opposed to spending money on construction projects	79	7.7%	11	6.7%	12	7.6%	18	10.1%
Would rather see more investments in alternative transportation options such as transit	139	13.5%	25	15.2%	24	15.3%	29	16.3%
Other, please specify:	365	35.6%	52	31.7%	44	28.0%	42	23.6%
Total Respondents	1026	N/A	164	N/A	157	N/A	178	N/A

The debrief section concluded with a series of statements related to respondents' attitudes toward highway tolling. Respondents were asked to indicate the level with which they agree or disagree with the statements on a five-point scale. Figure 4-9 shows their attitudes related to highway tolling and their willingness to pay tolls for reduced travel time or improved travel time reliability. Fifty-two percent of respondents indicated they would use a toll route if the tolls were reasonable and they saved time, while 31% disagreed with the statement. Fifty-one percent indicated they could afford to pay tolls and 50% indicated they would pay a toll if it guaranteed they would not be slowed by traffic. A minority (24%) agreed or strongly agreed that they would support increased or new taxes to pay for highway improvements.

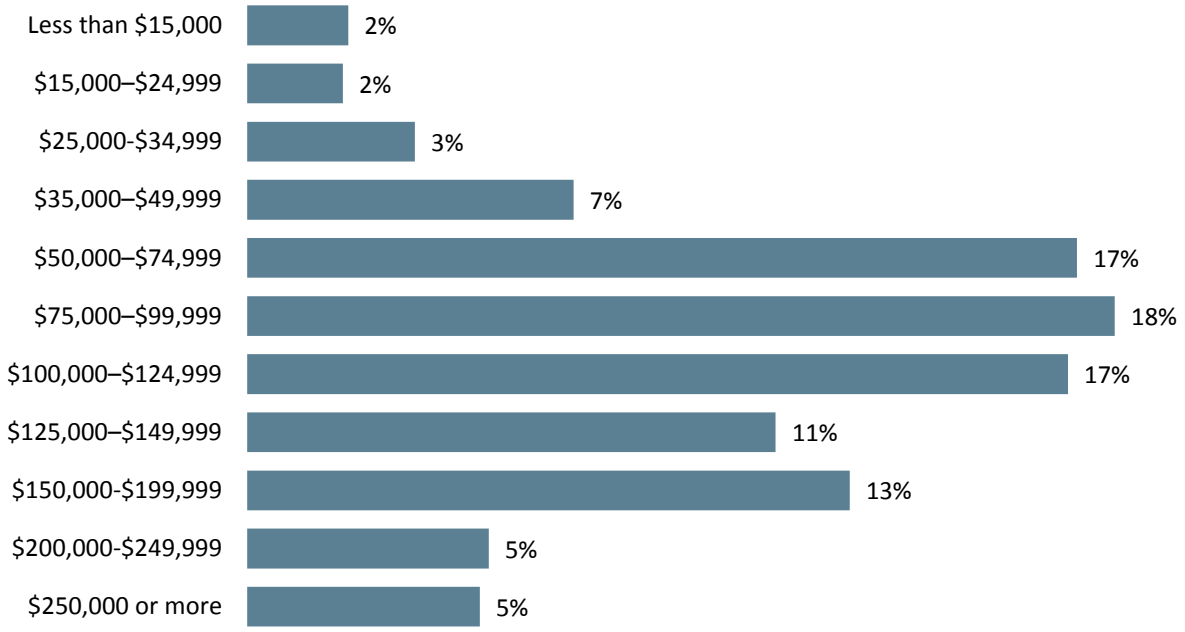
Figure 4-9: Toll Attitudes by Market Segment



4.1.4 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. Fifty-six percent of survey takers were females. About 79% of respondents were employed full time while another 6% were employed part time. Figure 4-10 shows the distribution of annual household income; the median household income falls into the $100,000-124,999 range.

Figure 4-10: Annual Household Income



4.2 Commercial Vehicle Results

A total of 290 respondents completed the commercial vehicle survey. The number of records was reduced to 244 after completing data checks and outlier analysis during the model estimation work described in Section 5 (Model Estimation). The descriptive analysis of the data presented here is based on the 244 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.

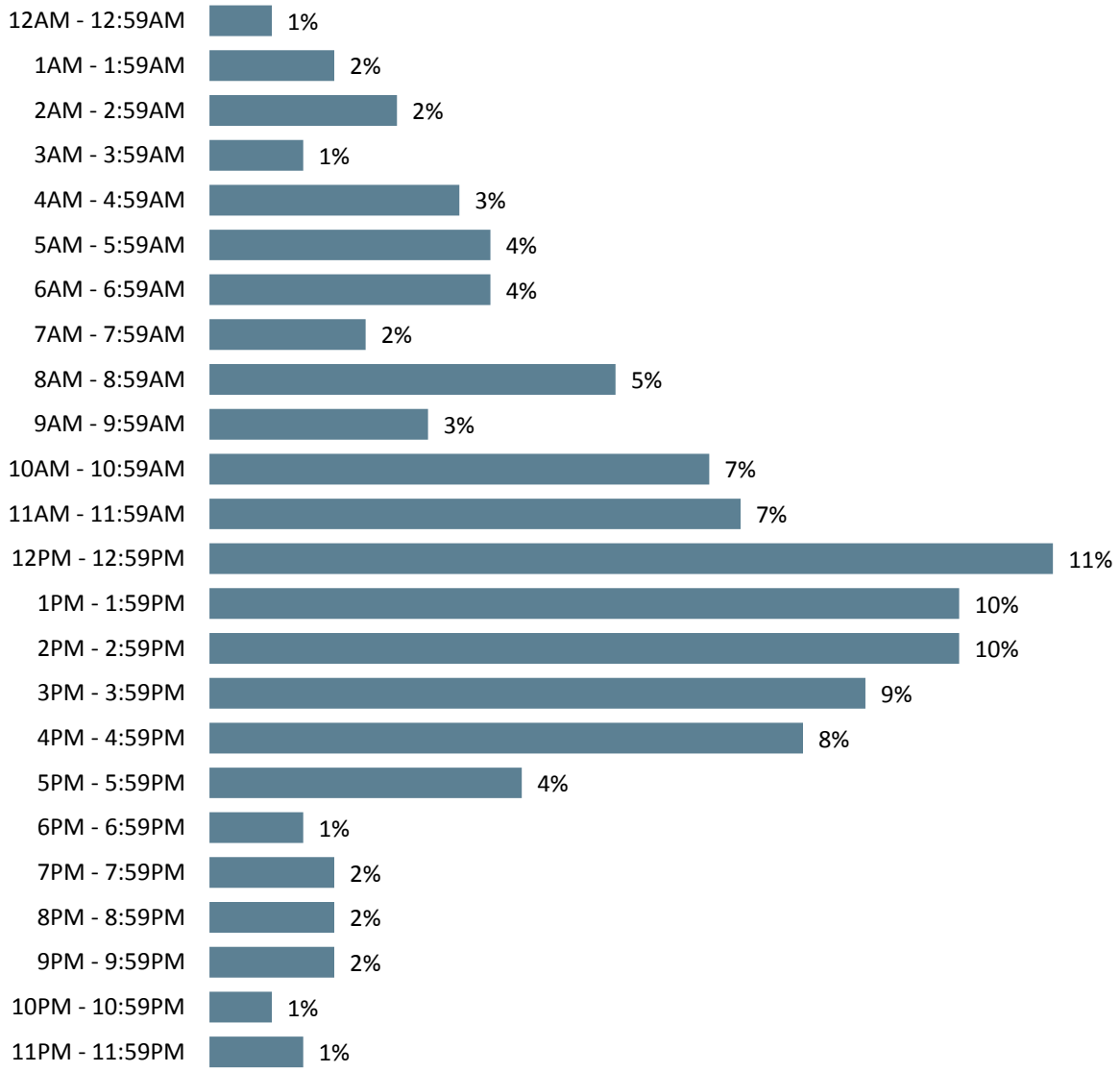
4.2.1 Trip Detail Questions

Seventy-one percent of respondents indicated they were fleet drivers and did not own their own truck, while owner-operators (17%) constituted the second largest group of respondents. A majority (68%) made their own routing decisions, while 23% made some, but not all routing decisions.

Most trips began outside the state of Connecticut (67%) or ended outside the state (65%). Seven percent of trips began in Hartford and about 9 percent ended in Hartford. After Connecticut, the states with highest number of origins and destinations included Pennsylvania, Massachusetts and New York.

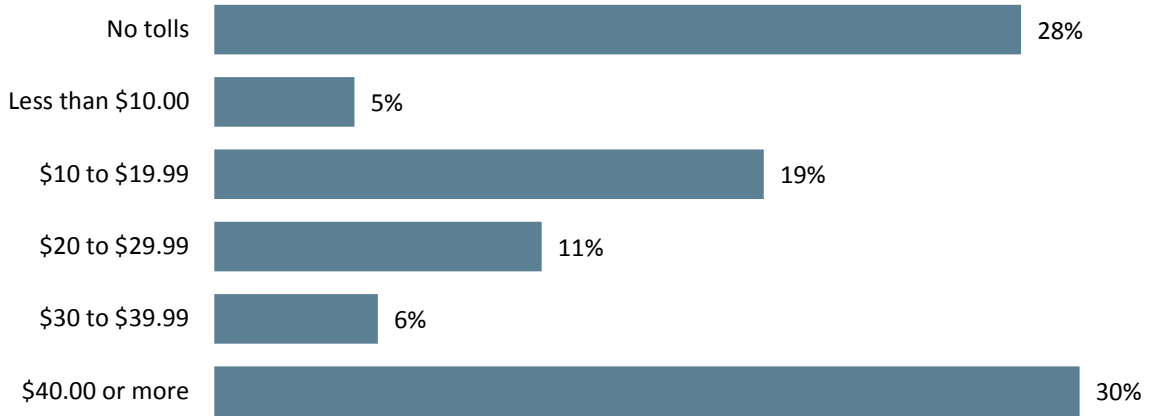
Respondents were asked what time of day they traveled through Downtown Hartford, which are presented in Figure 4-11. Just under half (44%) of respondents reported crossing through Downtown Hartford during the midday hours between 10:00 AM and 2:59 PM.

Figure 4-11: Time of Day when Commercial Vehicles Traveled Through Downtown Hartford



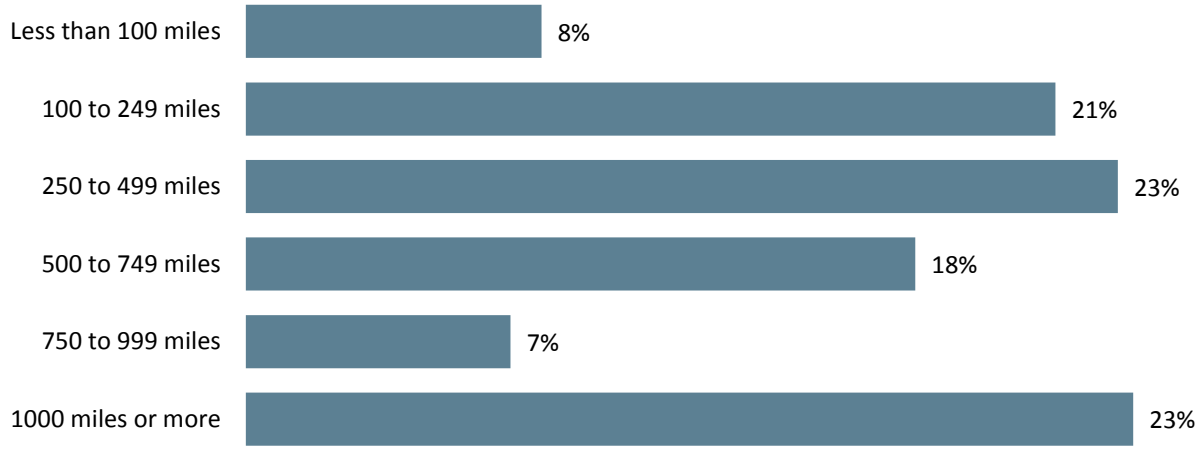
Most truck drivers reported to paying a toll on their trip (72%). Of those who reported paying a toll, the average amount paid was $32.15 with a median amount of $18.00. Figure 4-12 shows the amount all drivers paid in tolls. Thirty percent of drivers reported paying $40.00 or more on their reference trip. This is not surprising as many respondents reported a long distance trip through states with numerous toll facilities (Figure 4-13).

Figure 4-12: Amount Paid in Tolls



Respondents reported mostly medium and long-distance trips of more than 100 miles. The median reported trip was approximately 450 miles in distance (Figure 4-13). Overall, 46% of respondents experienced no delay while traveling through downtown Hartford. Among those who did report delay due to traffic congestion, the median reported time was 45 minutes of delay due to traffic. While this number is high, it is possible that respondents mistakenly reported delay due to traffic congestion on their entire trip, not just delay related to I-84 in downtown Hartford.

Figure 4-13: Trip Distance



The large majority of respondents reported driving a 5-axle vehicle (85%). Respondents were asked how often they make this particular trip; 42% 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-84 when making the same trip 65% reported using I-91 and I-691, but a much small number (6%) indicated using local city streets instead of I-84 (Table 4-8). Most drivers indicated that they have an electronic transponder to pay for tolls (68%).

Table 4-8: Use of Alternate Routes (Select all that apply)

	Count	Percent
I-91 and I-691	158	65%
Local or city streets	14	6%
No, I do not use any alternate routes	78	32%
Total respondents	244	N/A

4.2.2 Stated Preference Questions

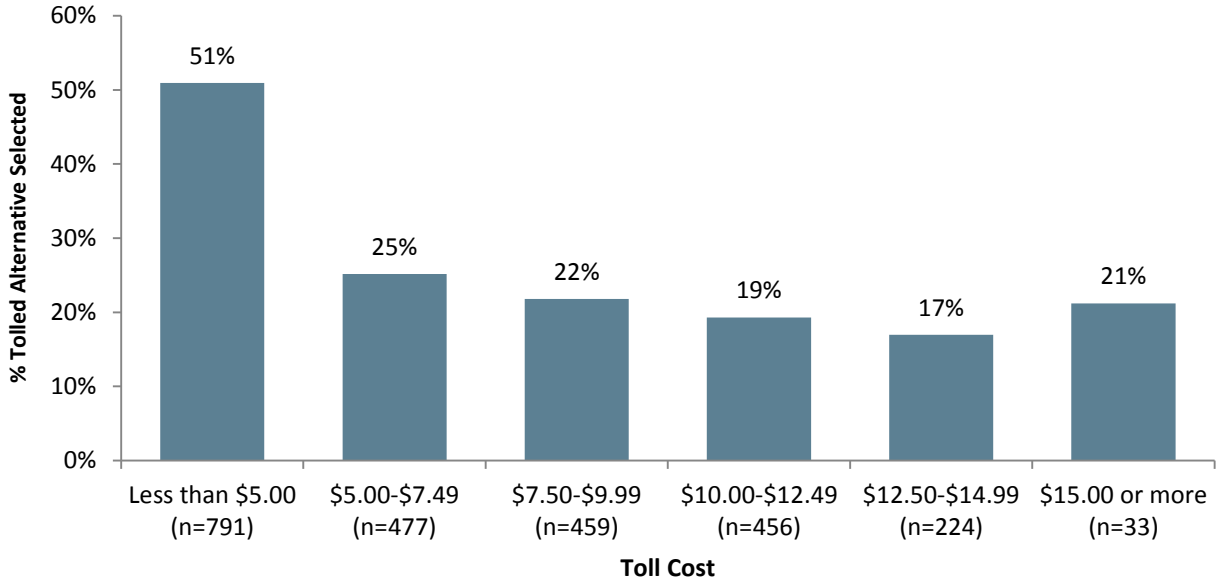
After completing the trip information portion of the survey, respondents answered ten stated preference tradeoff exercises, each tailored to their reported trip. Overall, respondents were more likely to choose the toll free alternative, comprising approximately 75 percent of the 2,390 choices made. Thirty-five percent of respondents chose both the toll free and the tolled option at least once during the ten exercises. Fifty-four percent always chose the toll free route and the final eleven percent always chose the tolled option.

Table 4-9: Stated Preference Choices by Alternative

	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1 - Use I-84	2,440	620	25%
Alternative 2 - Use an alternate route	2,440	1,820	75%

Respondents' likelihood to use at I-84 was related to the toll cost presented in the experiment. As the toll cost increased, respondents were less likely to choose I-84 in downtown Hartford. As shown in Figure 4-14 respondents chose I-84 51% of the time when the toll cost shown was less than five dollars.

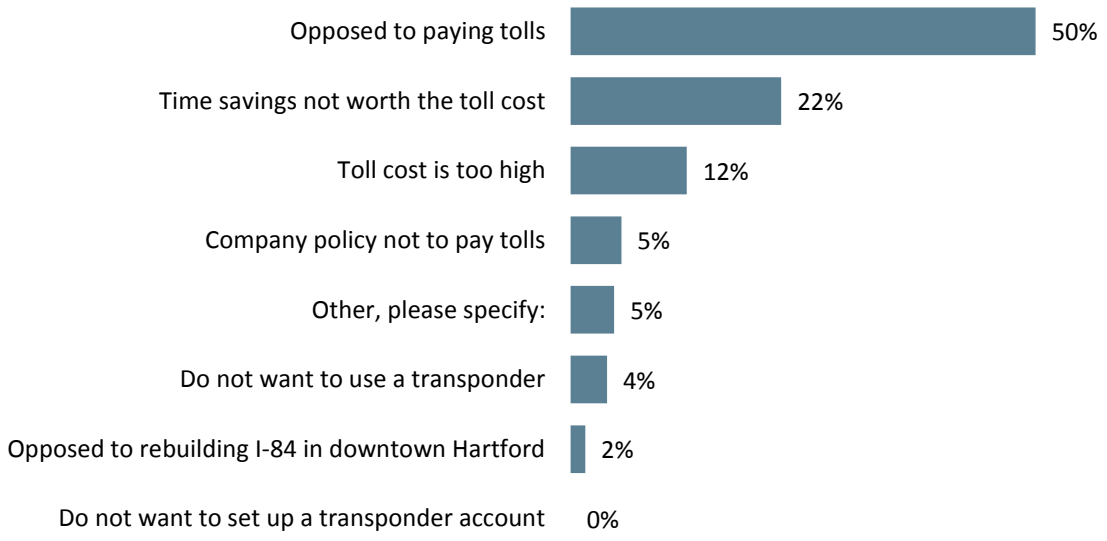
Figure 4-14: Percent of Times I-84 Selected by Toll Cost



4.2.3 Debrief and Opinion Questions

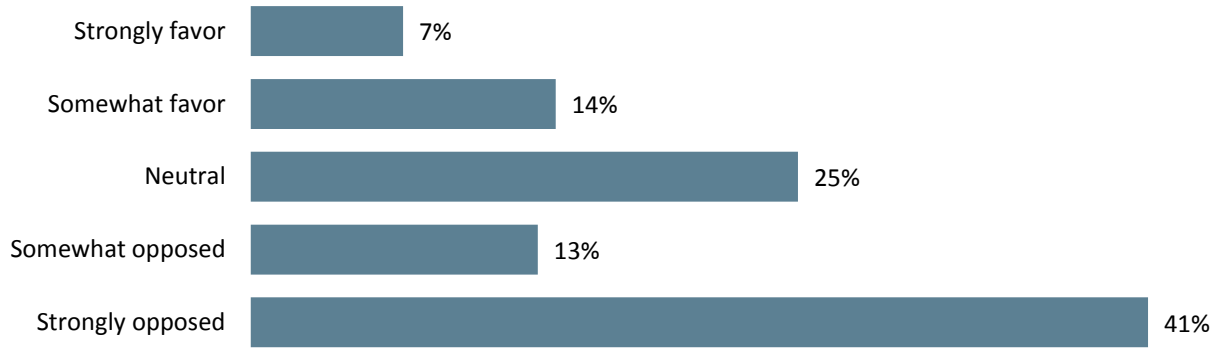
After completing the stated preference tradeoff exercises, respondents were asked to answer a set of debrief questions to better understand the reasoning behind their choices in the SP experiments. First, the 129 (53%) respondents who never chose to use I-84 with Value Pricing were asked to provide the main reason for their choices. One half of these respondents indicated they were opposed to tolls (Figure 4-15).

Figure 4-15: Primary Reason for Never Selecting an I-84 Alternative in the Stated Preference Experiments



Next, respondents provided their opinion of Value Pricing on I-84 given that the viaduct must be rebuilt and paid for. Slightly more than half (54%) were somewhat or strongly opposed, while about one-fifth (21%) were somewhat or strongly supportive (Figure 4-16).

Figure 4-16: Opinion of Value Pricing on I-84



The most common reason for favoring Value Pricing was 'improved road conditions' (59%). Forty-eight percent of respondents who opposed Value Pricing on I-84 cited general opposition to paying tolls as the primary reason not supporting the plan (Table 4-10 and Table 4-11).

Table 4-10: Reason(s) for Favoring Value Pricing on I-84 (Select all that Apply)

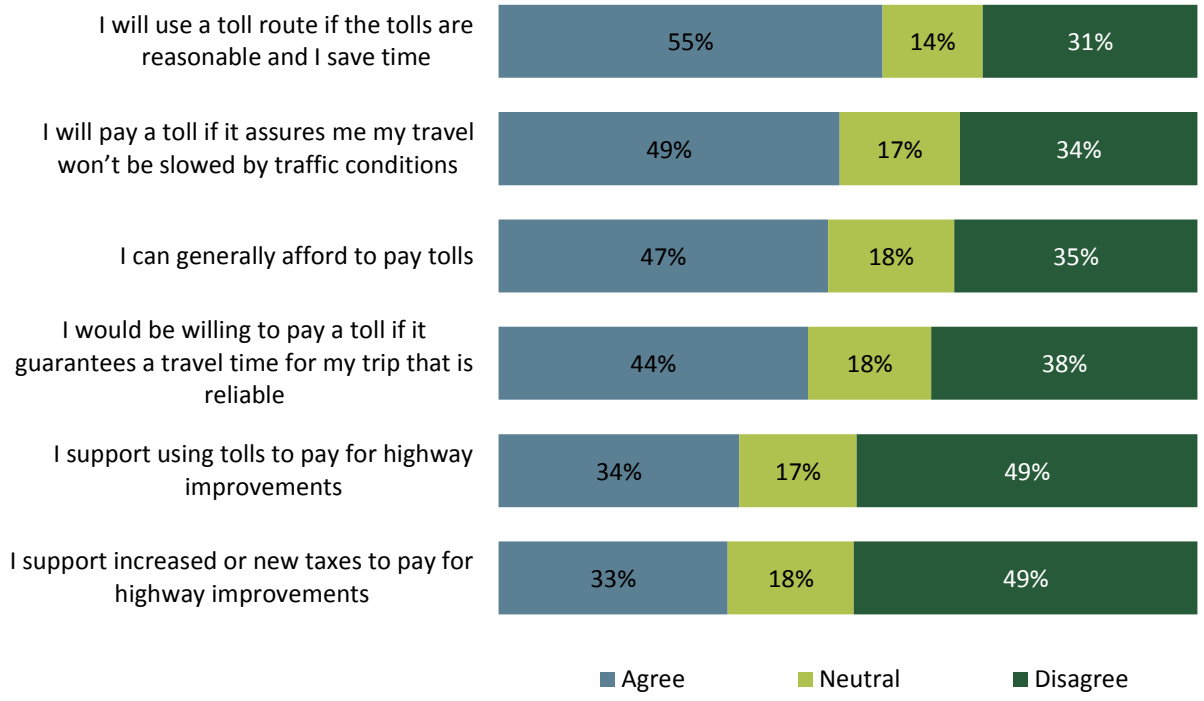
Reason	Count	Percent
Improved roadway conditions	30	58.8%
Less congestion	25	49.0%
Safer road conditions	21	41.2%
More reliable travel time	19	37.3%
Shorter travel time	18	35.3%
Generates revenue for transportation improvements and maintenance	16	31.4%
Reduced emissions and improved air quality	12	23.5%
Other, please specify:	2	3.9%
Total respondents	51	N/A

Table 4-11: Reason(s) for Opposing Value Pricing on I-84 (Select all that Apply)

Reason	Count	Percent
Opposed to paying tolls in general	63	47.7%
Toll costs are too high	41	31.1%
Opposed to paying tolls on I-84	25	18.9%
Do not like electronic toll collection	8	6.1%
Opposed to spending money on construction projects	7	5.3%
Would rather see more investments in alternative transportation options such as transit	4	3.0%
Other, please specify:	30	22.7%
Total respondents	132	N/A

The debrief section concluded with a series of statements related to drivers' attitudes toward highway tolling. A majority of drivers (55%) agreed with the statement "I will use a toll route if the tolls are reasonable and I save time". Drivers' responses to the attitude statements are presented in Figure 4-17.

Figure 4-17: Toll Attitudes



4.2.4 Company Background Questions

The last section of the survey collected background information, such as company headquarters location, fleet size, and typical trip length. A question was also included about the time frame structure for deliveries.

Nearly all companies were headquartered in the U.S (95%) but only 7% percent of companies were based within the state of Connecticut. Drivers were employed by Companies which varied in size; 36% 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.

Fifty-three percent did not have any form of incentive or penalty time structure for deliveries. Most drivers (55%) indicated that their company paid for tolls directly through a company transponder such as E-ZPass, while another 14% indicated that they were reimbursed by their company for tolls. Thirty percent of respondents reported that they paid for tolls directly out-of-pocket.

5.0 MODEL ESTIMATION

5.1 Alternatives and Methodology

The objective of the stated preference surveys was to estimate reliable values of time (VOT) for passenger and commercial vehicle travelers who may use the elevated portion of I-84 in downtown Hartford. These VOT estimates will support estimates of traffic and revenue for this project.

The 10 responses from the stated preference experiments were combined into passenger and commercial vehicle datasets for the purpose of estimating discrete choice models. 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[1]. The model coefficients provide information about respondents' sensitivities to the attributes that were tested in the stated preference experiments.

5.1.1 Passenger Vehicle Stated Preference Alternatives

In each of the ten stated preference experiments, passenger vehicle respondents were presented with up to four alternatives for making their trip in the future:

1. Alternative 1: Make your trip using I-84 (at current departure time)
2. Alternative 2: Make your trip using I-84 at a different time
3. Alternative 3: Make your trip using an alternate toll-free route (at current departure time)
4. Alternative 4: Make your trip using public transit (CTfastrak or a local bus) (at current departure time)

All respondents were presented with the first and third alternatives. Respondents who reported a trip in the peak period were shown an option of traveling on I-84 before or after the peak period, while respondents who reported a trip that could reasonably use CTfastrak or a local bus were also presented with a transit alternative. The presented mode shown in the transit alternative (CTfastrak or local bus) depended on the trip origin location reported by the respondent as described in **Section 2.1.3**.

5.1.2 Commercial Vehicle Stated Preference Alternatives

In each of the ten stated preference experiments presented to commercial vehicle respondents, two alternatives were shown for making their trip in the future:

1. Make your trip using tolled I-84
2. Make your trip using an alternate toll-free route

More information about the design of the stated preference scenarios can be found in **Section 2 (Survey Questionnaire)** of this report.

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[1] The multinomial logit model has the general form $p(i) = \frac{e^{U_i}}{\sum_{AllModes} e^{U_j}}$, where *p(i)* is the probability that mode i will be chosen and U_i is the "utility" of mode *i*, a function of service and other variables. See, for example, M. E. Ben-Akiva and S. R. Lerman, *Discrete Choice Analysis*, MIT Press, 1985 for details on the model structure and statistical estimations procedures.

5.2 Identification of Outliers

5.2.1 Identification of Outliers in the Passenger Vehicle Data

The passenger vehicle choice data were screened to ensure that all observations included in the model estimation represented realistic trips and reasonable tradeoffs in the stated preference exercises. Several variables were used for screening purposes, including an examination of the implied travel speed, reported delay time, total travel time and distance, and total survey duration. Additionally, each respondent's origin and destination were examined to ensure that all trips could have reasonably used I-84 in downtown Hartford.

After reviewing these variables and the effects that extreme values had on the models, it was determined that respondents who met the following conditions should be excluded from the final analysis (the categories are not mutually exclusive):

- Respondent's whose implied travel speed was less than 3 mph or more than 120 mph (31 respondents).
- Respondents who indicated a delay time that was greater than 80% of their total travel time (9 respondents).
- Respondents whose trip was more than 250 miles or less than one half mile in distance (35 respondents).
- Respondents who completed the survey in less than 5 minutes (4 respondents).
- Respondent's whose origin and destination coordinates indicated they could not have made reasonable use of I-95 through downtown Hartford (22 respondents).

The outlier analysis excluded 95 individual records from the final estimation (3% of all completed passenger vehicle surveys). After excluding these respondents, a total of 2,900 respondents (29,900 SP observations) were used to estimate the passenger vehicle choice models presented in this report.

5.2.2 Identification of Outliers in the Commercial Vehicle Data

A similar data cleaning process was used for the commercial vehicle data. Outliers were identified and removed from the final dataset based on the following criteria (the categories are not mutually exclusive):

- Respondent's implied trip speed was less than 3 mph or more than 150 mph (36 respondents)
- Respondents who took less than 5 minutes to complete the entire survey (10 respondents).
- Respondents who indicated their trip took more than 10 days (1 respondent)

The outlier analysis excluded 46 individual records from the final analysis (16% of all completed commercial surveys). After excluding these respondents, a total of 244 respondents (2,440 SP observations) were used to estimate the model presented in this report.

5.3 Model Specification

The multinomial logit model estimates a choice probability for each alternative presented in the stated preference tradeoff exercises. The alternatives are represented in the model by observed utility equations of the form:

$U_1 = \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n$

Where each X represents a variable specified by the researcher and each β is a coefficient estimated by the model that represents the sensitivity of the respondents in the sample to the corresponding variable.

Several utility equation structures were tested using the variables included in the stated preference scenarios, as well as trip characteristics, attitudinal indicators, and demographic variables. The models presented in this section are final model specifications, including only the variables that proved statistically significant.

5.3.1 Passenger Vehicle Model Specification

Segmented models were estimated for different traveler groups based on trip purpose and the reported trip departure time: peak work travelers, peak non-work travelers, off-peak work travelers, and off-peak non-work travelers.

By segmenting the models in this way, the behavioral differences between the segments can be identified and applied separately in a travel forecasting model. This final segmentation scheme was chosen based on the behavioral differences observed between the segments, expected application of the choice models, and the reasonableness and intuitiveness of the segmented results.

Utility equations were specified for each alternative using the variables tested in the stated preference exercises (travel time, and toll cost), as well as certain trip detail, attitude, and demographic variables that could have explanatory power in the model, including:

- Time of day (departure time)
- Trip Purpose
- Opinion
- Household Income
- Trip distance
- Delay experienced
- ETC ownership

After reviewing the significance of each variable, alone and in concert, the final model specification was chosen based on model fit, the intuitiveness and reasonableness of the model coefficients, and the expected application of the model results. In addition to the variables included in the stated preference scenarios, household income, trip distance, and ETC ownership were found to be statistically significant. A strategic bias variable was also included in the model specification for respondents who met the following criteria:

- Respondents who somewhat or strongly oppose the proposed project
- Respondents who selected "Opposed to paying tolls" when asked what was their primary reason for never selecting the tolled I-84 option in the stated preference exercises
- Respondents who strongly disagreed with the statement "I will use a toll route if the tolls are reasonable and I save time"

The final model specifications include variables for travel time and toll/fare cost, trip departure time, ETC ownership, and transit type. Separate travel time and toll cost coefficients were also estimated for the strategic bias variable described above.

Transformations of the cost coefficients by total trip distance and household income were tested in order to capture any systematic relationship between cost sensitivity and income or distance. To

capture the relationship between cost sensitivity, trip distance and income, the elasticities of the cost coefficients relative to trip distance and income were estimated by including the following transformations in the utility equation:

$$V_i = \cdots + \beta_c * TC_i * \left(\frac{income}{\overline{income}}\right)^{\lambda_{c,inc}} * \left(\frac{distance}{\overline{distance}}\right)^{\lambda_{c,dist}}$$

Where:

- TC_i gives the toll cost of alternative i
- Income and distance give the household income and trip distance for the current respondent, with $\overline{income}$ and $\overline{distance}$ giving the average household income and trip distance for the sample

The remaining terms are estimated in the model:

- The term β_c is the cost sensitivity (in units of 1/$)
- The interaction term $\lambda_{c,inc}$ gives the cost elasticity in relation to income and $\lambda_{c,dist}$ gives the cost elasticity in relation to trip distance

The sign of the estimated elasticity coefficients indicates whether cost sensitivity decreases or increases with increasing trip distance and income, while the magnitude of the coefficients indicate the strength of the relationship.

An alternative-specific constant is also included on all of the alternatives except for the alternate toll free route alternative. The constants capture the utility (or disutility) for each alternative relative to the alternate toll free route alternative that cannot be attributed to any other explanatory variables in the model.

5.3.2 Commercial Vehicle Model Specification

Similar to the passenger vehicle survey, utility equations were specified for each alternative using the variables tested in the stated preference exercises (travel time and toll cost), as well as certain trip detail, attitude, and company information variables that could have explanatory power in the model. The final model specification for the commercial vehicle survey includes a variable for travel time and separate cost coefficients for different vehicle sizes (medium and heavy trucks). A toll constant is included on the tolled I-84 alternative to capture utility for that alternative that cannot be attributed to the other variables in the model. Additionally, strategic bias constants were included on the tolled I-84 alternative.

5.3.3 Coefficient Estimates

The results of the final model specifications are presented below and include coefficients for the passenger vehicle travelers by market segment and commercial vehicle travelers by vehicle size. The coefficient values, robust standard errors, robust t-statistics, and general model statistics are presented in Table 5-1 through Table 5-2.

The coefficient values are the values estimated by the choice model that represent the relative importance of each of the variables. It should be noted that these values are unit-specific and the units must be accounted for when comparing coefficients. The sign of the coefficient indicates a positive or negative relationship between utility and the associated variable. For example, a negative travel time coefficient implies that utility for a given travel alternative will decrease as the travel time associated with that alternative increases.

The standard error is a measure of error around the mean coefficient estimate. The t-statistic is the coefficient estimated divided by the standard error, which can be used to evaluate statistical significance. A t-statistic greater/less than ±1.96 indicates that the coefficient is statistically significantly different from 0 (unless otherwise reported) at the 95% level.

The model fit statistics that are presented include the number of observations, the number of estimated parameters, the initial log-likelihood, the log-likelihood at convergence, rho-squared, and adjusted rho-squared. The log-likelihood is a model fit measure that indicates how well the model predicts the choices observed in the data. The null log-likelihood is the measure of the model fit with coefficient values of zero. The final log-likelihood is the measure of model fit with the final coefficient values at model convergence. A value closer to zero indicates better model fit. The log-likelihood cannot be evaluated independently, as it is a function of the number of observations, the number of alternatives, and the number of parameters in the choice model. The rho-square model fit measure accounts for this to some degree by evaluating the difference between the null log-likelihood and the final log-likelihood at convergence. The adjusted rho-square value takes into account the number of parameters estimated in the model.

Table 5-1: Passenger Vehicle Multinomial Logit Model Results

Coefficient	Units	Alternatives				Coefficient Values		
		1: I-84 Tolled	2: I-84 Tolled, TT Shift	3: Toll-free	4: Transit	Value	Robust Std. Error	Robust T-Test (0)
Travel Time - Peak work	Min	X	X	X	X	-0.11	0.005	-19.85
Travel Time - Peak non-work	Min	X	X	X	X	-0.13	0.010	-13.13
Travel Time - Off-peak work	Min	X	X	X	X	-0.14	0.018	-8.13
Travel Time - Off-peak non-work	Min	X	X	X	X	-0.10	0.015	-6.91
Travel Time – Strategic Bias	Min	X	X	X	X	-0.04	0.003	-11.84
*Toll Cost - Peak work**	$	X	X	-	X	-0.62	0.036	-17.38
*Toll Cost - Peak non-work**	$	X	X	-	X	-0.88	0.072	-12.21
*Toll Cost - Off-peak work**	$	X	X	-	X	-0.79	0.117	-6.76
*Toll Cost - Off-peak non-work**	$	X	X	-	X	-0.65	0.097	-6.73
Toll Cost – Strategic Bias	$	X	X	-	X	-1.05	0.045	-23.49
Departure Shift Earlier	Min	-	X	-	-	-0.02	0.004	-5.68
Departure Shift Later	Min	-	X	-	-	-0.03	0.003	-9.43
Transit Mode - CTfastrak	(0,1)	X	-	-	X	1.26	0.200	6.27
ETC Ownership	(0,1)	X	X	-	-	0.20	0.064	3.18
I-84 Tolled Constant	(0,1)	X	-	-	-	-0.70	0.054	-13.12
I-84 Shift Early Constant	(0,1)	-	X	-	-	-1.66	0.161	-10.34
I-84 Shift Late Constant	(0,1)	-	X	-	-	-1.25	0.139	-9
Transit Constant	(0,1)	-	-	-	X	-1.47	0.146	-10.1
Lambda Income	--	X	X	-	X	-0.10	0.030	-3.31
Lambda Distance	--	X	X	-	X	-0.10	0.041	-2.36

The toll cost variables are transformed by distance and income as described in Section 5.3.1

Model Statistics	
Number of estimated parameters	20
Number of observations	29000
Number of individuals	2900
Initial log-likelihood	39011.96
Final log-likelihood	-22570.11
Rho-square	0.421
Adjusted rho-square	0.421
Model Statistics	

Table 5-2: Commercial Vehicle Multinomial Logit Model Results

Coefficient	Units	Alternatives		Coefficient Values		
		I-84 Tolled	Alternate Route	Value	Robust Std. Error	Robust *t*-stat
Travel Time	Min	X	X	-0.060	0.010	-6.32
Toll Cost – 2 to 4 axles	$	X		-0.115	0.019	-6.24
Toll Cost – 5 or more axles	$	X		-0.328	0.114	-2.88
Dummy variable: somewhat/strongly in favor of the proposed project	(0,1)	X		1.450	0.344	4.22
Dummy variable: somewhat/strongly opposed to the proposed project	(0,1)	X		-0.719	0.330	-2.18
Alternative specific constant for the tolled alternative	(0,1)	X		-0.993	0.287	-3.46

Model Statistics	
Number of estimated parameters:	6
Number of observations:	2440
Number of individuals:	244
Initial log-likelihood:	-1691.28
Final log-likelihood:	-1174.5
Rho-square:	0.306
Adjusted rho-square:	0.302

5.3.4 Willingness to Pay for Travel Time Savings (Values 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 by using I-84 with Value Pricing.

For passenger vehicle survey respondents, this willingness to pay for travel time savings, or value of time, can be calculated by simply dividing the travel time coefficient by the toll cost coefficient after accounting for the income and distance transformation that was applied in the model specification. The resulting value of time is in units of dollars per minute; multiplying by 60 will convert this into the more commonly cited units of dollars per hour:

$$VOT = 60 \times \frac{\beta Time}{\beta Toll * \left(\frac{income^{\lambda_{c,inc}}}{\overline{income}}\right) * \left(\frac{distance^{\lambda_{t,dist}}}{\overline{distance}}\right)}$$

Where βTime is the value of the travel time coefficient (with units of 1/min), βCost is the value of the toll cost coefficient (with units of 1/$), and the lambdas control for non-linear income and distance effects.

Similarly, for commercial vehicle respondents, the value of time can be calculated by simply dividing the travel time coefficient by the toll cost coefficient. The resulting value of time is in units of dollars per minute; multiplying by 60 will convert this into the more commonly cited units of dollars per hour.

Table 5-3 and Table 5-4 show the VOT for various market segments at the average segment income and distance. Values of time evaluated at different values of household income and trip distance by market segment are presented below in Table 5-5 to Table 5-8. The corresponding figures are shown in Figure 5-1 to Figure 5-4.

Table 5-3: Passenger Vehicle Values of Time by Market Segment

Time of day	Trip Purpose	Mean VOT ($/hr.)
Peak	Work	$10.30
Peak	Non-work	$9.14
Off-peak	Work	$10.96
Off-peak	Non-work	$9.45

Table 5-4: Commercial Vehicle Values of Time by Vehicle Size

Trip Purpose	Mean VOT ($/hr.)
2-4 axles	$10.99
5 or more axles	$31.36

Table 5-5: Passenger Vehicle Value of Time by Household Income and Trip Distance (Peak Work)

Dist. (mi)	Household Income ($)										
	$15,000	$20,000	$30,000	$42,500	$62,500	$87,500	$112,500	$137,500	$175,500	$225,000	$250,000
5	$7.32	$7.53	$7.83	$8.10	$8.41	$8.69	$8.91	$9.09	$9.31	$9.53	$9.63
10	$7.84	$8.06	$8.38	$8.67	$9.01	$9.31	$9.54	$9.73	$9.96	$10.20	$10.31
15	$8.16	$8.39	$8.73	$9.03	$9.37	$9.69	$9.93	$10.12	$10.37	$10.62	$10.73
20	$8.39	$8.63	$8.98	$9.29	$9.64	$9.96	$10.21	$10.41	$10.66	$10.92	$11.04
25	$8.57	$8.82	$9.17	$9.49	$9.85	$10.18	$10.44	$10.64	$10.90	$11.17	$11.28
30	$8.73	$8.98	$9.34	$9.66	$10.03	$10.37	$10.62	$10.83	$11.10	$11.37	$11.48
35	$8.86	$9.11	$9.48	$9.81	$10.19	$10.53	$10.79	$11.00	$11.26	$11.54	$11.66
40	$8.98	$9.24	$9.61	$9.94	$10.32	$10.66	$10.93	$11.15	$11.41	$11.69	$11.81
45	$9.08	$9.34	$9.72	$10.06	$10.44	$10.79	$11.06	$11.27	$11.55	$11.83	$11.95
50	$9.18	$9.44	$9.82	$10.16	$10.55	$10.90	$11.17	$11.39	$11.67	$11.95	$12.08
55	$9.27	$9.53	$9.91	$10.26	$10.65	$11.00	$11.28	$11.50	$11.78	$12.06	$12.19

Figure 5-1: Passenger Vehicle Value of Time by Household Income and Trip Distance (Peak Work)

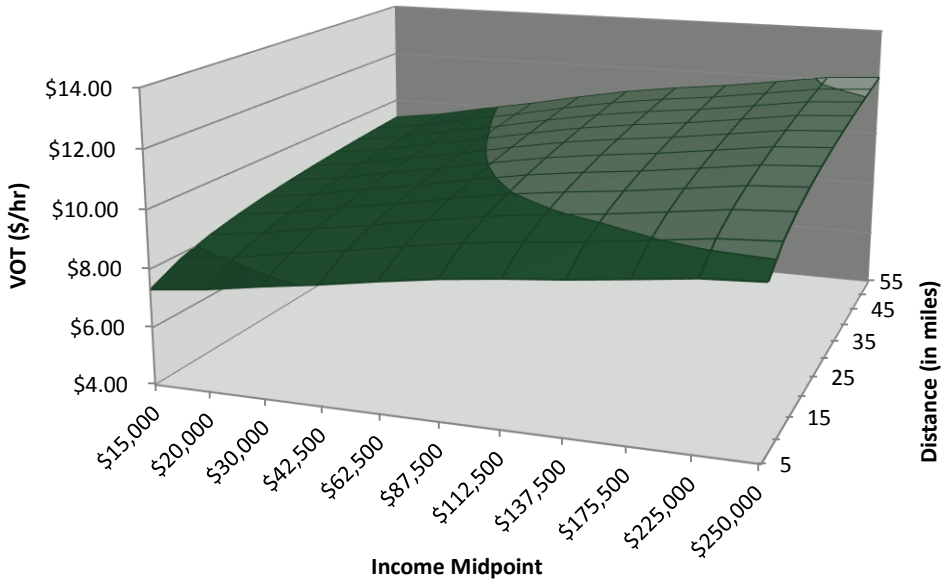


Table 5-6: Passenger Vehicle Value of Time by Household Income and Trip Distance (Peak Non-Work)

Dist. (mi)	Household Income ($)										
	$15,000	$20,000	$30,000	$42,500	$62,500	$87,500	$112,500	$137,500	$175,500	$225,000	$250,000
5	$6.30	$6.48	$6.74	$6.97	$7.24	$7.48	$7.67	$7.82	$8.01	$8.20	$8.29
10	$6.74	$6.94	$7.21	$7.46	$7.75	$8.01	$8.21	$8.37	$8.57	$8.78	$8.87
15	$7.02	$7.22	$7.51	$7.77	$8.07	$8.33	$8.54	$8.71	$8.92	$9.14	$9.23
20	$7.22	$7.42	$7.72	$7.99	$8.30	$8.57	$8.79	$8.96	$9.17	$9.40	$9.50
25	$7.38	$7.59	$7.89	$8.17	$8.48	$8.76	$8.98	$9.16	$9.38	$9.61	$9.71
30	$7.51	$7.73	$8.04	$8.31	$8.63	$8.92	$9.14	$9.32	$9.55	$9.78	$9.88
35	$7.63	$7.84	$8.16	$8.44	$8.76	$9.06	$9.28	$9.47	$9.69	$9.93	$10.03
40	$7.73	$7.95	$8.27	$8.55	$8.88	$9.18	$9.40	$9.59	$9.82	$10.06	$10.17
45	$7.82	$8.04	$8.36	$8.65	$8.98	$9.28	$9.51	$9.70	$9.94	$10.18	$10.28
50	$7.90	$8.12	$8.45	$8.74	$9.08	$9.38	$9.61	$9.80	$10.04	$10.28	$10.39
55	$7.97	$8.20	$8.53	$8.82	$9.16	$9.47	$9.70	$9.89	$10.13	$10.38	$10.49

Figure 5-2: Passenger Vehicle Value of Time by Household Income and Trip Distance (Peak Non-Work)

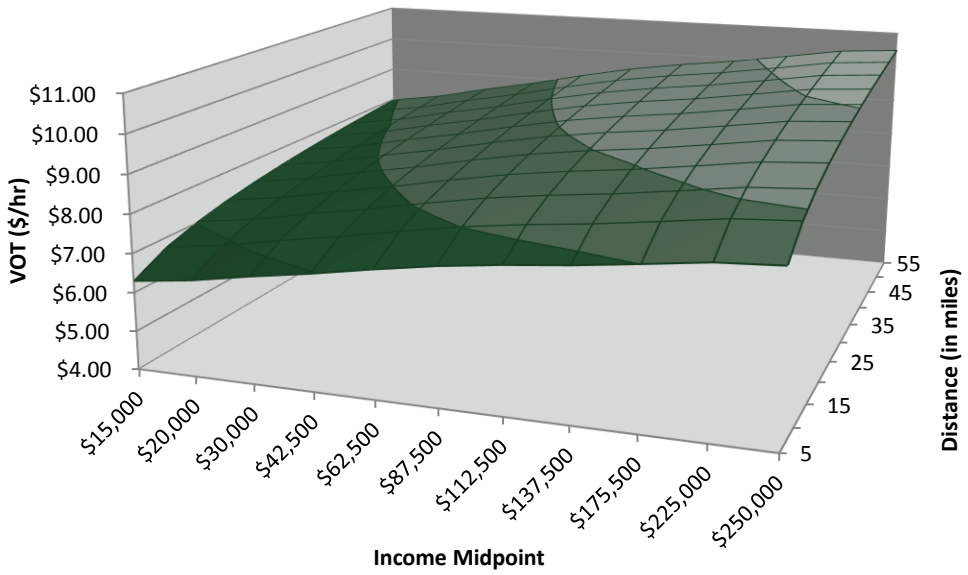


Table 5-7: Passenger Vehicle Value of Time by Household Income and Trip Distance (Off-Peak Work)

Dist. (mi)	Household Income ($)										
	$15,000	$20,000	$30,000	$42,500	$62,500	$87,500	$112,500	$137,500	$175,500	$225,000	$250,000
5	$7.78	$8.00	$8.33	$8.61	$8.94	$9.24	$9.47	$9.66	$9.89	$10.13	$10.24
10	$8.33	$8.57	$8.91	$9.22	$9.57	$9.89	$10.14	$10.34	$10.59	$10.85	$10.96
15	$8.67	$8.92	$9.28	$9.60	$9.96	$10.30	$10.55	$10.76	$11.02	$11.29	$11.41
20	$8.92	$9.17	$9.54	$9.87	$10.25	$10.59	$10.85	$11.07	$11.33	$11.61	$11.73
25	$9.11	$9.37	$9.75	$10.09	$10.48	$10.83	$11.09	$11.31	$11.59	$11.87	$11.99
30	$9.28	$9.54	$9.93	$10.27	$10.66	$11.02	$11.29	$11.52	$11.79	$12.08	$12.21
35	$9.42	$9.69	$10.08	$10.43	$10.83	$11.19	$11.47	$11.69	$11.97	$12.27	$12.39
40	$9.55	$9.82	$10.21	$10.57	$10.97	$11.34	$11.62	$11.85	$12.13	$12.43	$12.56
45	$9.66	$9.93	$10.33	$10.69	$11.10	$11.47	$11.75	$11.99	$12.27	$12.57	$12.70
50	$9.76	$10.03	$10.44	$10.80	$11.21	$11.59	$11.88	$12.11	$12.40	$12.71	$12.84
55	$9.85	$10.13	$10.54	$10.90	$11.32	$11.70	$11.99	$12.22	$12.52	$12.82	$12.96

Figure 5-3: Passenger Vehicle Value of Time by Household Income and Trip Distance (Off-Peak Work)

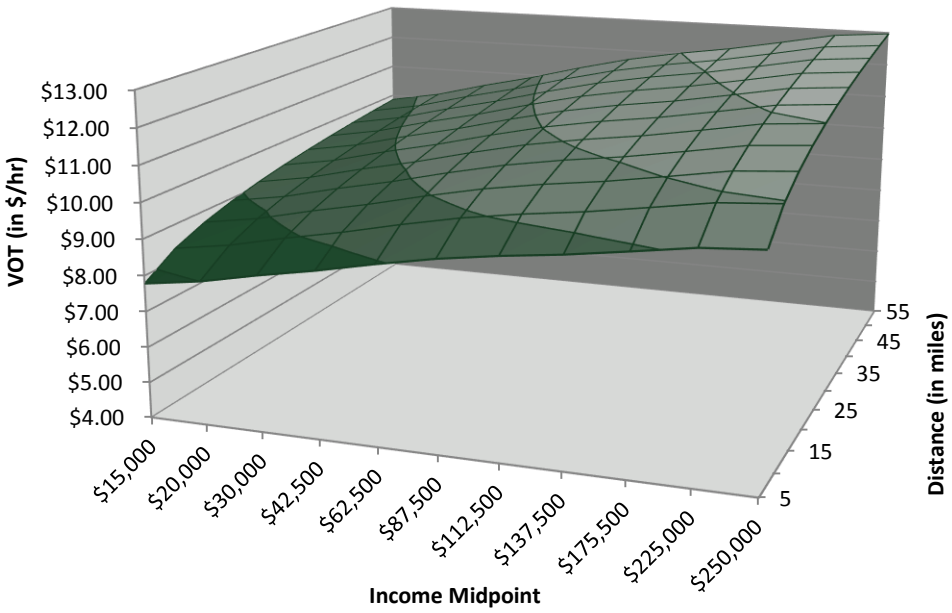
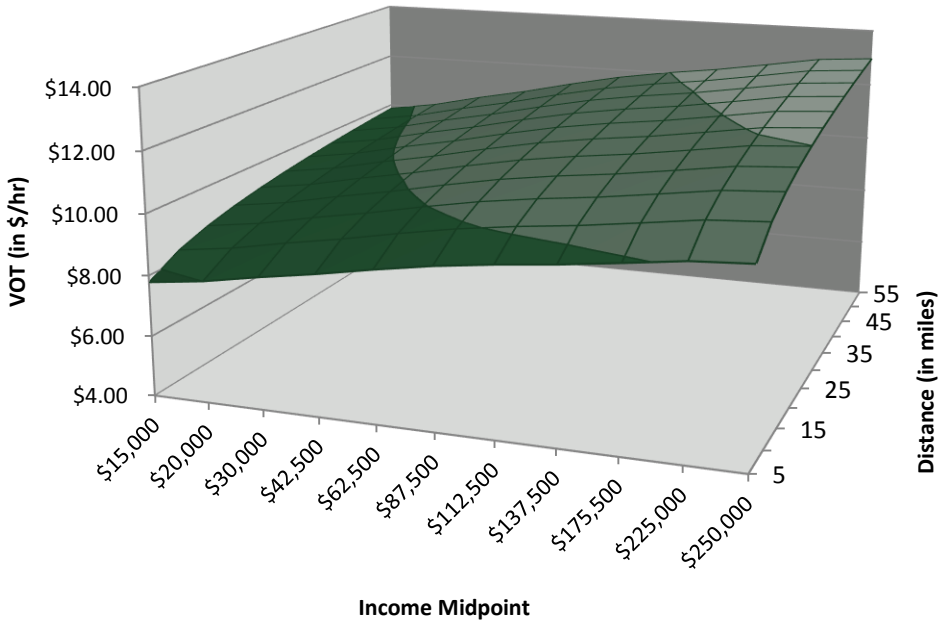


Table 5-8: Passenger Vehicle Value of Time by Household Income and Trip Distance (Off-Peak Non-Work)

Dist. (mi)	Household Income ($)										
	$15,000	$20,000	$30,000	$42,500	$62,500	$87,500	$112,500	$137,500	$175,500	$225,000	$250,000
5	$6.52	$6.71	$6.98	$7.22	$7.50	$7.75	$7.94	$8.09	$8.29	$8.49	$8.58
10	$6.98	$7.18	$7.47	$7.73	$8.02	$8.29	$8.50	$8.66	$8.87	$9.09	$9.18
15	$7.26	$7.47	$7.77	$8.04	$8.35	$8.63	$8.84	$9.02	$9.23	$9.46	$9.56
20	$7.47	$7.69	$8.00	$8.27	$8.59	$8.87	$9.10	$9.27	$9.50	$9.73	$9.83
25	$7.64	$7.86	$8.17	$8.45	$8.78	$9.07	$9.30	$9.48	$9.71	$9.95	$10.05
30	$7.78	$8.00	$8.32	$8.61	$8.94	$9.24	$9.46	$9.65	$9.88	$10.13	$10.23
35	$7.90	$8.12	$8.45	$8.74	$9.07	$9.38	$9.61	$9.80	$10.03	$10.28	$10.39
40	$8.00	$8.23	$8.56	$8.85	$9.19	$9.50	$9.74	$9.93	$10.17	$10.42	$10.52
45	$8.09	$8.32	$8.66	$8.96	$9.30	$9.61	$9.85	$10.04	$10.29	$10.54	$10.65
50	$8.18	$8.41	$8.75	$9.05	$9.40	$9.71	$9.95	$10.15	$10.39	$10.65	$10.76
55	$9.27	$9.53	$9.91	$10.26	$10.65	$11.00	$11.28	$11.50	$11.78	$12.06	$12.19

Figure 5-4: Passenger Vehicle Value of Time by Household Income and Trip Distance (Off-Peak Non-Work)



6.0 SUMMARY AND CONCLUSIONS

RSG successfully developed and implemented two stated preference survey questionnaires that gathered information from 2,900 passenger vehicle travelers and 244 commercial vehicle travelers who use I-84 in Hartford, CT. The questionnaires collected data on current travel behavior, presented respondents with information about the proposed Value Pricing on I-84 in downtown Hartford, 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. 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 lower end of the range. For passenger vehicle travelers, average values of time varied by trip purpose and time of day, and generally fell within a range of $9.14/hr. to $10.96/hr. For commercial vehicles, the value of time for small trucks (2-4 axles) was estimated to be $10.99/hr., whereas the value of time for large trucks (5 or more axles) was estimated to be $31.36/hr.

The estimated VOTs presented here for passenger vehicle travelers are somewhat lower than the VOTs estimated on other tolled highway corridors in the United States, particularly with respect to the high household earnings reported by the respondents in this study. However, this is not unexpected for this region and there are several possible explanations why the estimated values of time for travelers who use the I-84 in downtown Hartford are somewhat lower than other regions of the United States:

- Lack of familiarity with tolls in Connecticut: There are currently no tolls in the state of Connecticut and many travelers are not familiar with paying tolls or electronic toll collection. RSG has generally found lower willingness to pay in regions without existing toll facilities or familiarity with the potential benefits of tolling and value pricing.
- The perceived ease at which respondents may bypass the I-84 Viaduct in downtown Hartford: The elevated portion of I-84 is better thought of as a 'point' toll rather than a toll corridor where many respondents may have considered local streets as an acceptable alternative to I-84 with minimal time penalties, particularly for trips that originate or end in downtown Hartford which account for the majority of the sample.
- The high levels of opposition to Value Pricing on I-84 and strong anti-tax and anti-toll sentiments expressed by a majority of the respondents: Over one-half of respondents indicated they were opposed to Value Pricing on I-84. In addition, many respondents indicated in the open-ended comments portion of the survey that they considered Connecticut income taxes to be burdensome and the recent gas tax hike a sufficient new revenue source for future infrastructure repairs and expansion. Respondents who are adamantly opposed to tolls are less likely to make reasonable time/cost tradeoffs and significantly more likely to make 'protest' choices, i.e. always choosing the toll free alternative. While the modeling effort sought to mitigate the impact of this by identifying and controlling for strategic bias in the data, there is still an overall theme of opposition to tolling in the survey sample.
- Willingness to pay low toll rates: Even among respondents who are not strategically opposed to tolling, the willingness to pay tolls on I-84 in downtown Hartford was relatively low. For example, some respondents expressed they would be willing to pay a low priced, flat toll that was not dependent on time savings and in most cases less than $1.00. This observation is supported in the data where selected toll costs in the SP experiments were low. Among the choices where Value Pricing was selected, the average toll was a modest $1.05.

These factors likely explain why the willingness to pay for travel time savings on I-84 in downtown Hartford is somewhat lower than in other regions of the country.

Overall, the survey and choice model results indicate that travel time savings and toll costs can have a significant impact on individuals' travel behaviors. The results of this work will help CDM Smith and the Connecticut Department of Transportation (CTDOT) to evaluate a range of tolling scenarios and travel conditions related to the proposed Value Pricing on I-84 in downtown Hartford.

RSG INC.
TRANSPORTATION

Connecticut I-84 Value Pricing Stated Preference Survey Report

Appendix A

Survey Screen Captures

September 2013

DATA ■ ANALYSIS ■ SOLUTIONS

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1.0 PASSENGER VEHICLE SURVEY QUESTIONNAIRE

1.1 Introduction and Qualification Questions

Figure 1-1: Survey Instructions

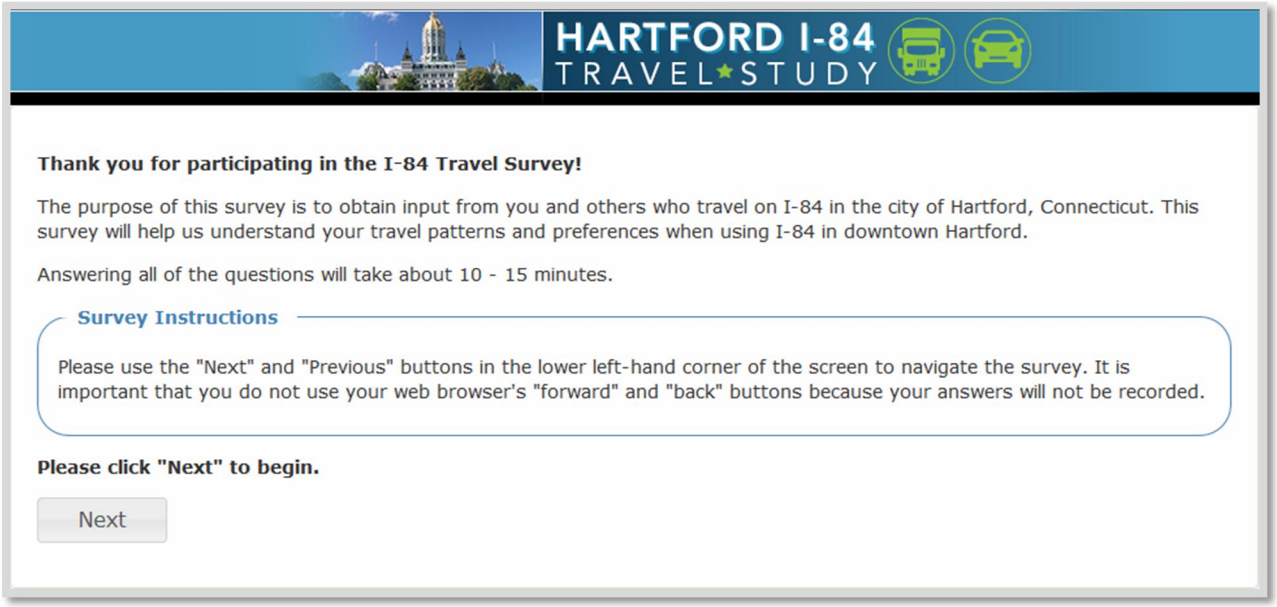


Figure 1-2: Trip Qualification

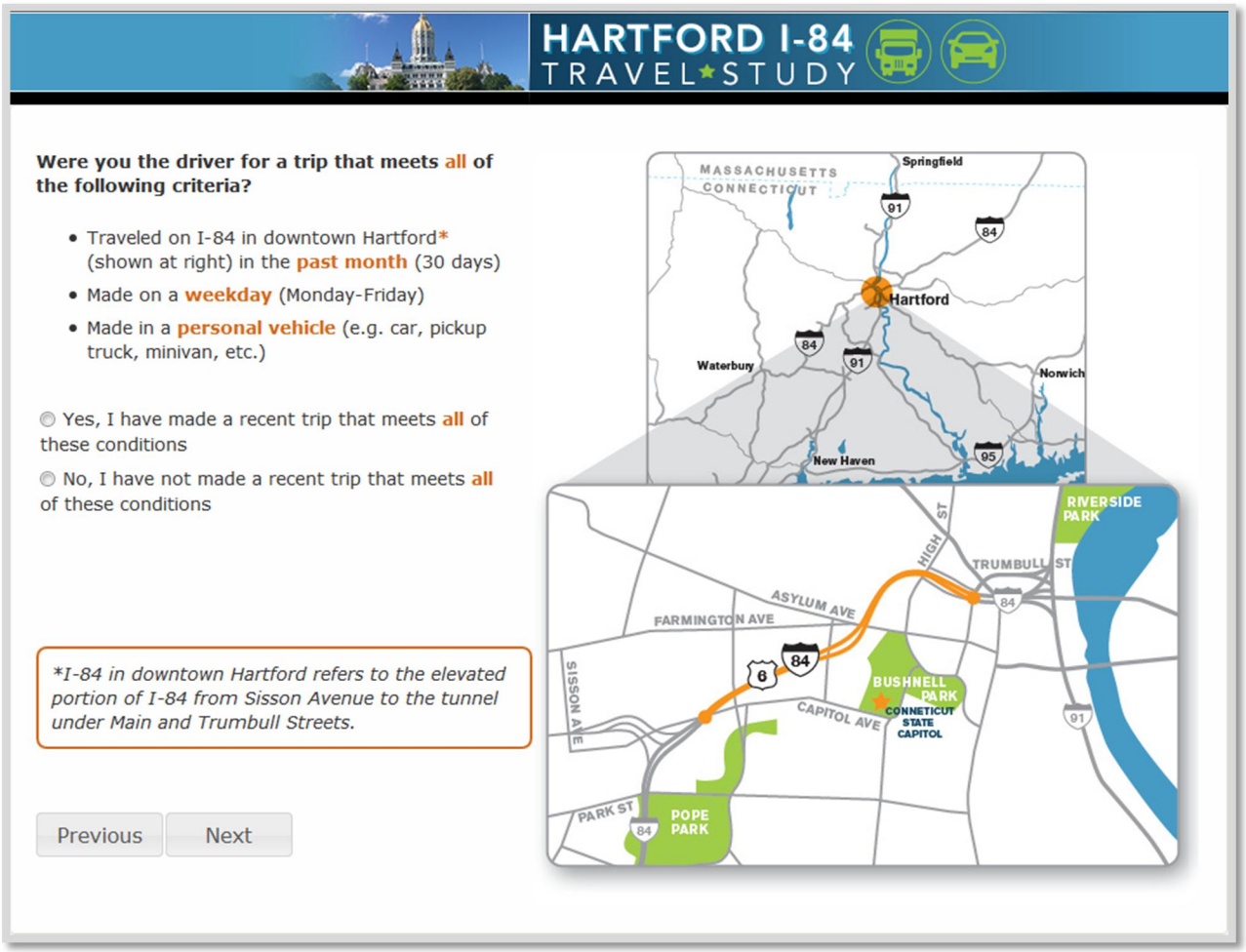
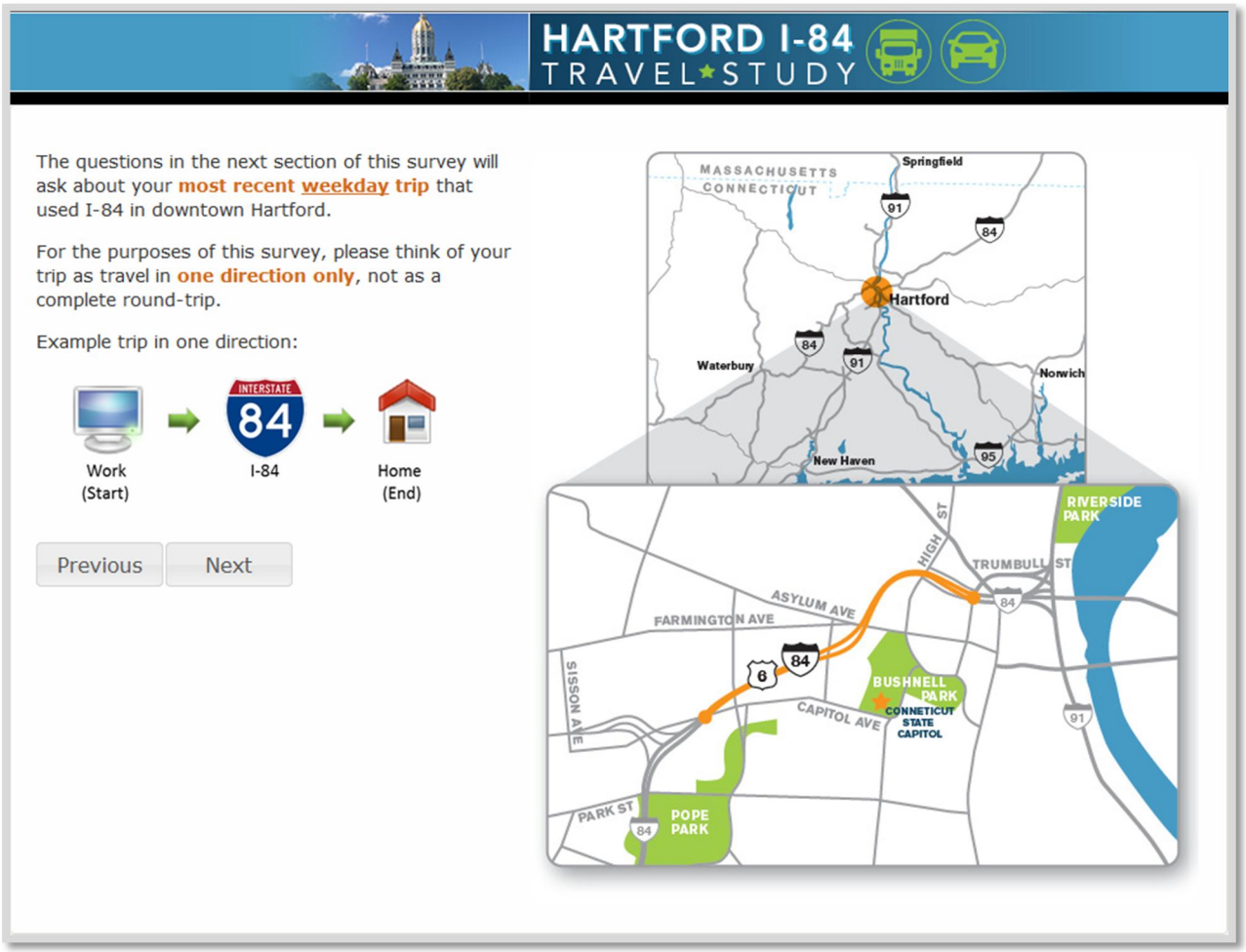


Figure 1-3: Trip Definition



1.2 Trip Characteristic Questions

Figure 1-4: Travel Date

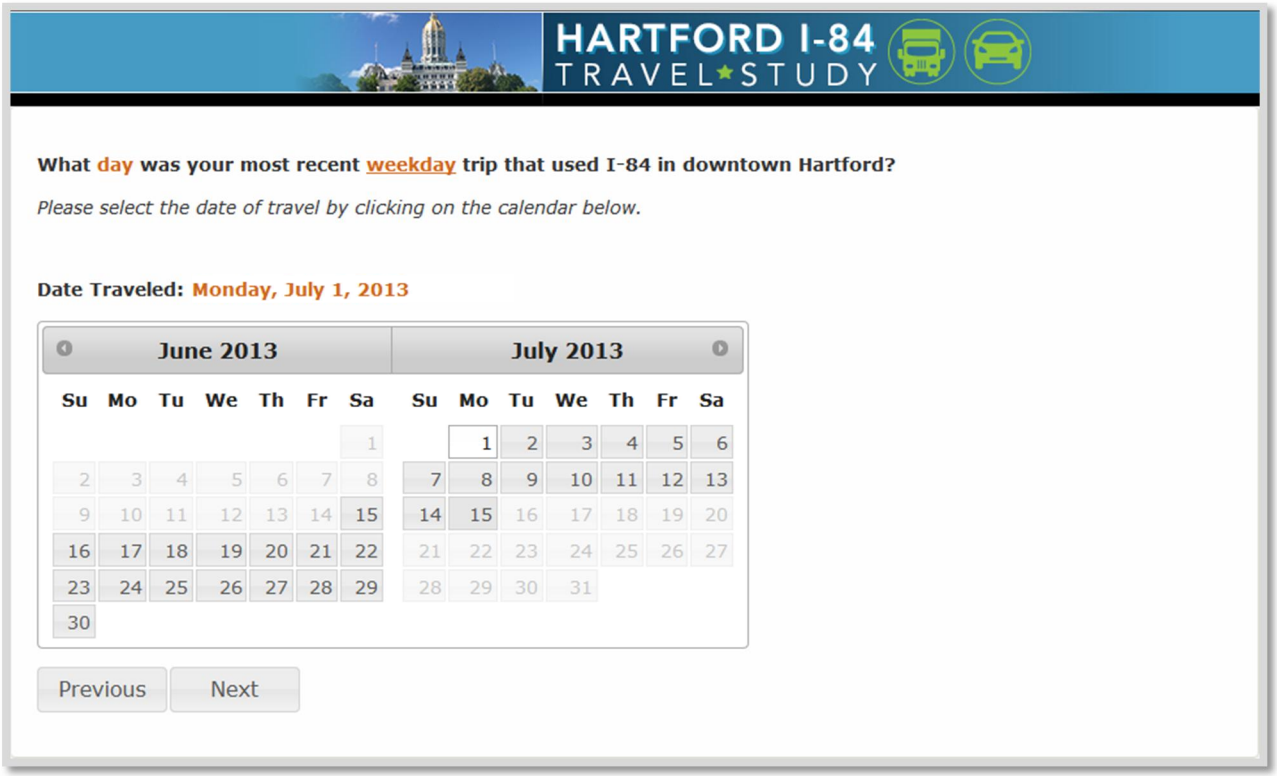


Figure 1-5: Trip Purpose

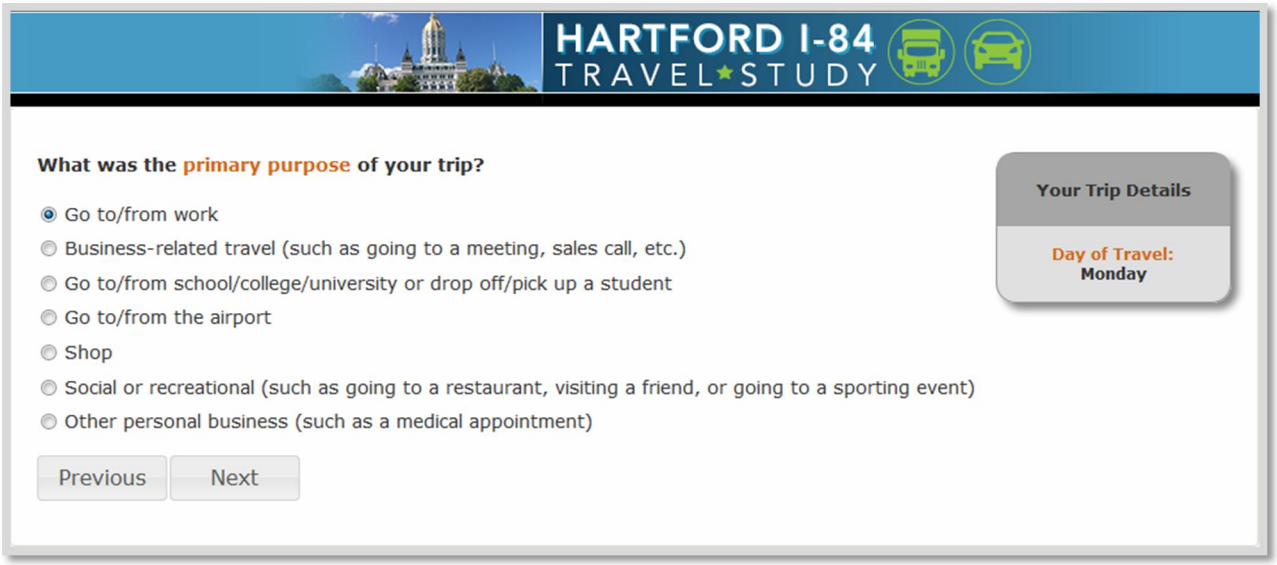


Figure 1-6: Beginning and Ending Location

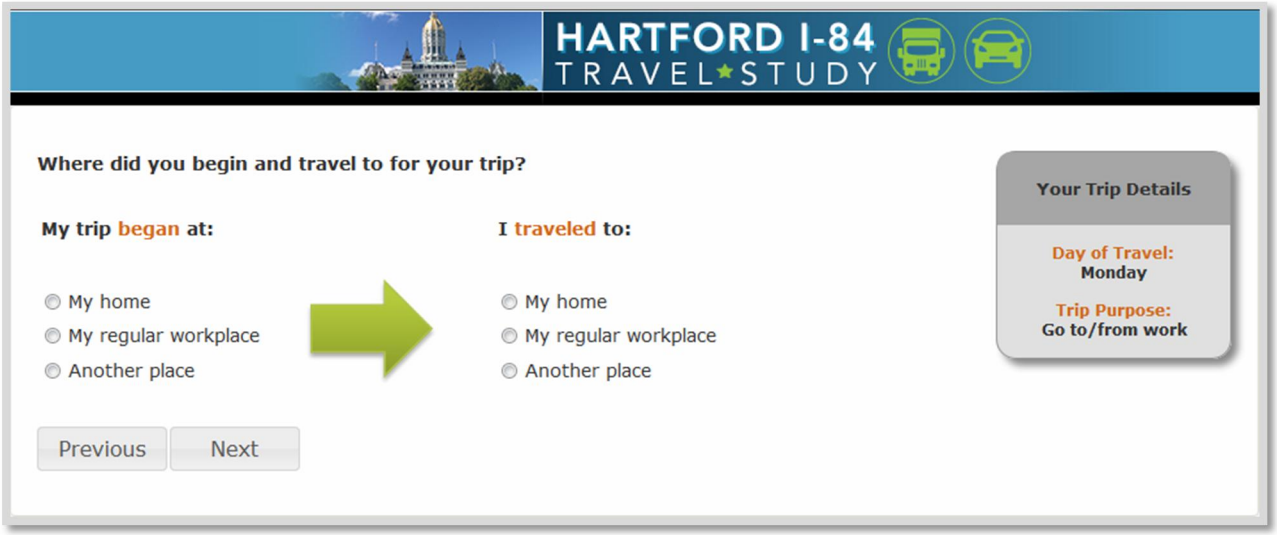
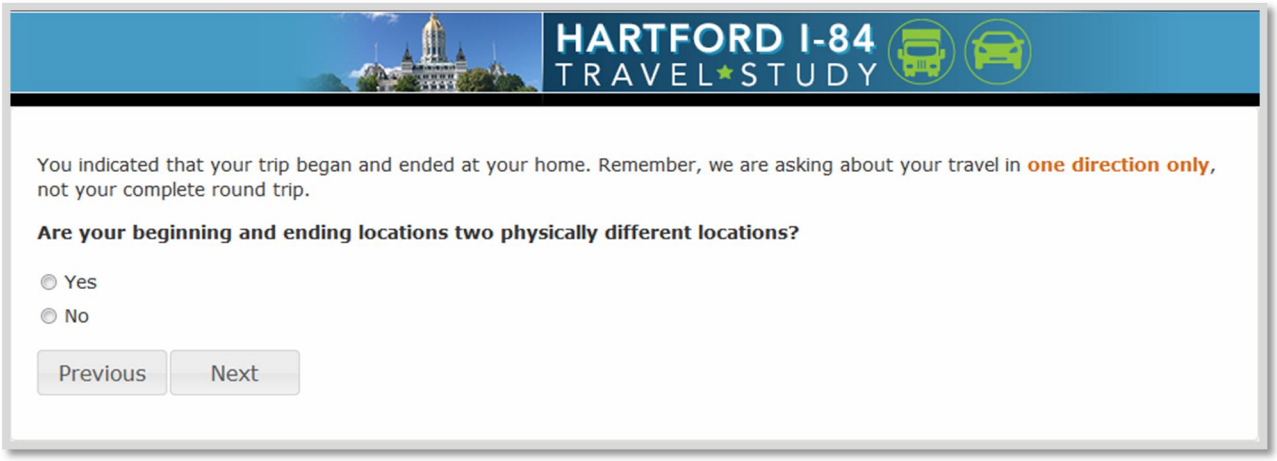


Figure 1-7: Trip Confirmation



If beginning and ending locations are the same. If 'yes' send back to Screener

Figure 1-8: Origin Address and Map Interface

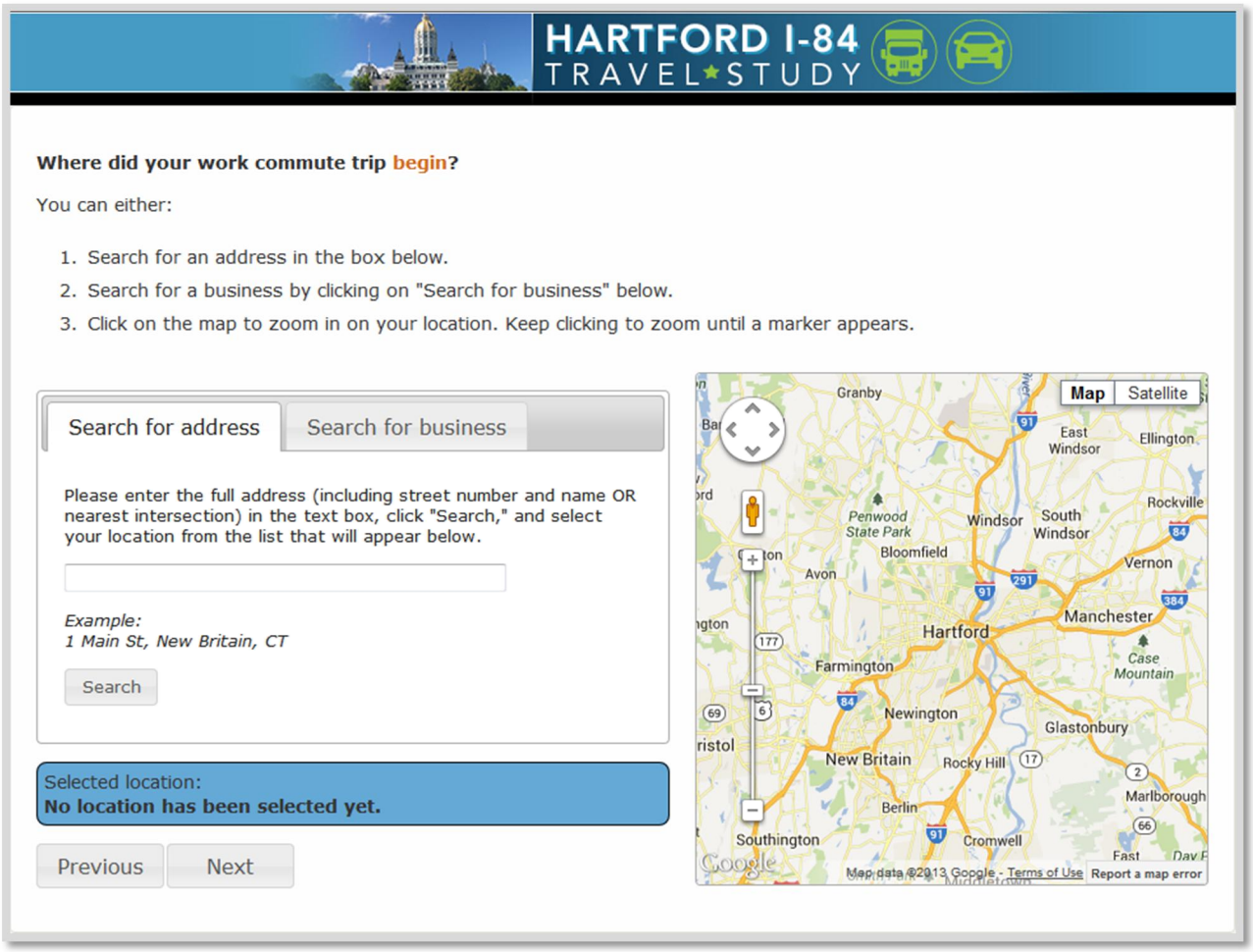


Figure 1-9: Destination Address and Map Interface

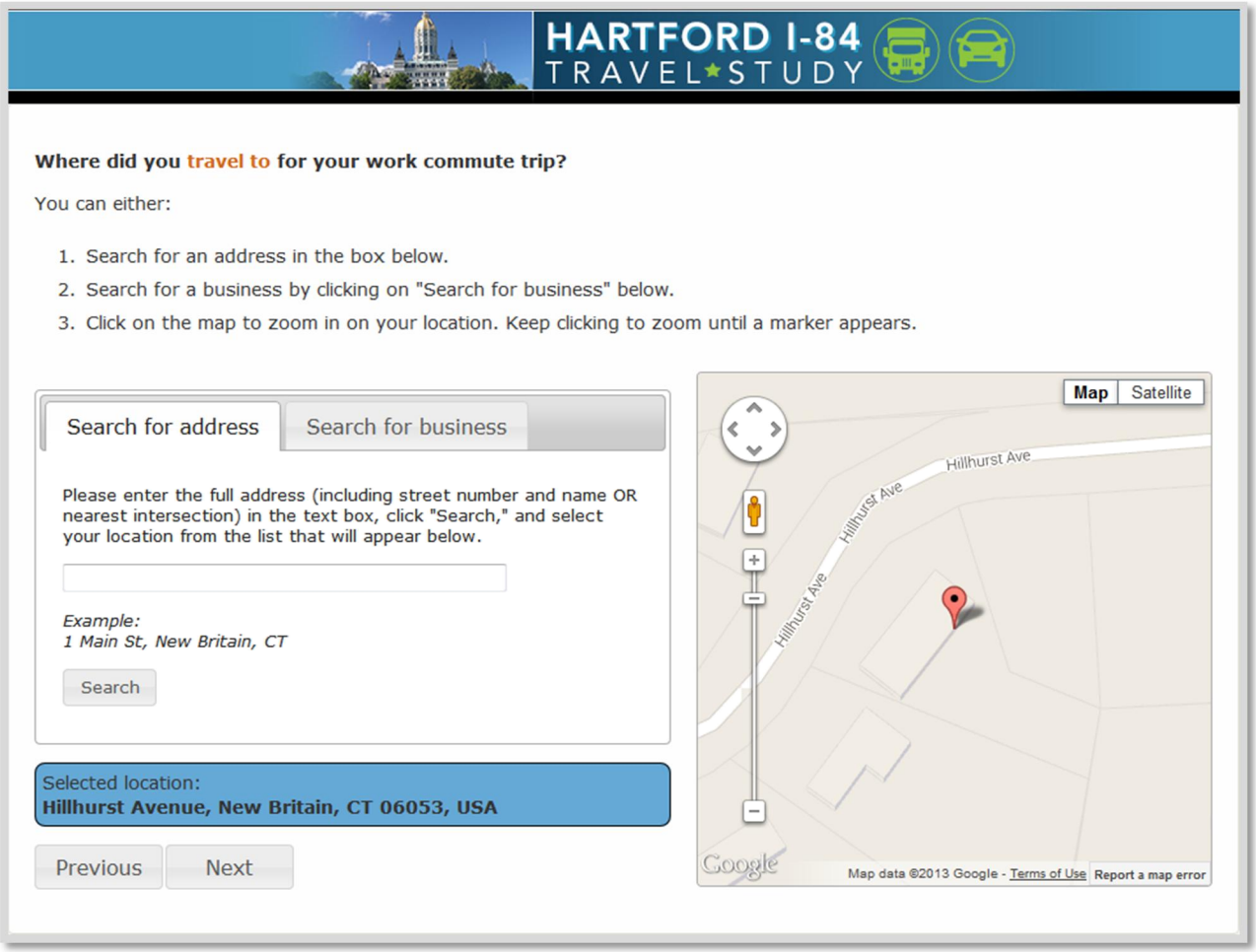


Figure 1-10: Trip Departure Time

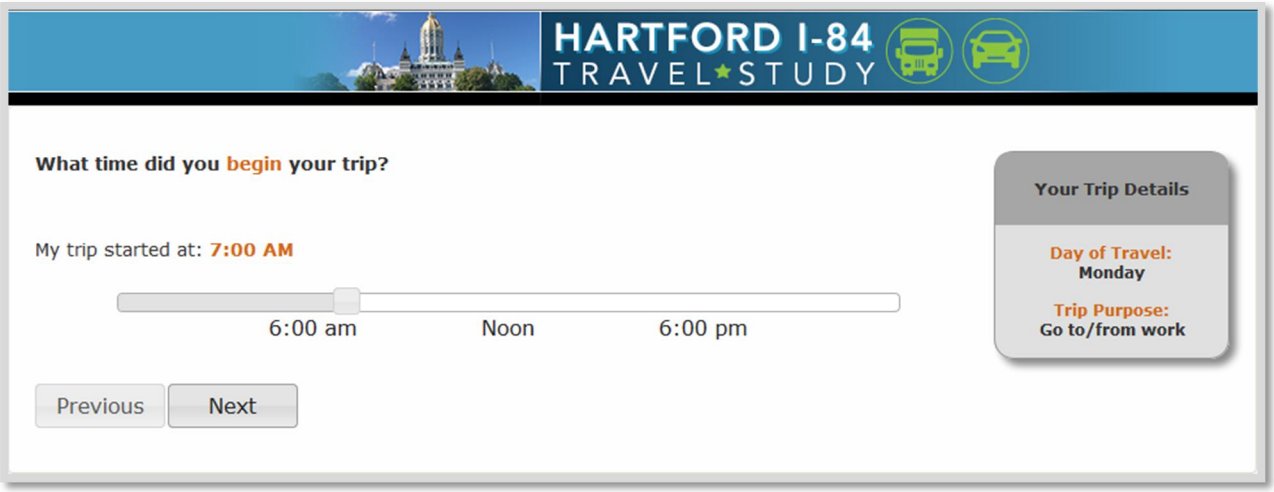


Figure 1-11: Minimize Impact of Traffic Congestion

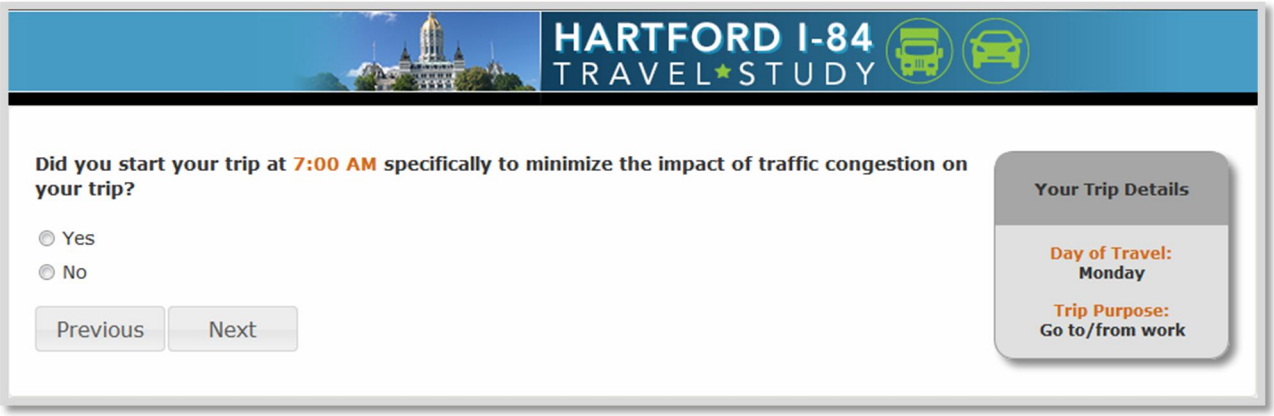
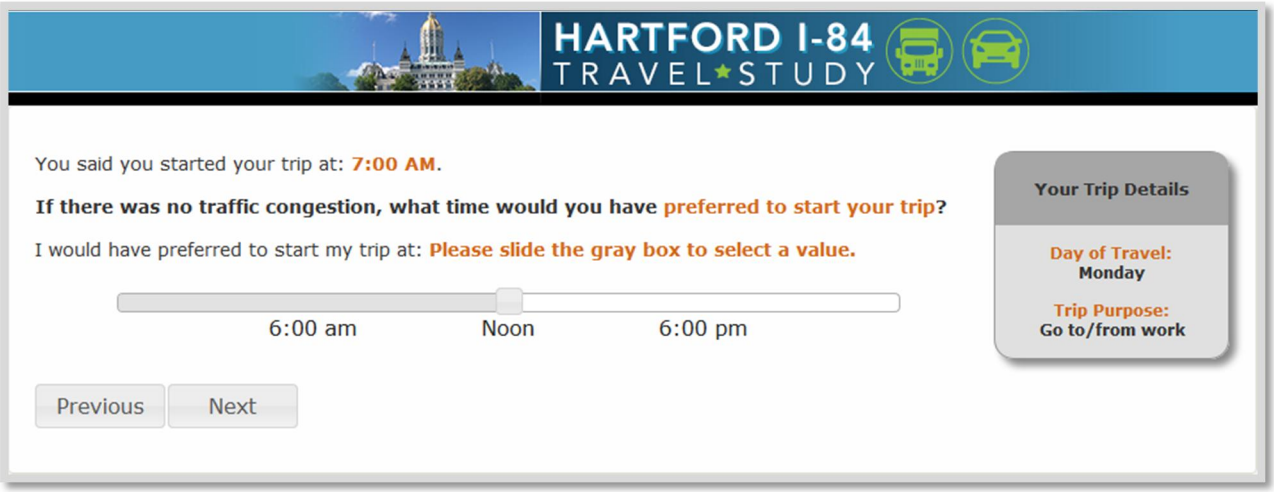


Figure 1-12: Preferred Departure Time



If chose departure time to minimize impact of traffic congestion

Figure 1-13: Travel Time

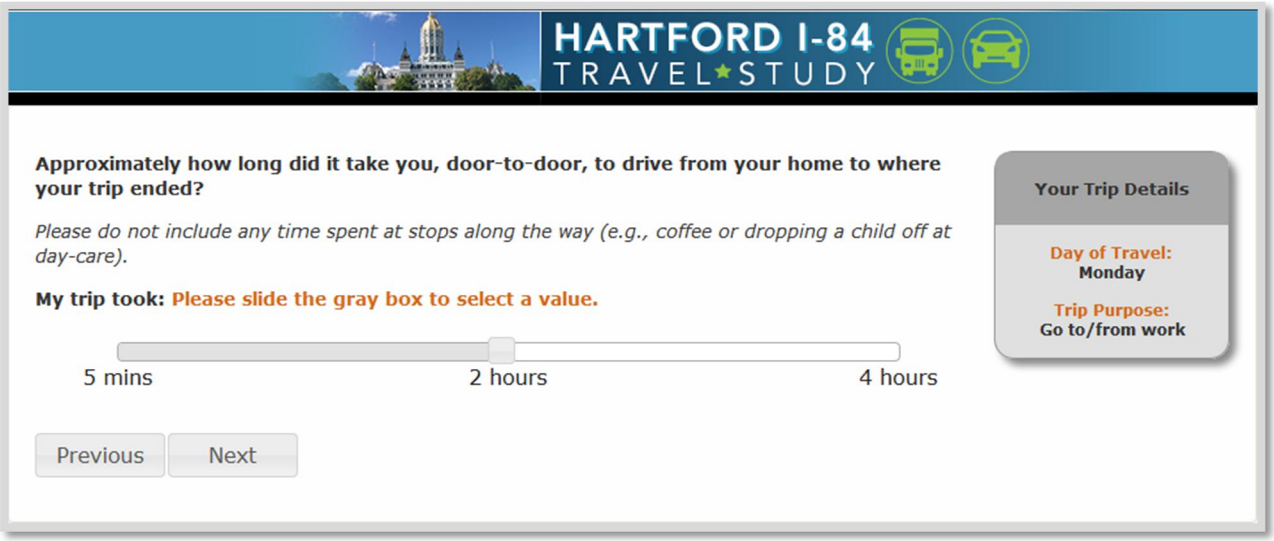
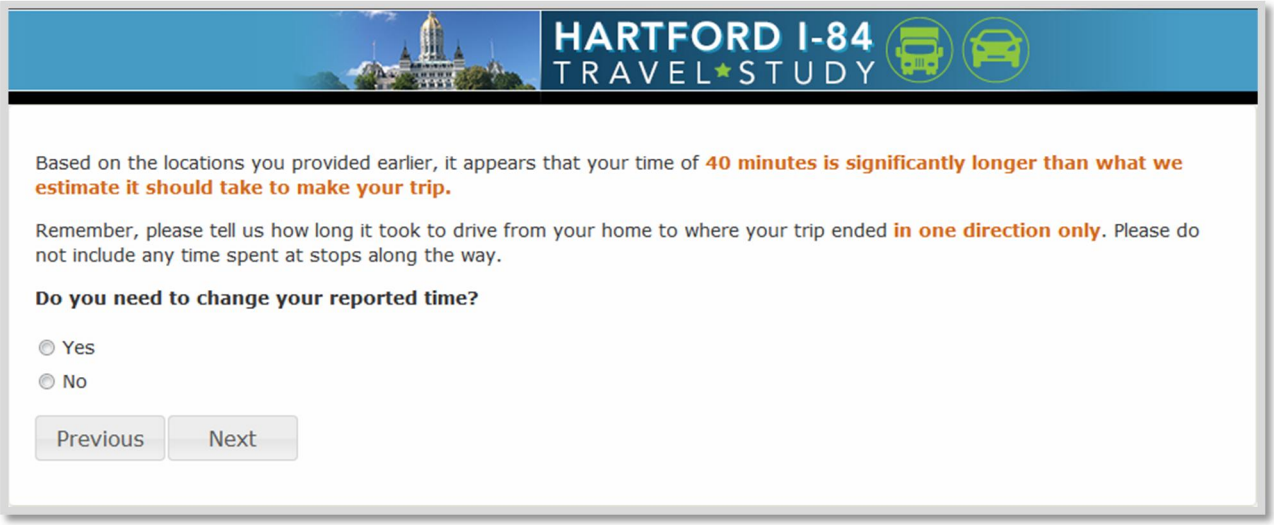


Figure 1-14: Travel Time Confirmation



If travel time is greater than 2.5 times or less than 0.75 times the Google-calculated travel time. If 'Yes,' send back to travel time question

Figure 1-15: Experienced Delay Due to Traffic Congestion

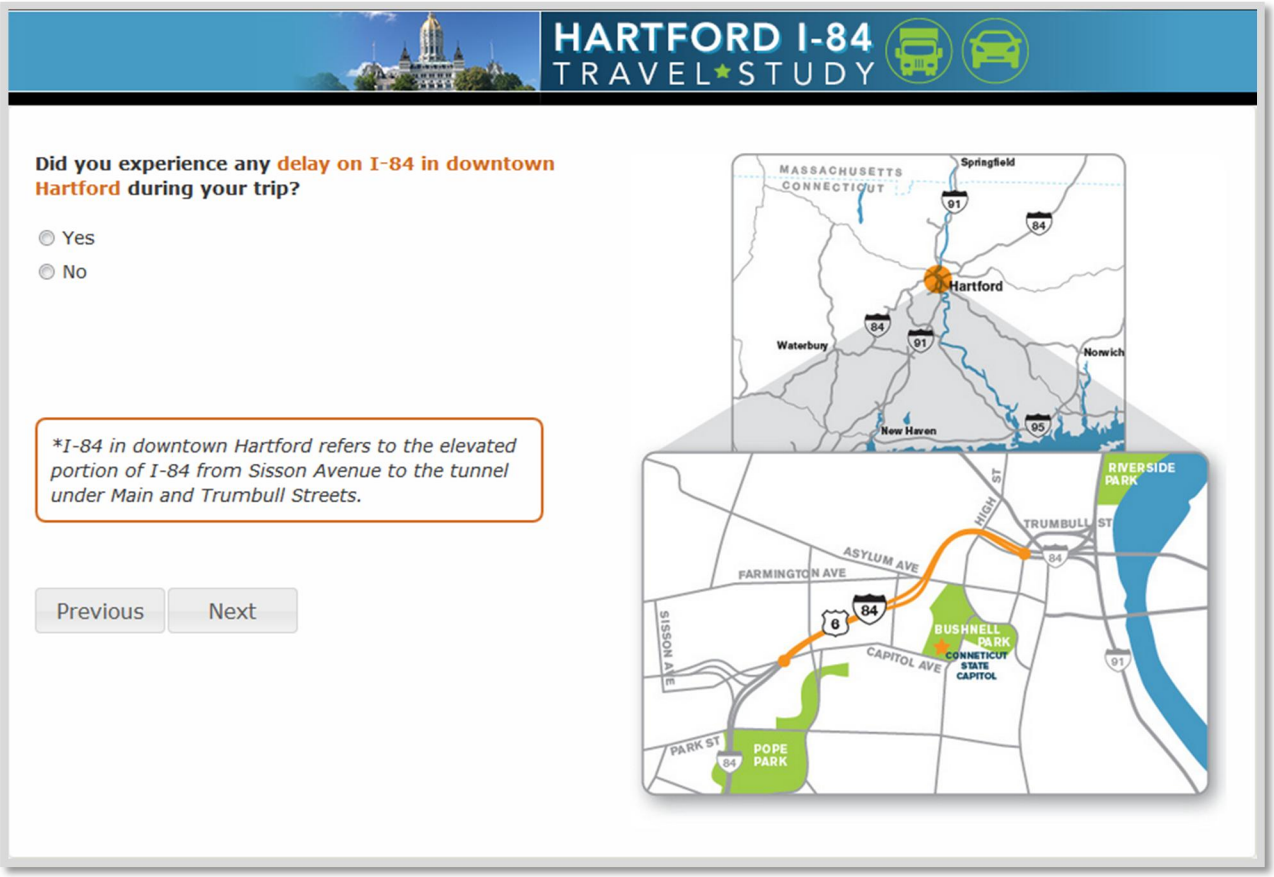
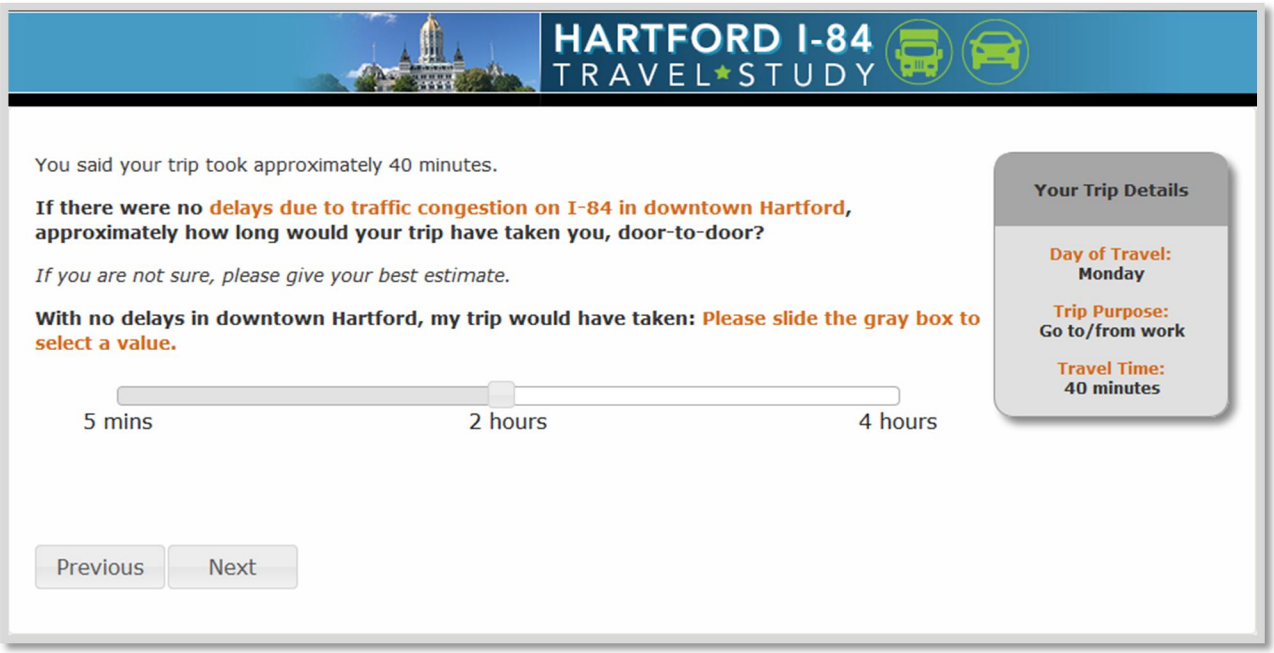


Figure 1-16: Travel Time without Delay



If experienced delay

Figure 1-17: Arrival Time Flexibility

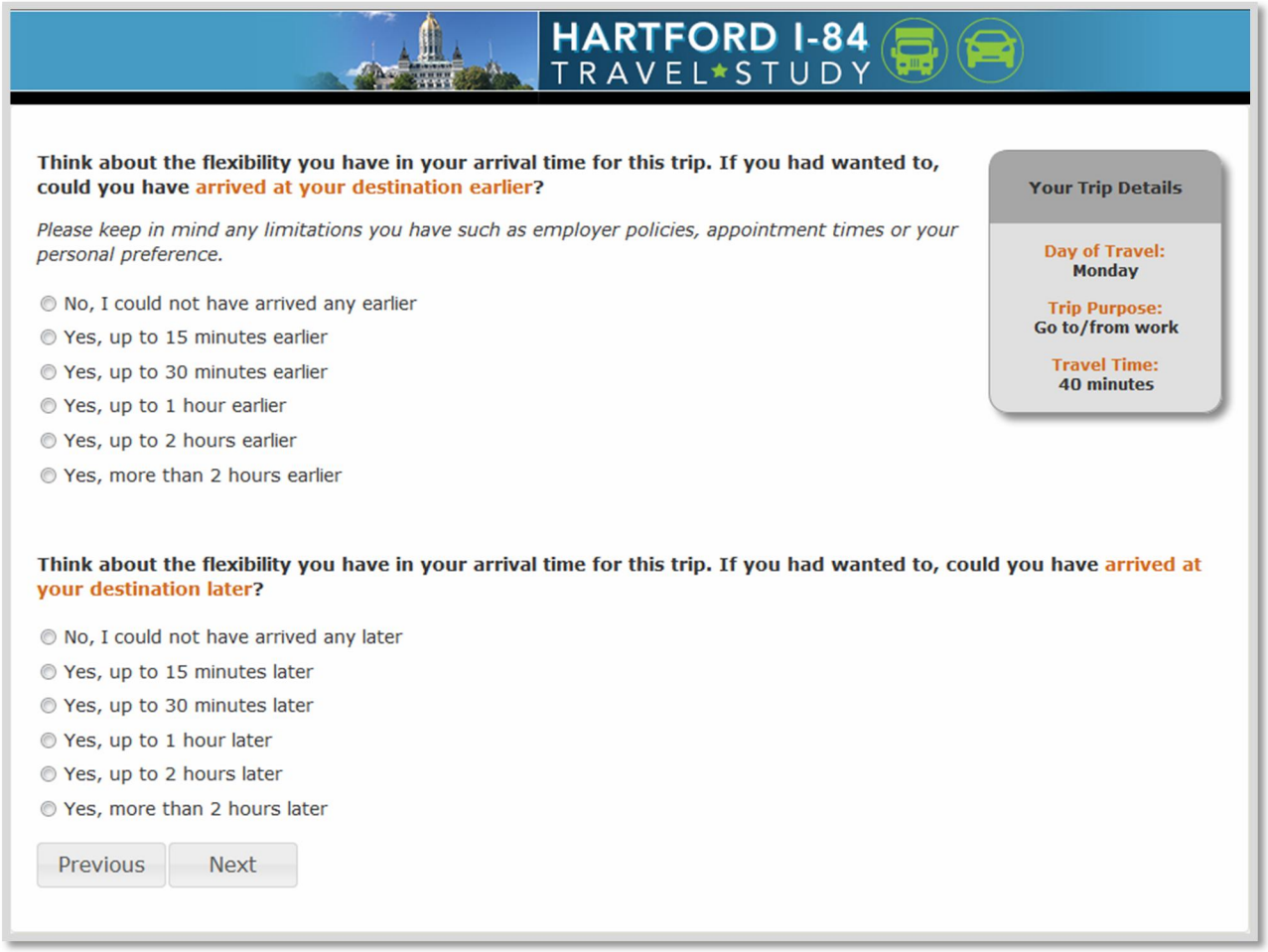
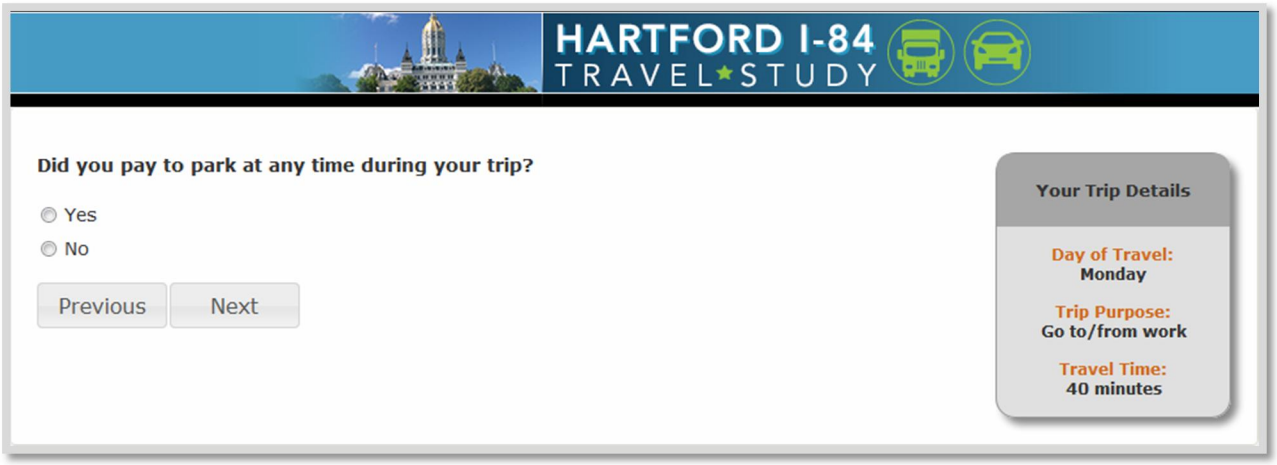
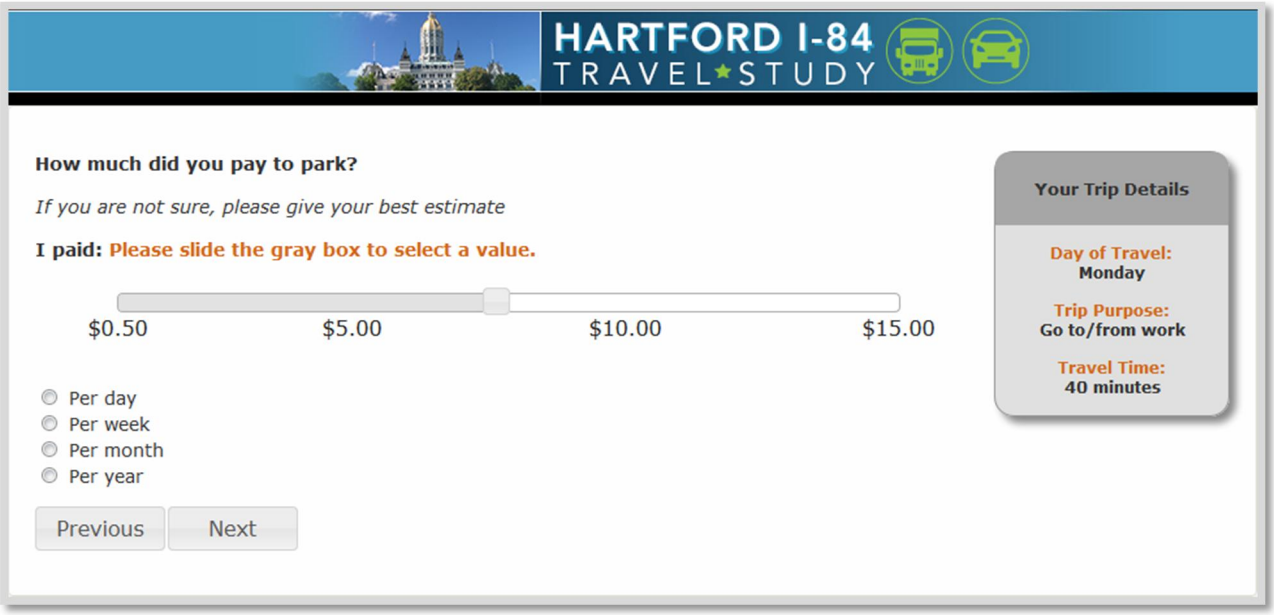


Figure 1-18: Pay to Park



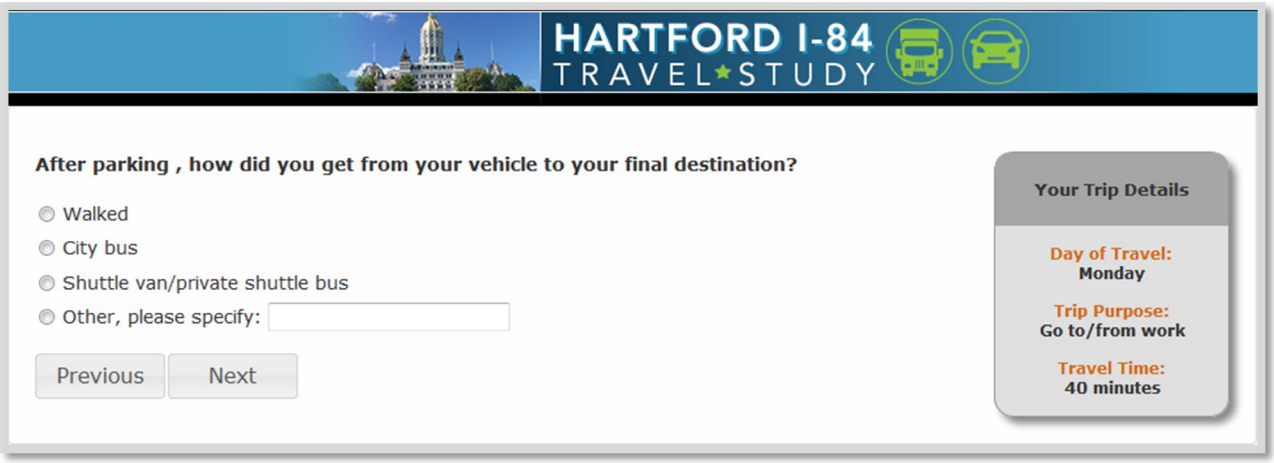
If work commute trip

Figure 1-19: Parking Cost



If work commute trip and paid for parking

Figure 1-20: Destination Access Mode after Parking



If work commute trip

Figure 1-21: Vehicle Occupancy

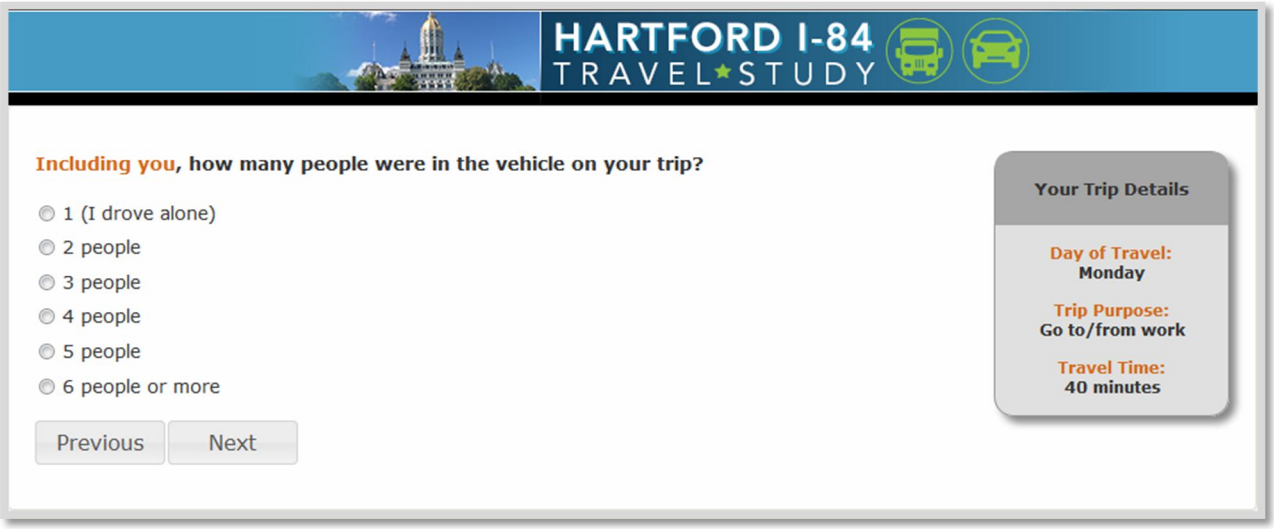


Figure 1-22: Trip Frequency

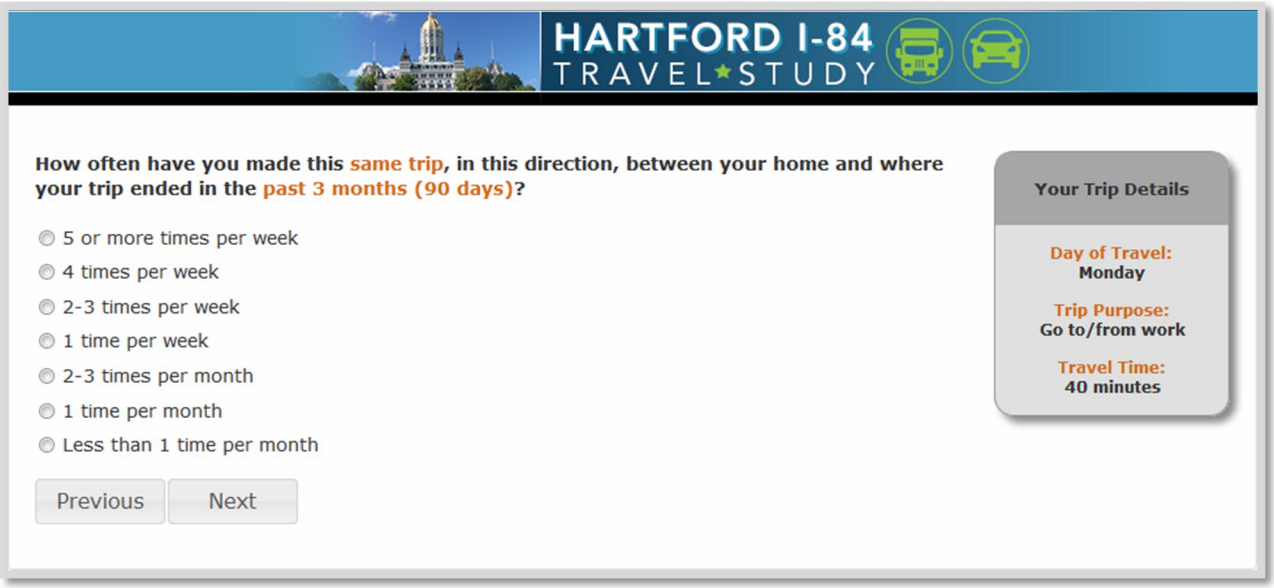


Figure 1-23: Use of Alternate Routes or Transit to Avoid I-84 in Downtown Hartford

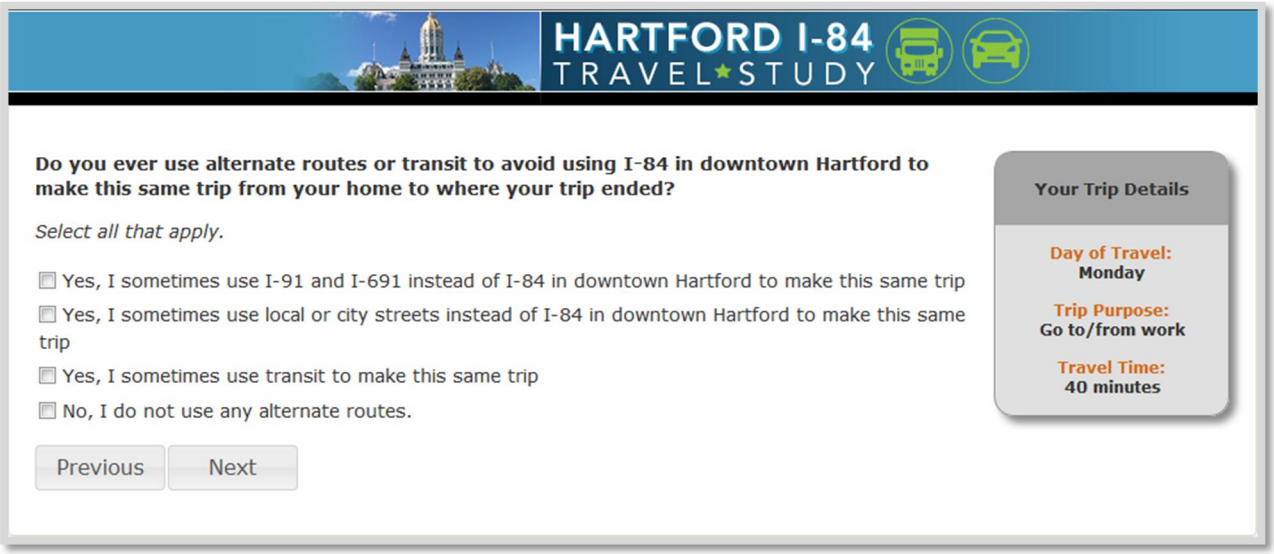


Figure 1-24: ETC Ownership

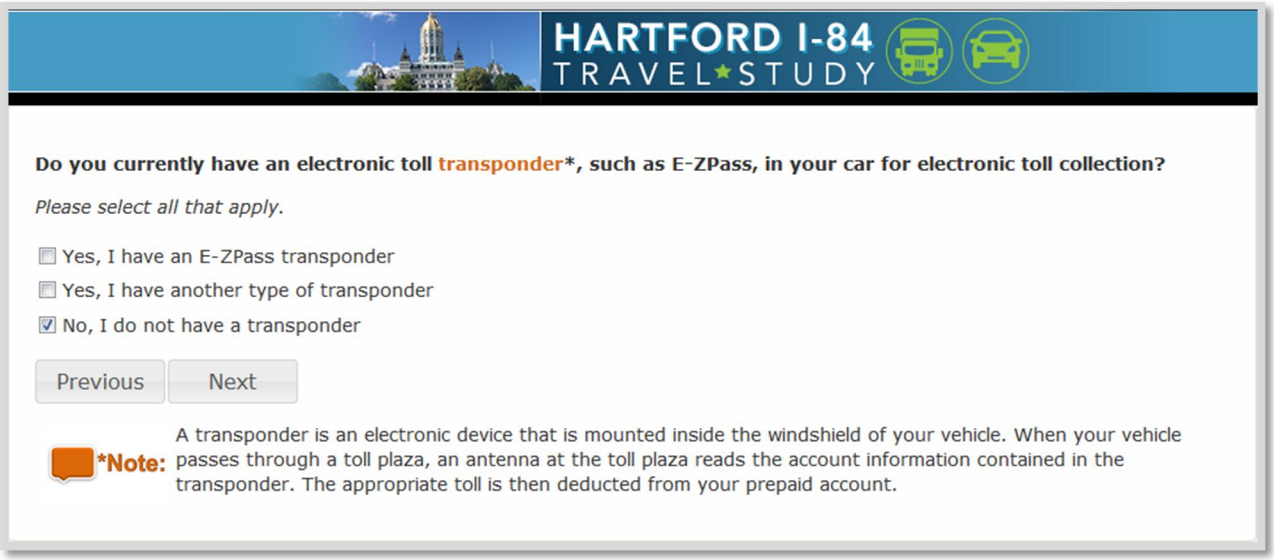


Figure 1-25: Familiarity with Public Transit Systems in the Area

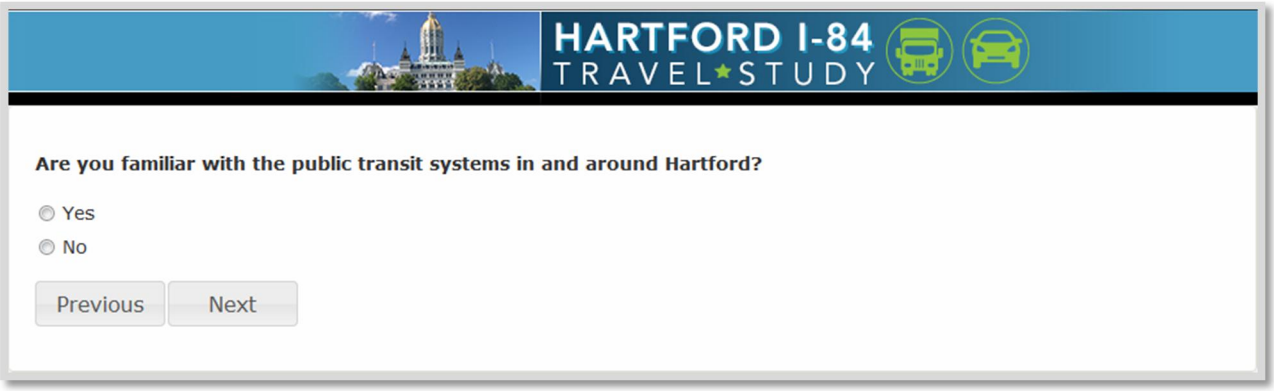
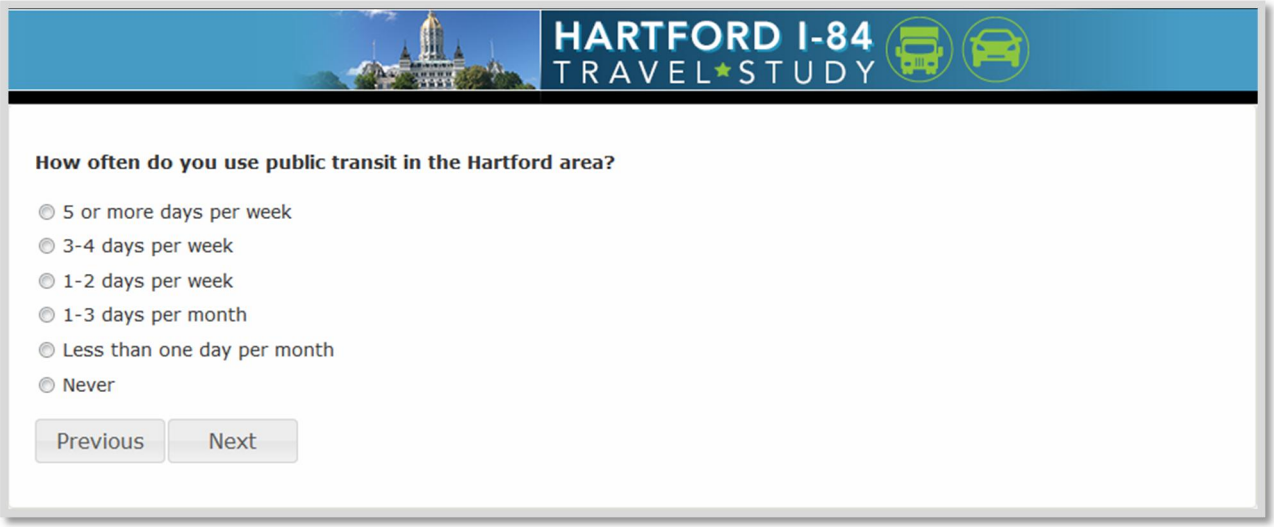


Figure 1-26: Frequency of Public Transit Use in the Hartford Area



If familiar with public transit in the region

1.3 Stated Preference Questions

Figure 1-27: Project Description

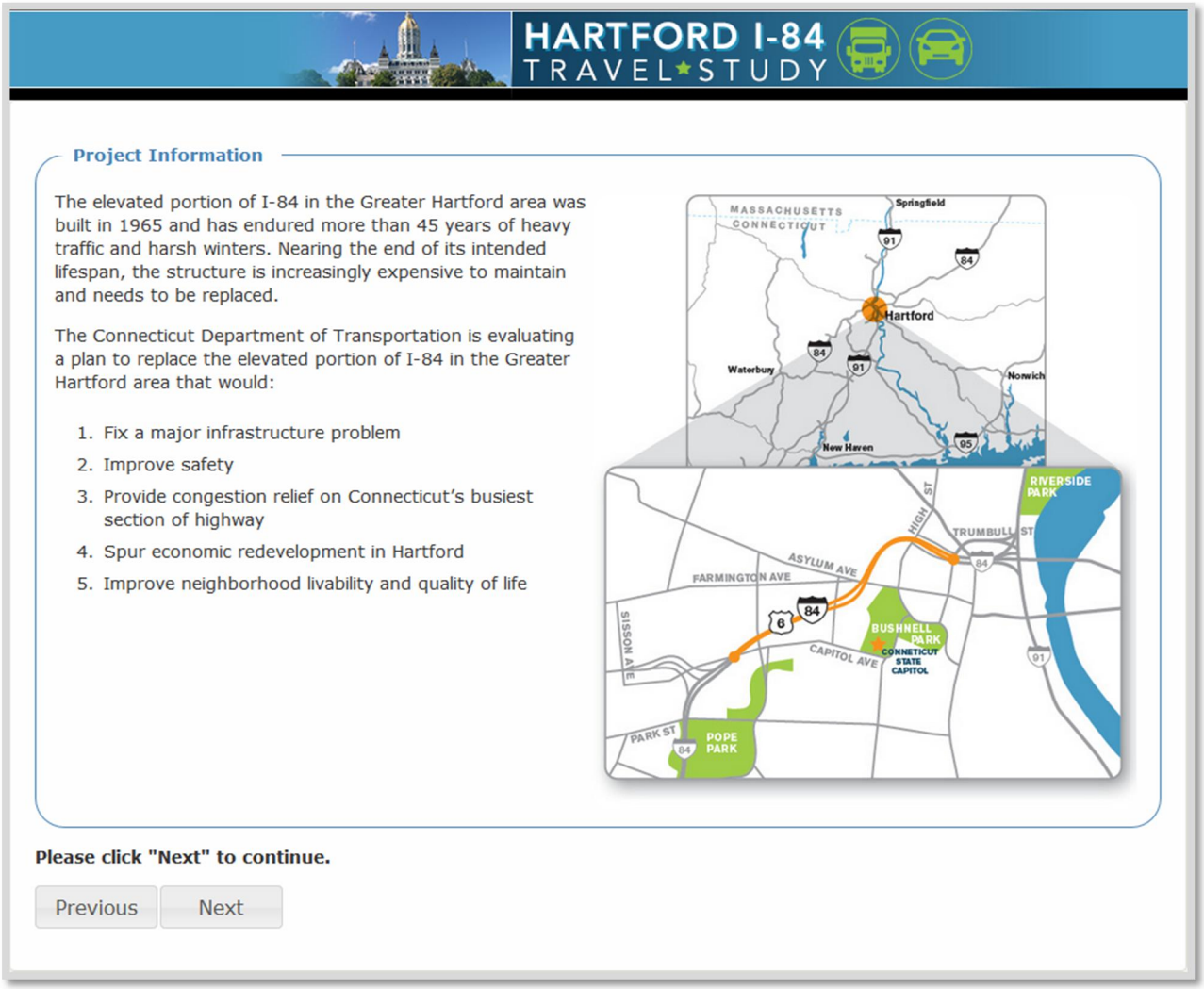


Figure 1-28: Value Pricing Description

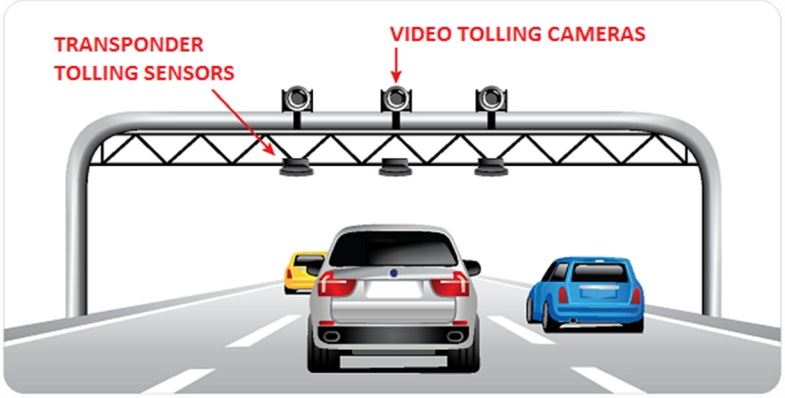
HARTFORD I-84
TRAVEL STUDY

Value Pricing

One option being evaluated is the use of **"Value Pricing"** in which variable tolls would be charged on a portion of I-84 in the Greater Hartford area to manage congestion in the corridor and to pay for reconstruction. Tolls would be higher during rush hour or other heavily congested times to manage traffic flow and congestion.

If Value Pricing were implemented, tolls on I-84 in the Greater Hartford area would be collected electronically at highway speeds. There would be no toll booths and drivers would not have to stop at a booth or gate to pay the toll. Two payment options would be available:

- **Transponder**: A transponder is mounted inside your vehicle's windshield and tolls would be deducted from a prepaid account each time you use I-84 in downtown Hartford.
- **Video tolling**: You do not need an account. Instead of having a transponder, your vehicle's license plate is read by a camera and bills are sent to the vehicle's registered owner. Video toll rates will include an additional surcharge.



Please click "Next" to continue.

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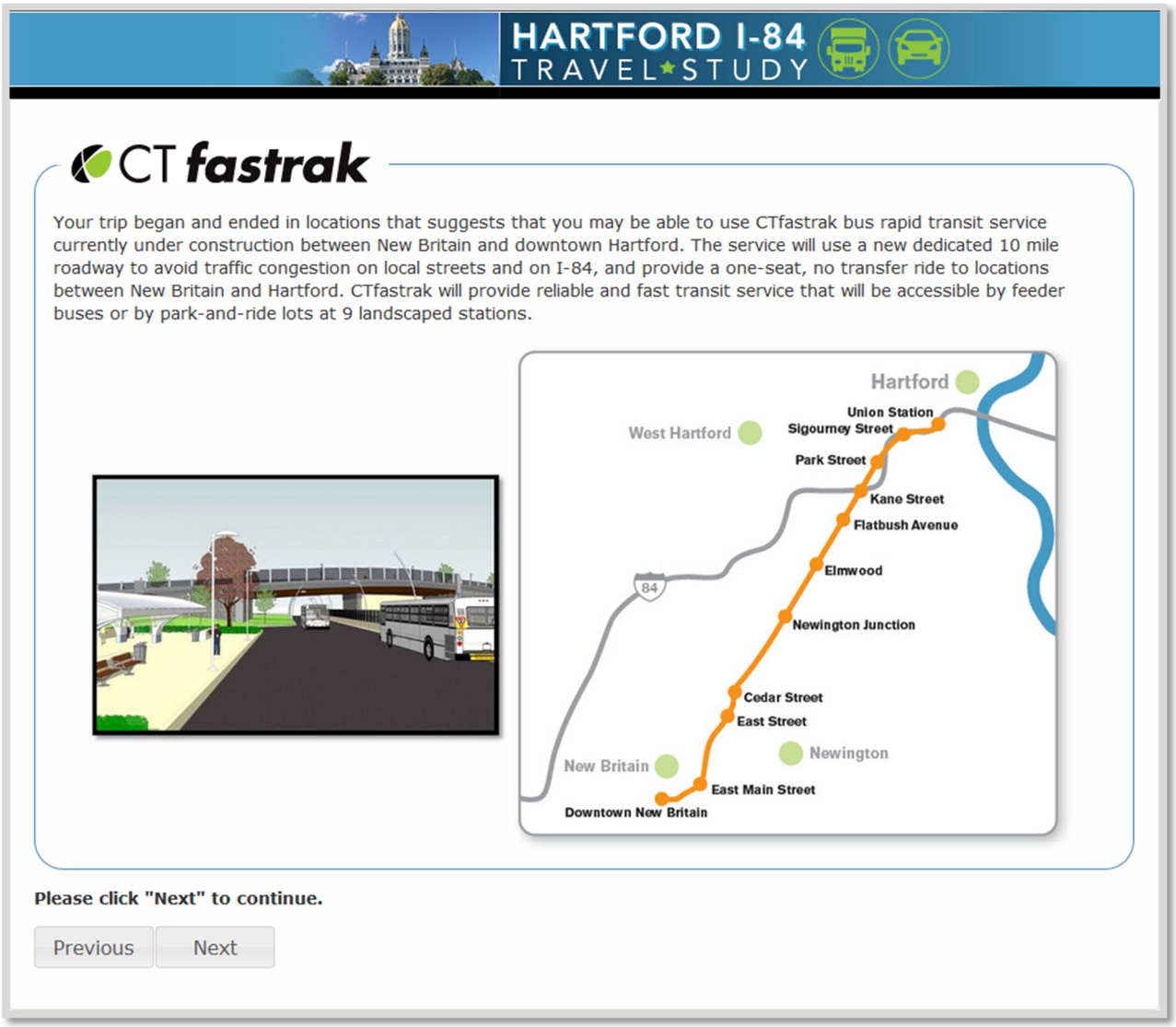
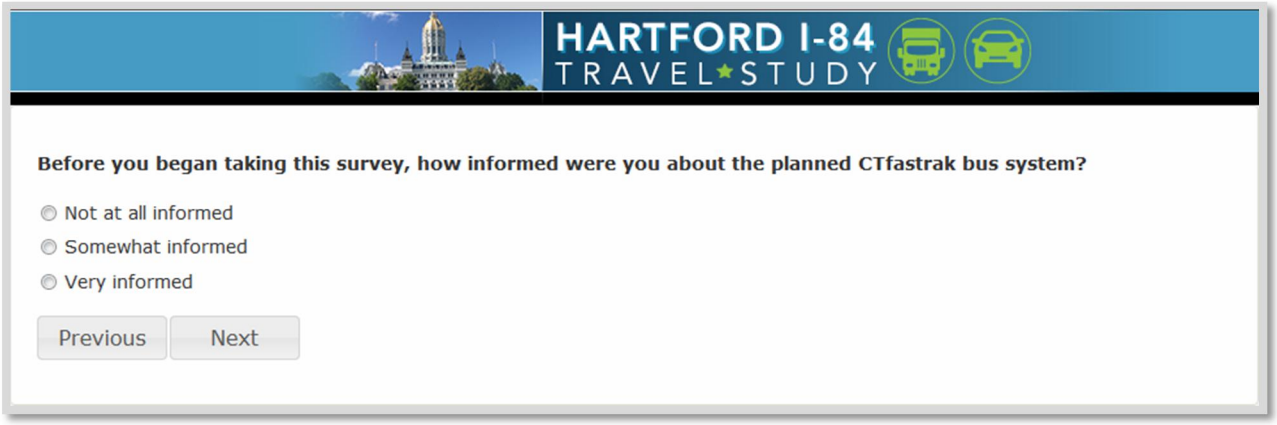
Figure 1-29: CTfastrak Description



If origin and destination indicated a trip that could reasonably use CTfastrak

Figure 1-30: Stated Preference Introduction Slide V – Knowledge of CTfastrak



If origin and destination indicated a trip that could reasonably use CTfastrak

Figure 1-31: Stated Preference Instructions

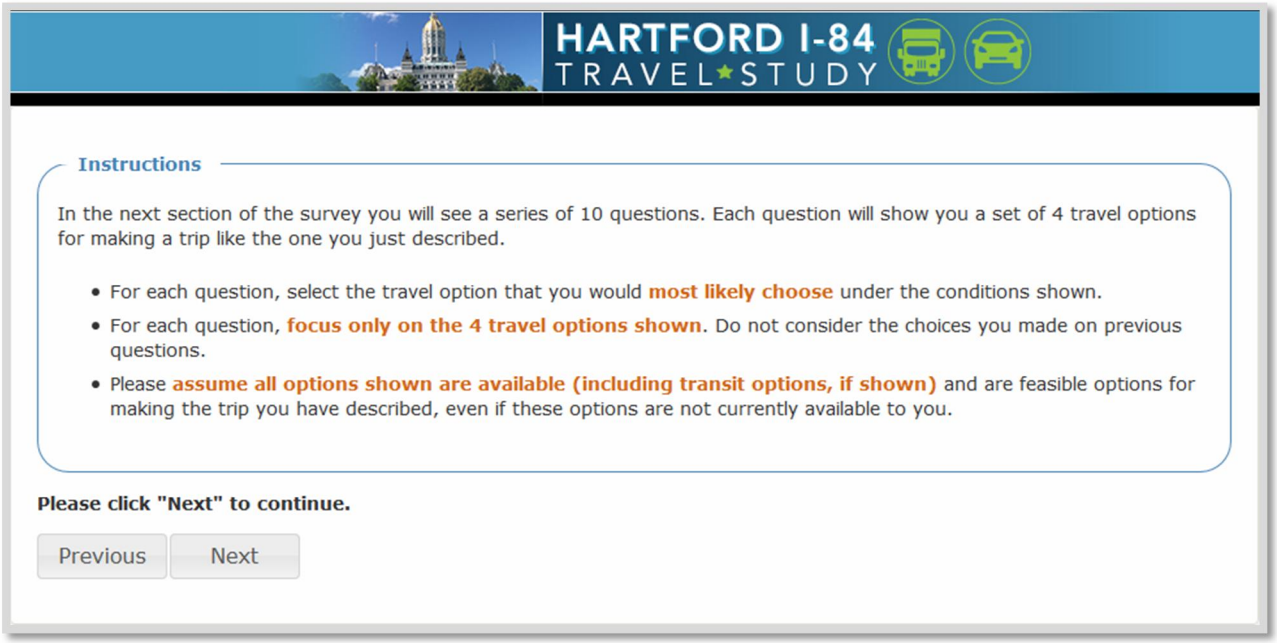
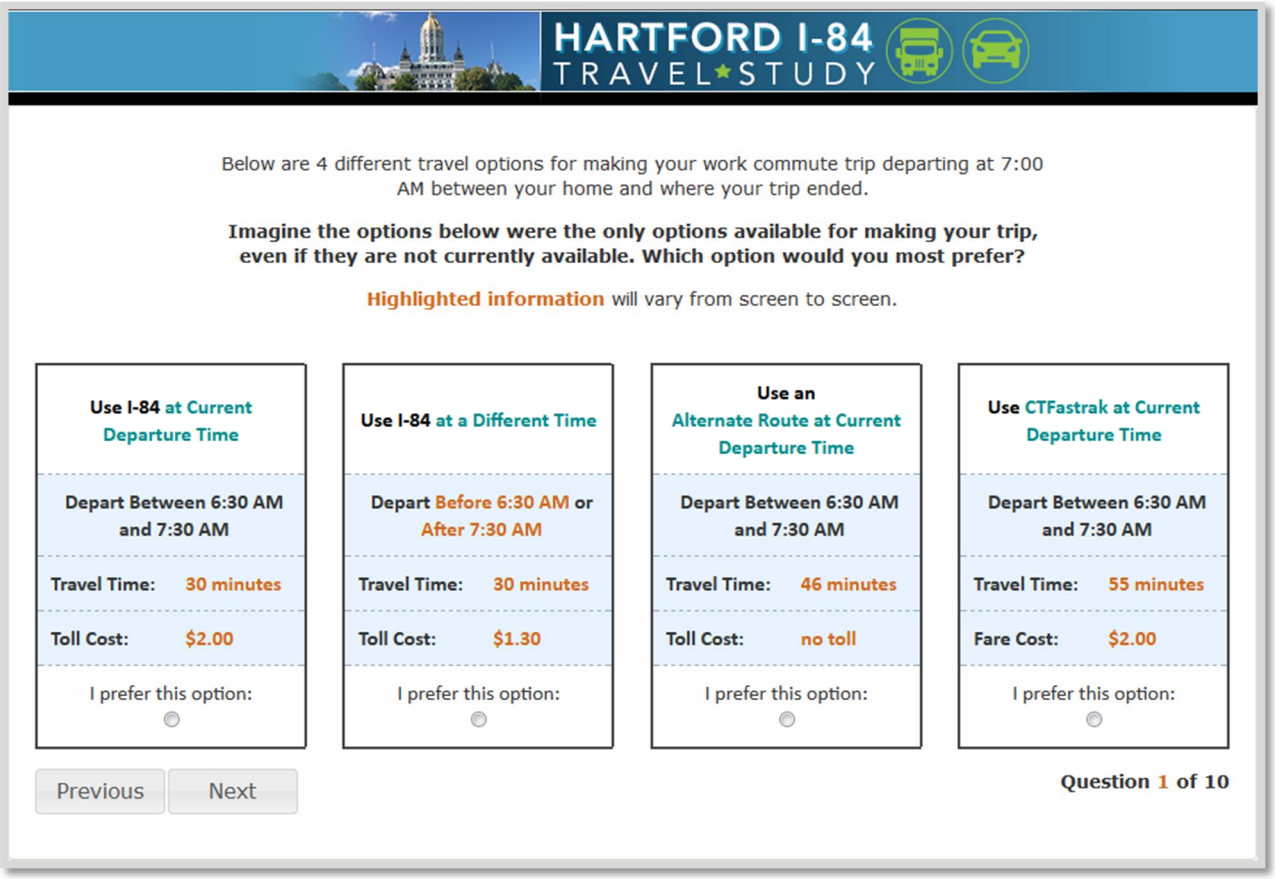


Figure 1-32: Stated Preference Experiment Example I



Stated preference experiment with four alternatives shown if respondent traveled during a peak period and reported a trip within specified distance from the CTfastrak alignment

Figure 1-33: Stated Preference Experiment Example II

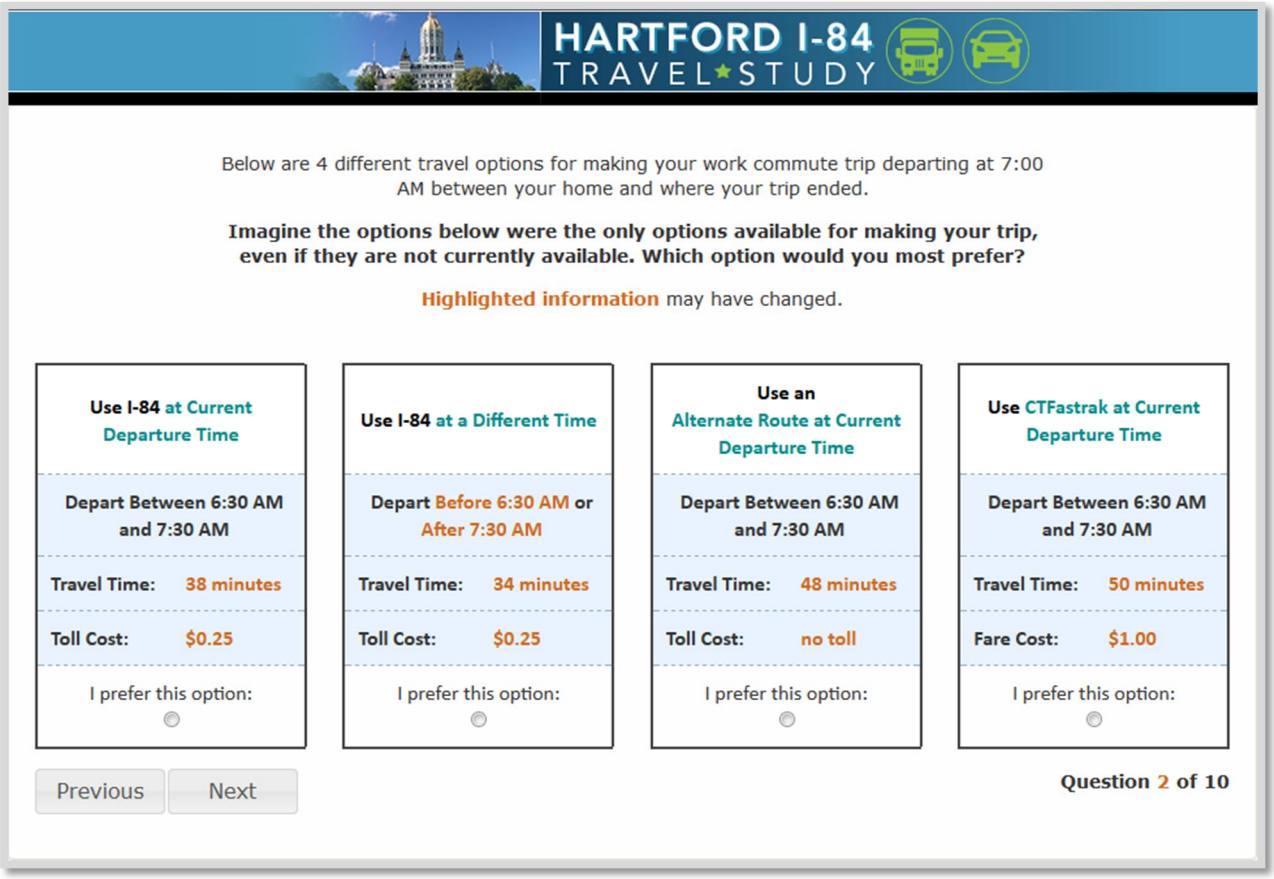


Figure 1-34: Stated Preference Experiment Example III

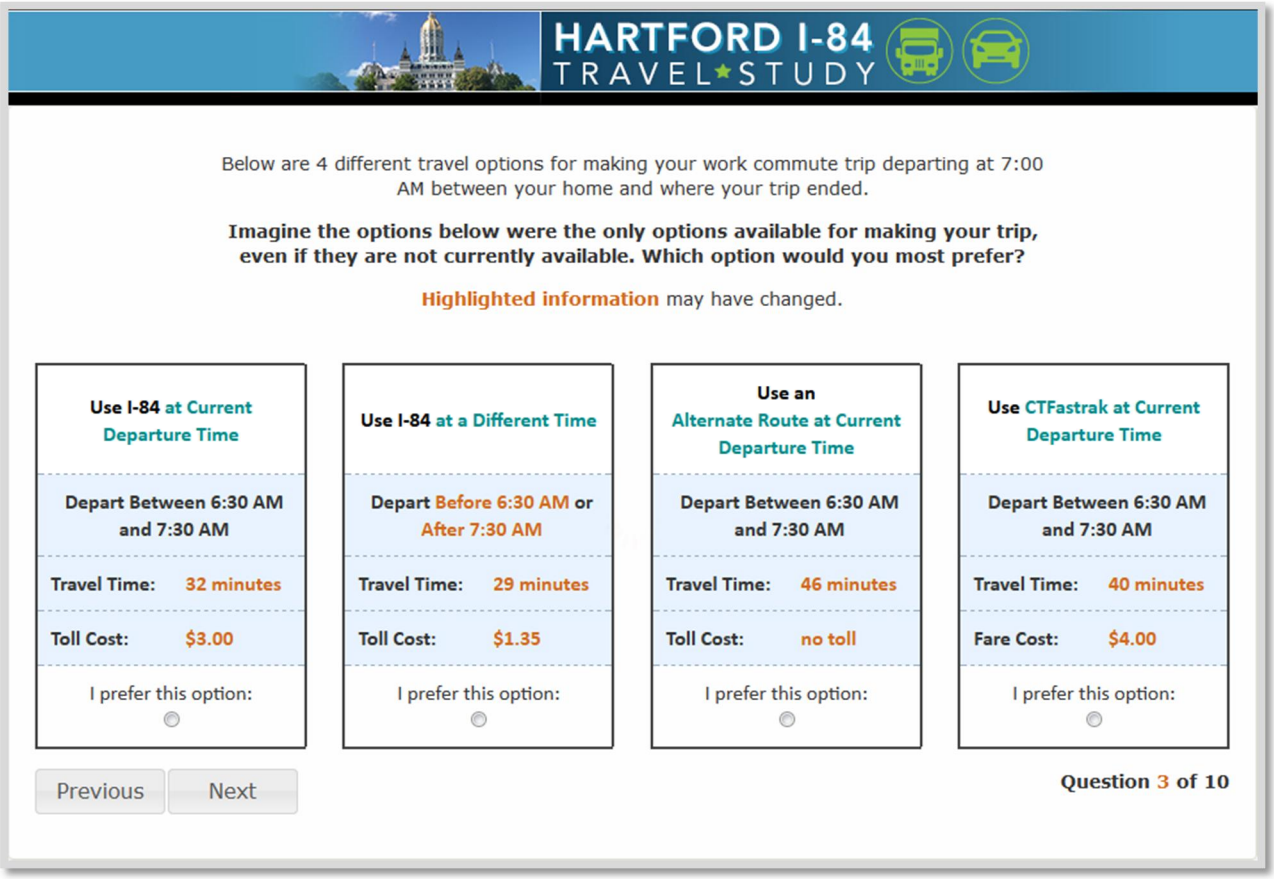


Figure 1-35: Stated Preference Experiment Example IV

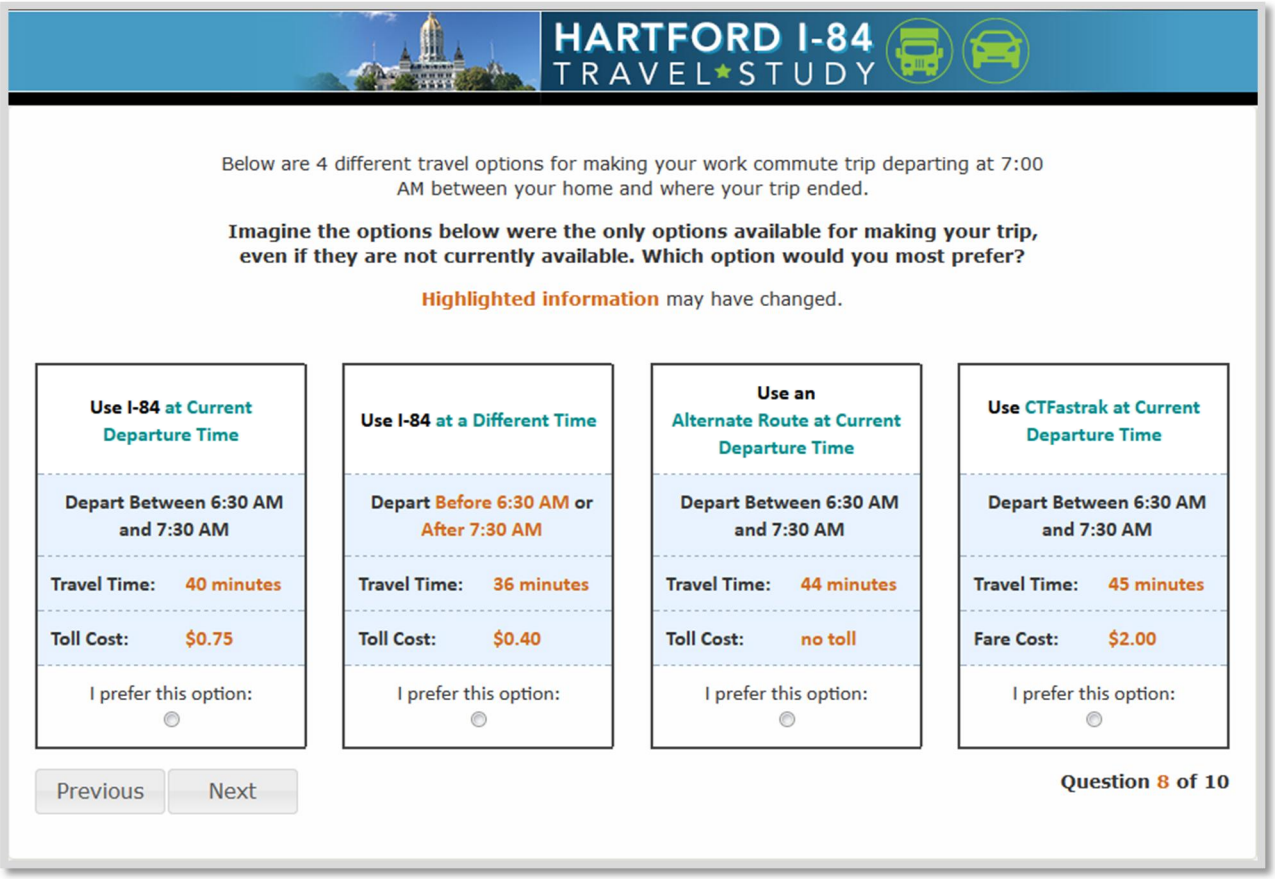
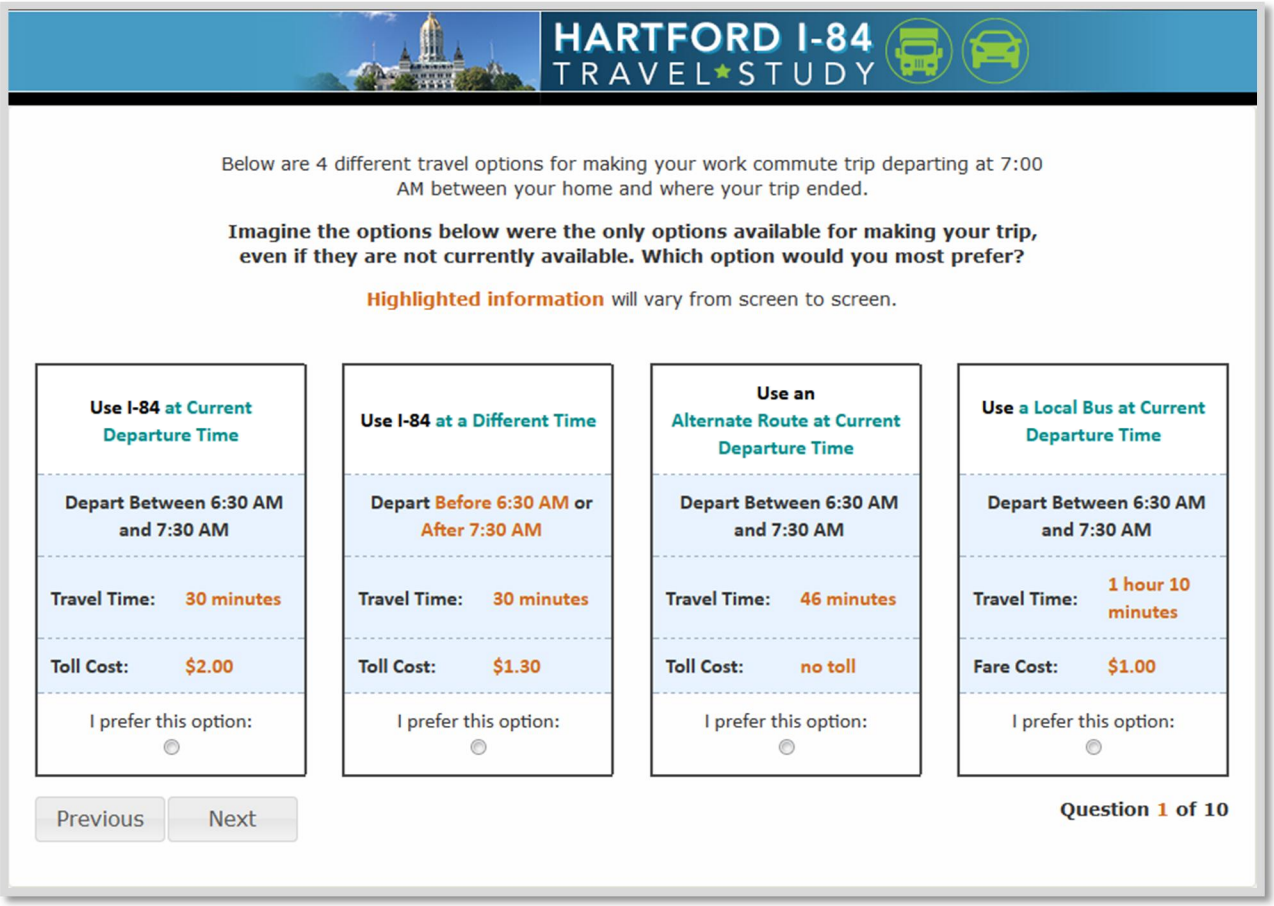
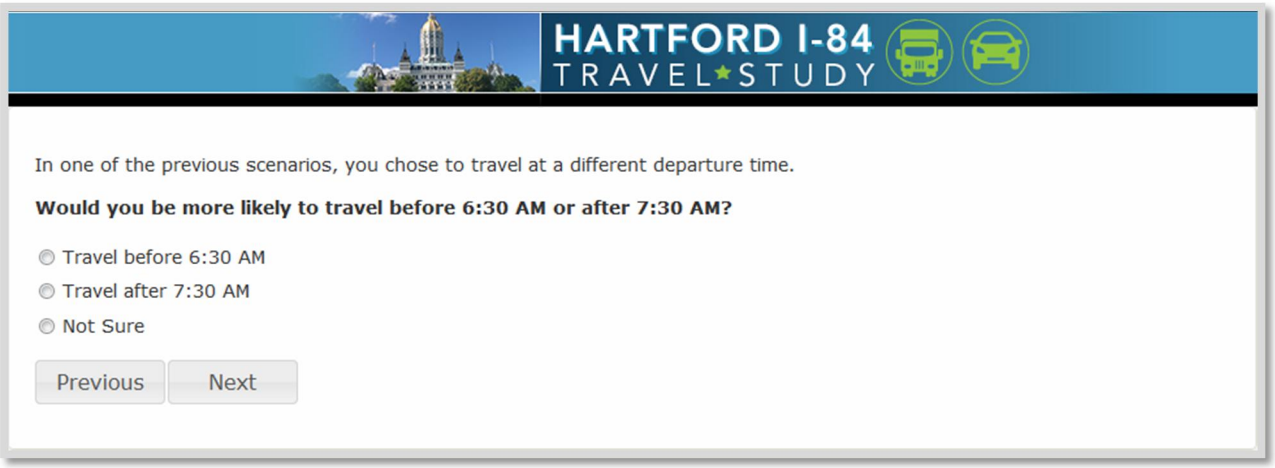


Figure 1-36: Stated Preference Experiment Example V



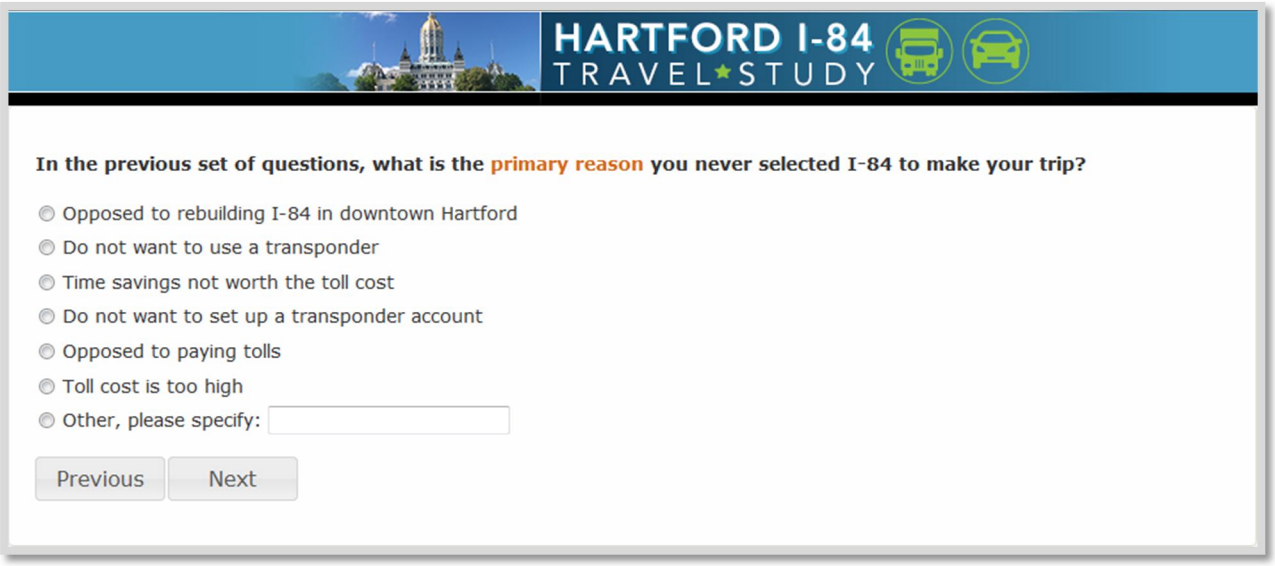
1.4 Debrief and Opinion Questions

Figure 1-37: Preferred Departure Shift Direction



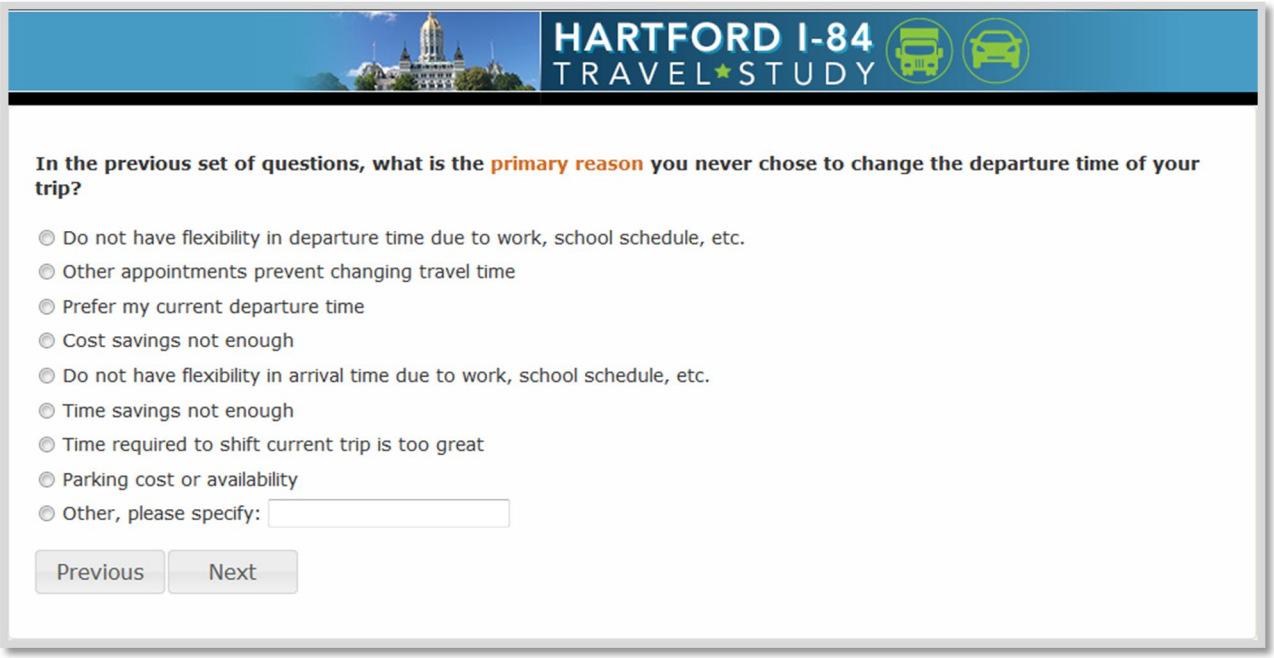
If chose at least one departure time shift alternative in the stated preference experiments

Figure 1-38: Primary Reason for Never Choosing I-84



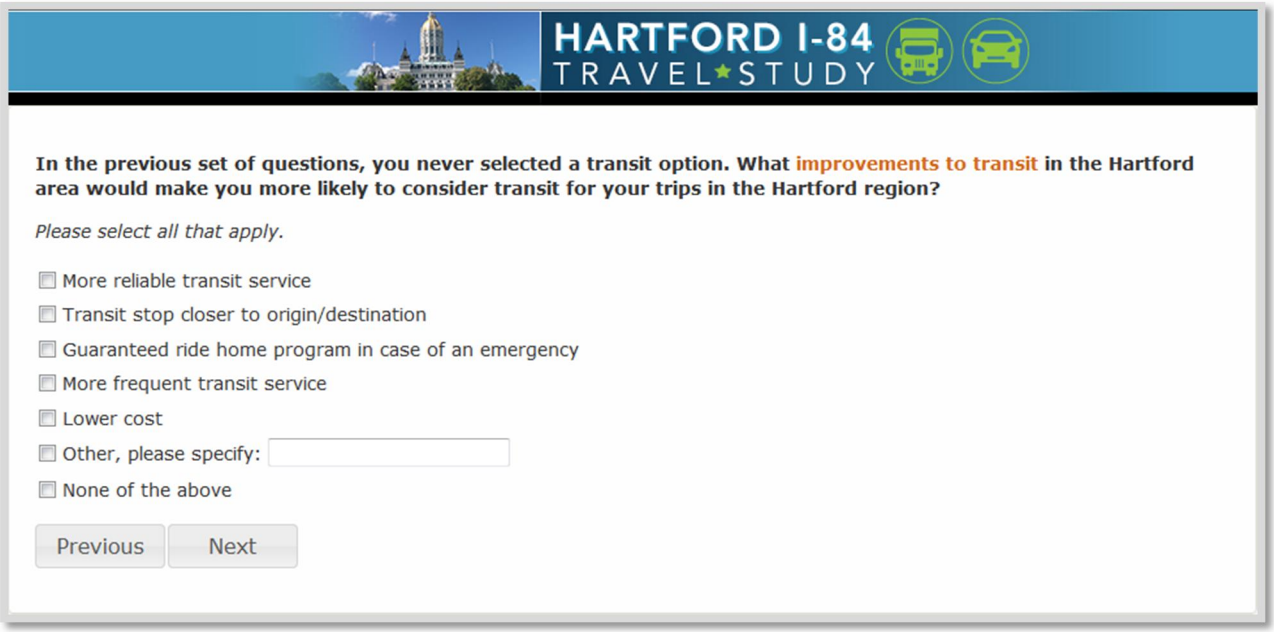
If never chose an I-84 alternative in the stated preference experiments

Figure 1-39: Primary Reason for Never Choosing I-84 Outside of Peak Times



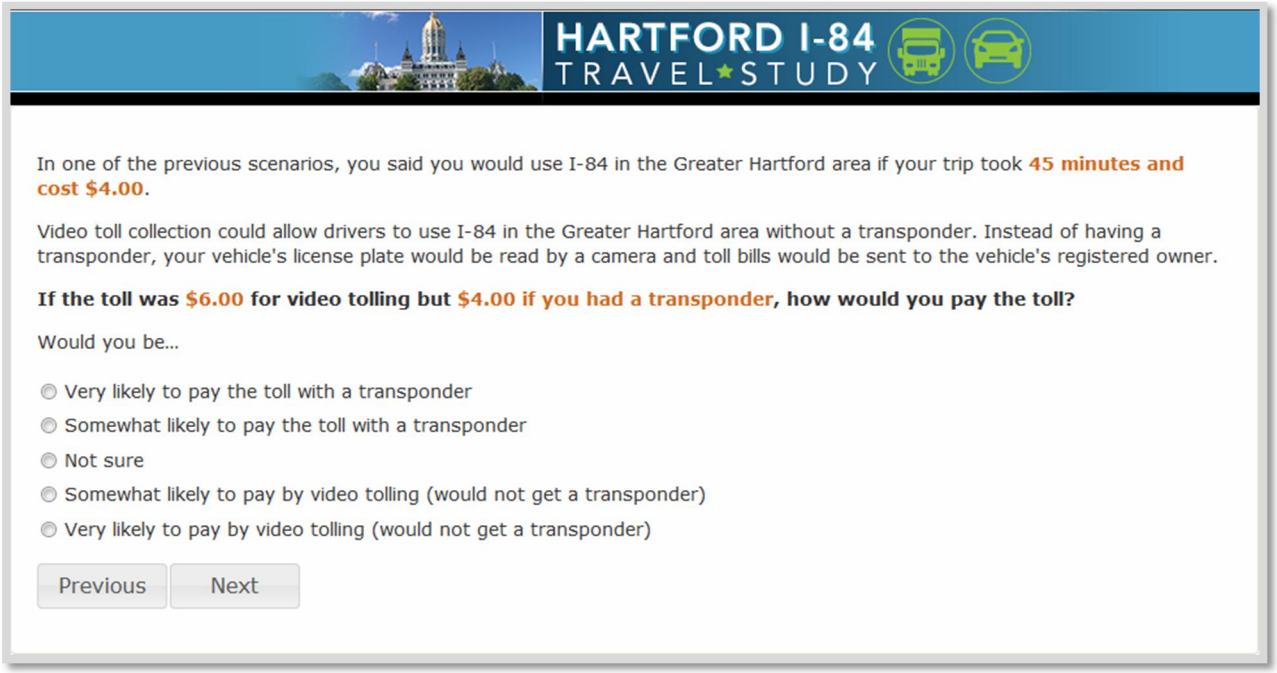
If never chose the departure time shift alternatives in the stated preference experiments

Figure 1-40: Improvements to Increase Likelihood of Using Transit



If never chose the transit alternative in the stated preference experiments

Figure 1-41: ETC Acquisition



If chose at least one I-84 option in the stated preference experiments and does not currently own an ETC transponder

Figure 1-42: Opinion of Value Pricing on I-84

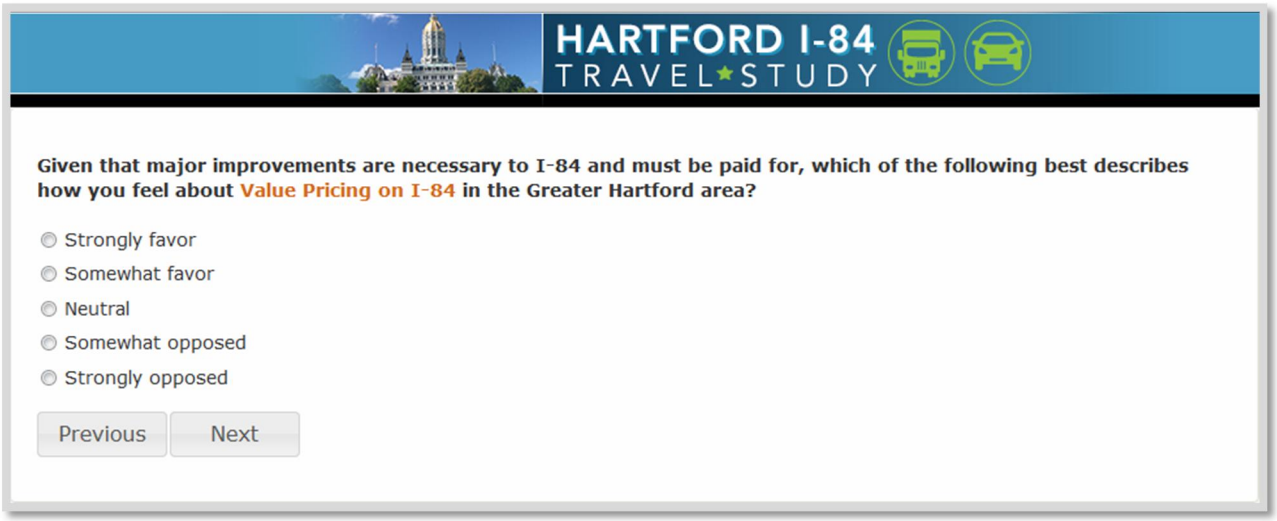
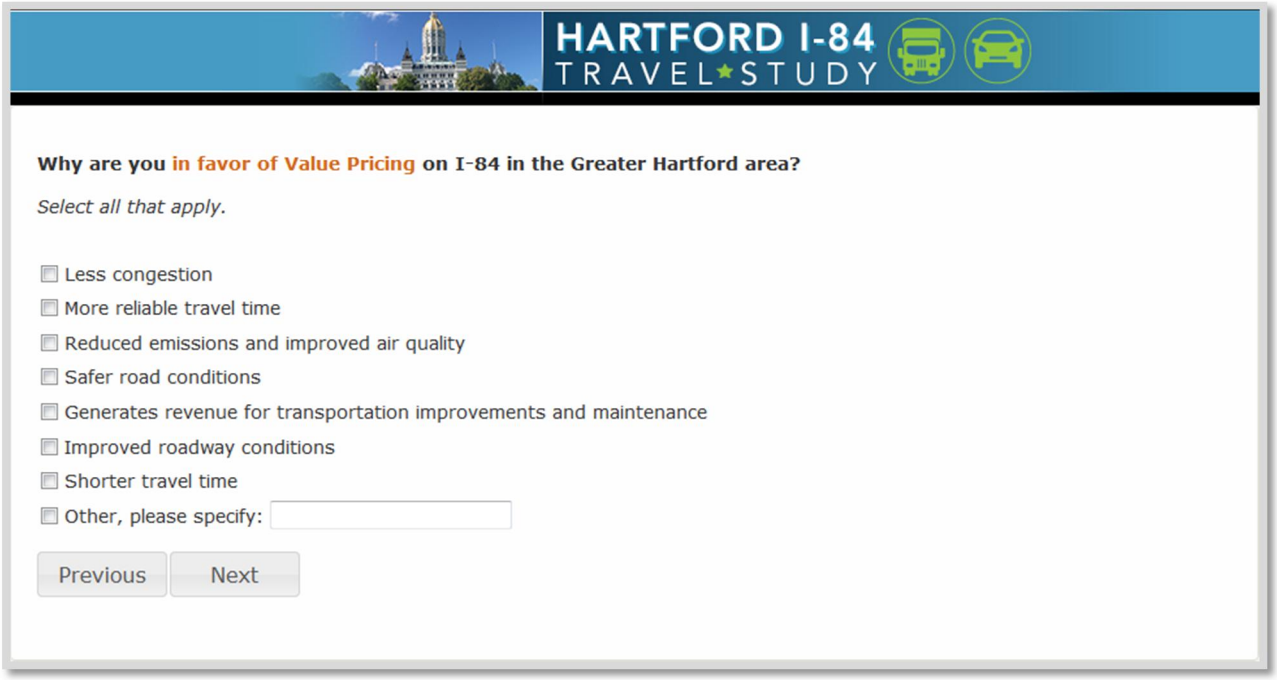
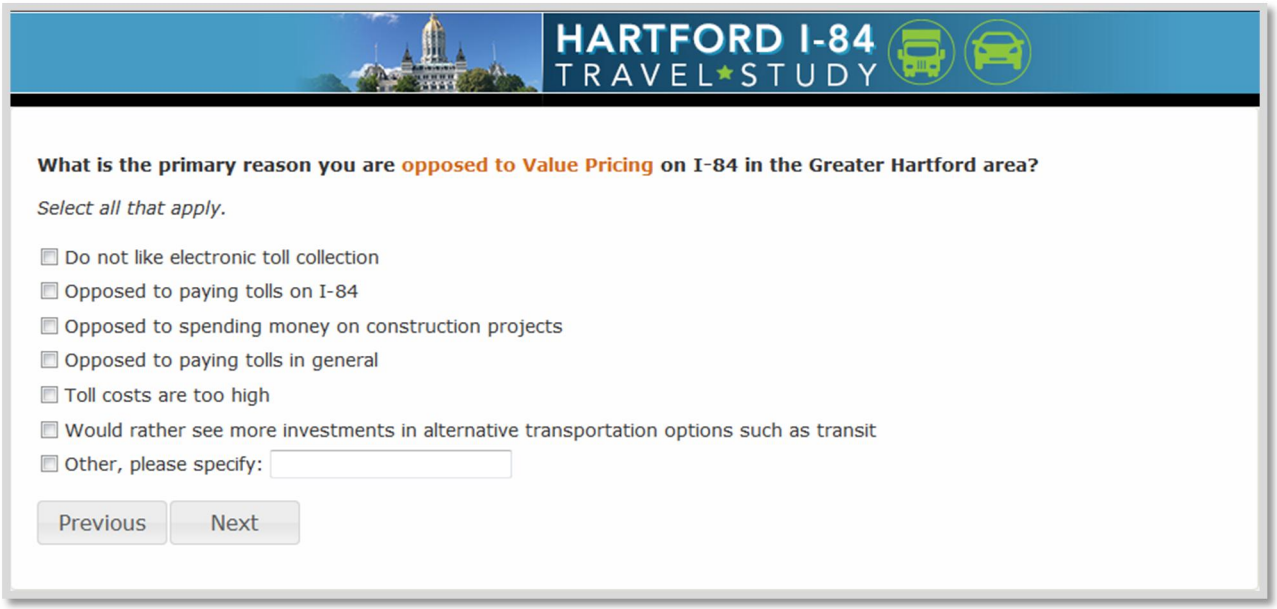


Figure 1-43: Reason for Favoring Value Pricing on I-84



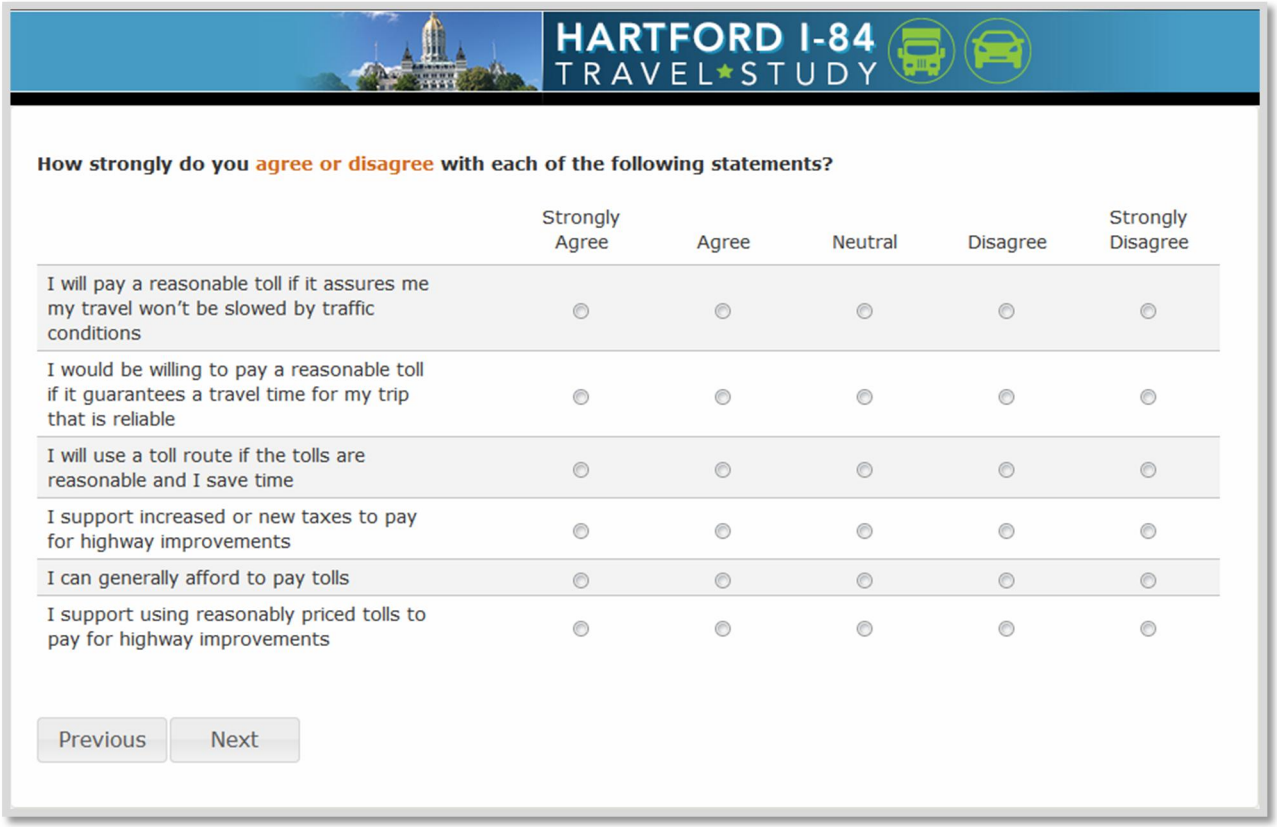
If strongly or somewhat favors value pricing on I-84

Figure 1-44: Reason for Opposing Value Pricing on I-84



If strongly or somewhat opposed to value pricing on I-84

Figure 1-45: Toll Attitudes



HARTFORD I-84
TRAVEL STUDY

How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I will pay a reasonable toll if it assures me my travel won't be slowed by traffic conditions					
I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable					
I will use a toll route if the tolls are reasonable and I save time					
I support increased or new taxes to pay for highway improvements					
I can generally afford to pay tolls					
I support using reasonably priced tolls to pay for highway improvements					

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1.5 Demographic Questions

Figure 1-46: Zip Code

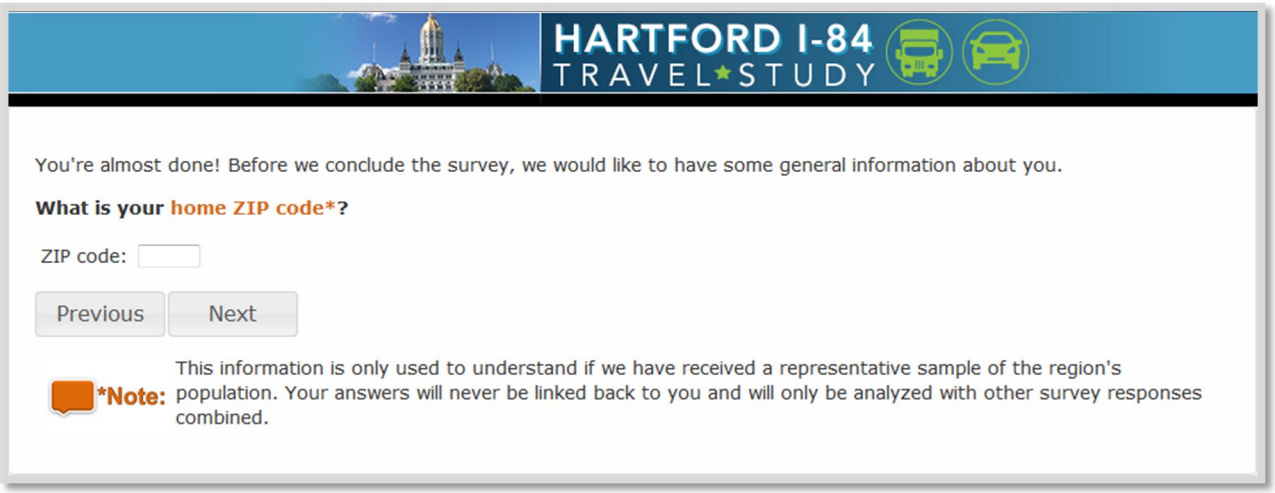


Figure 1-47: Gender

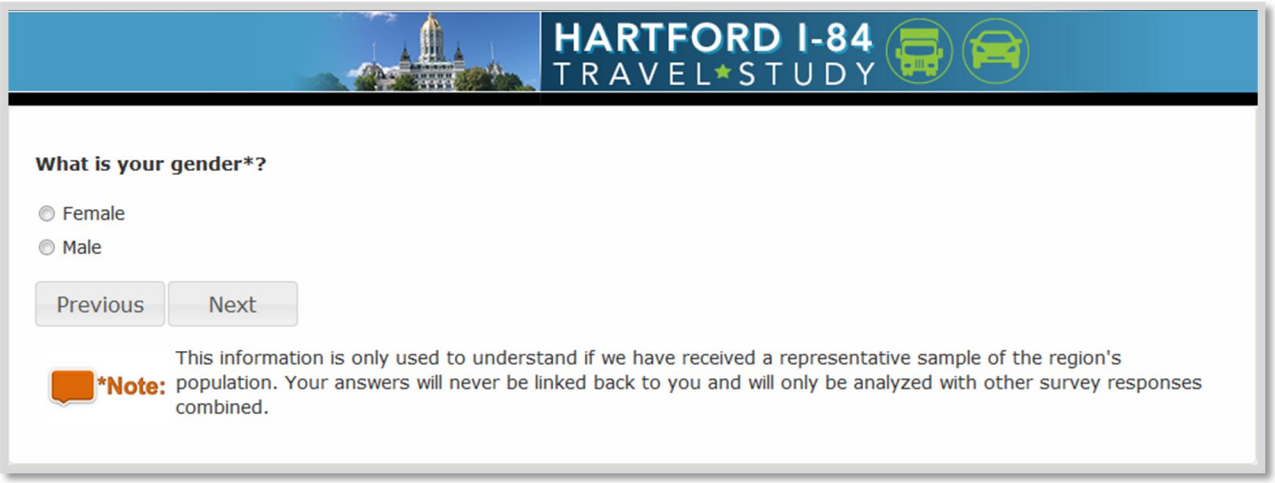


Figure 1-48: Age

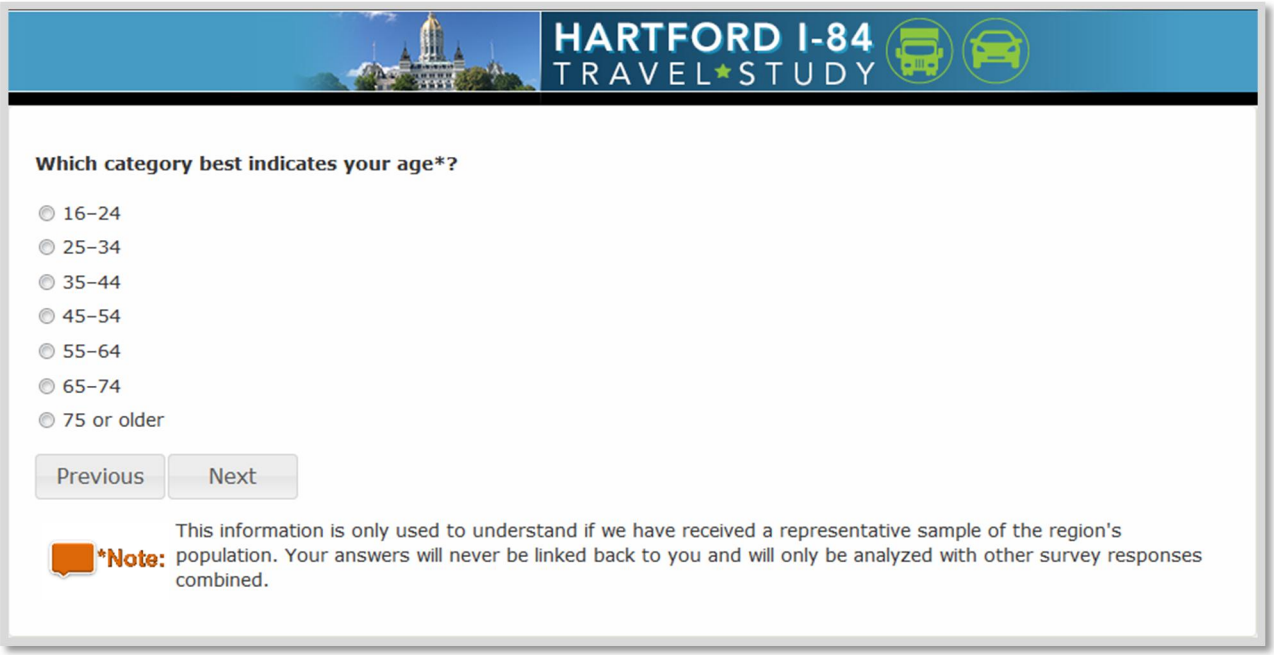


Figure 1-49: Employment Status

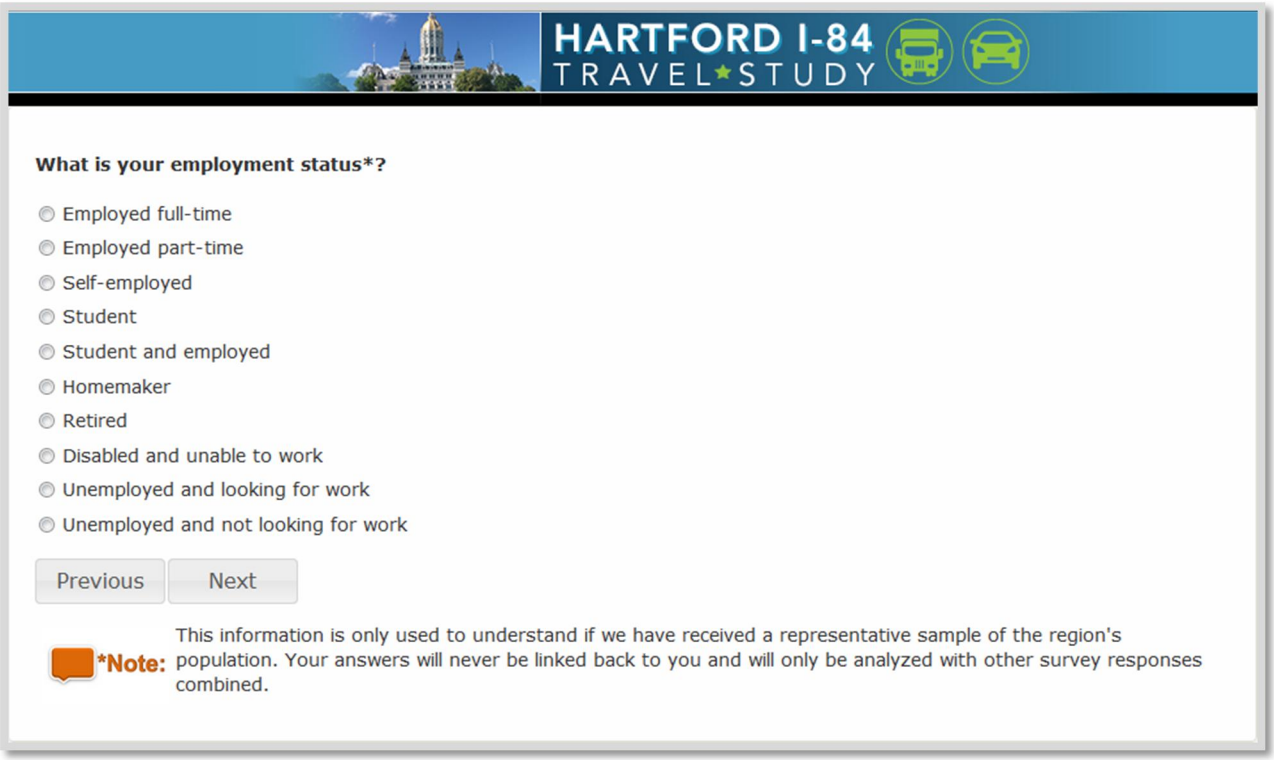


Figure 1-50: Household Size

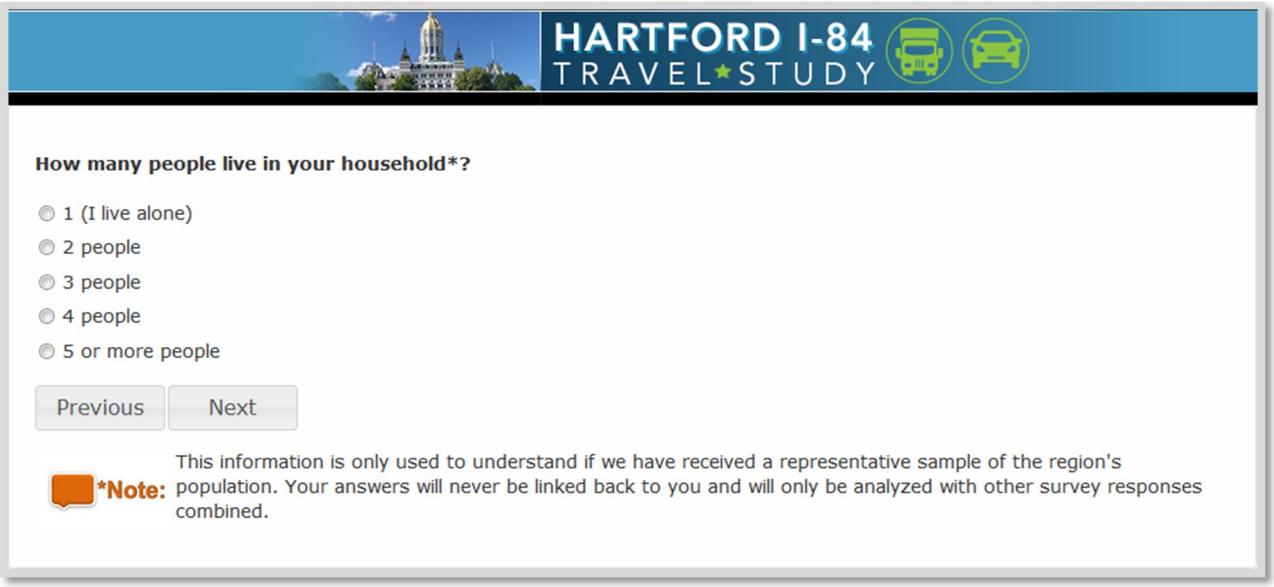


Figure 1-51: Vehicle Ownership

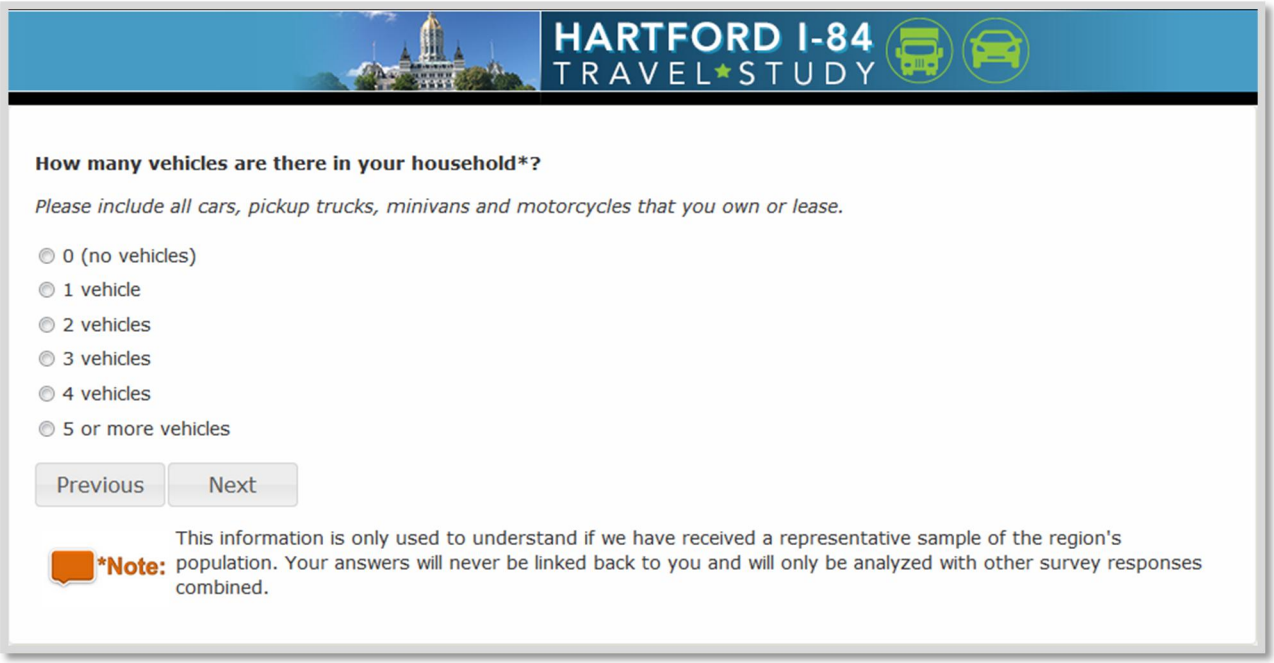


Figure 1-52: Annual Household Income

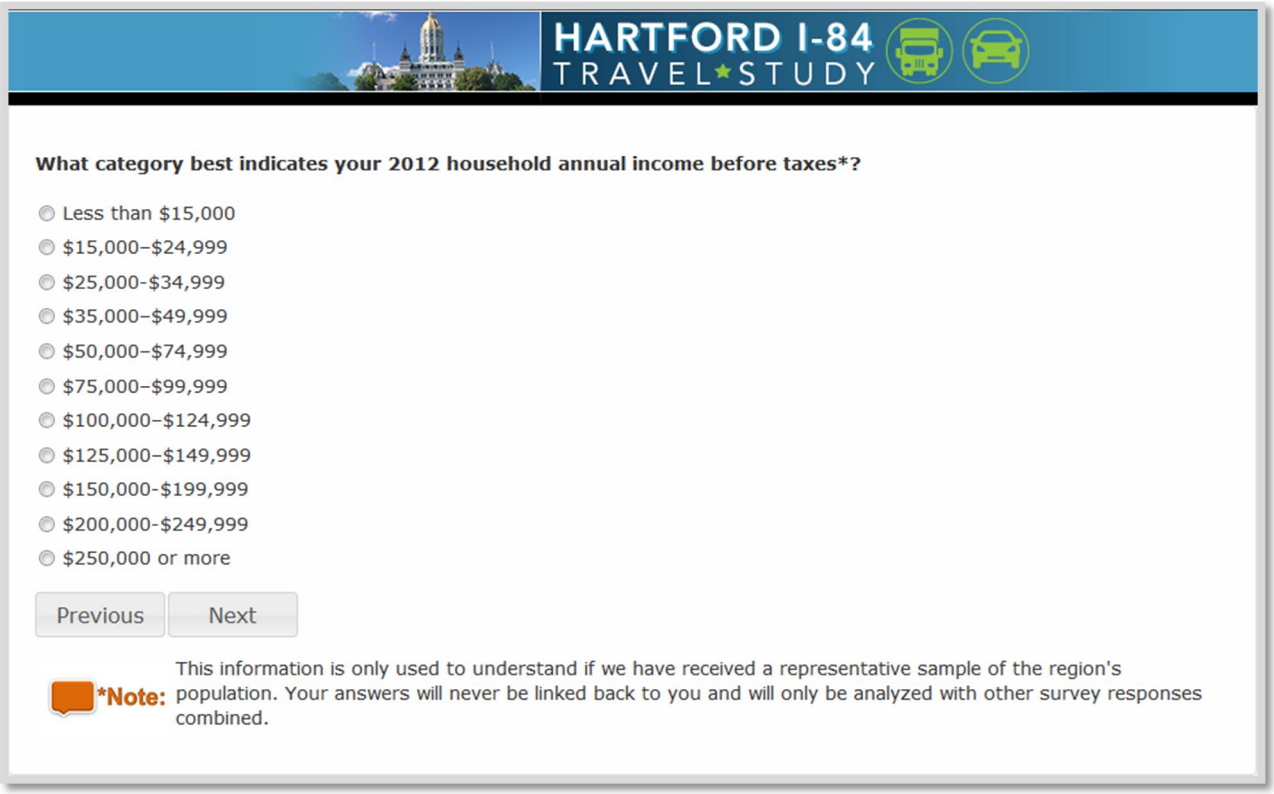


Figure 1-53: Ethnicity

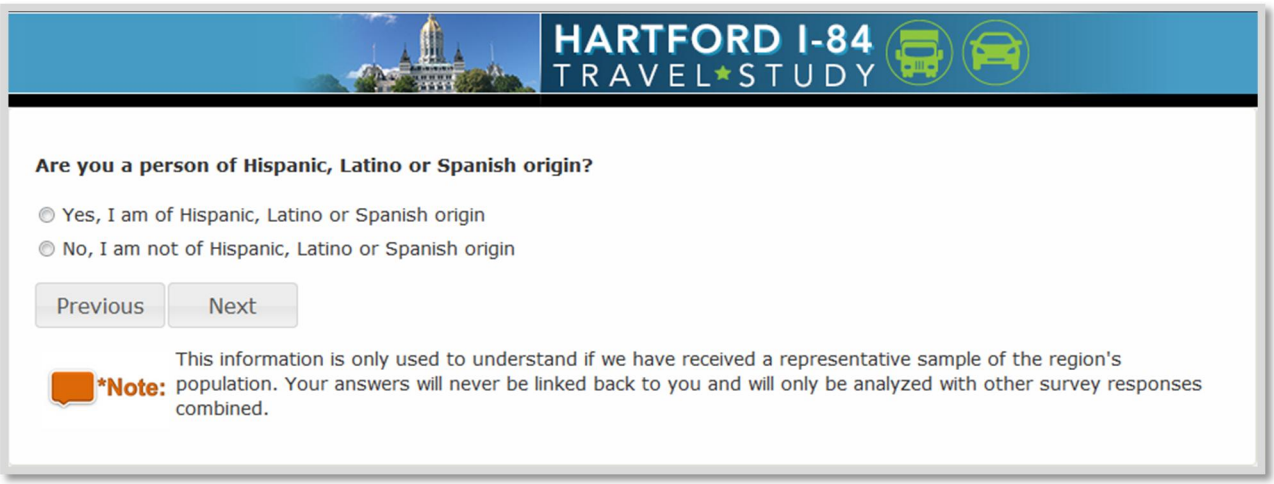


Figure 1-54: Race

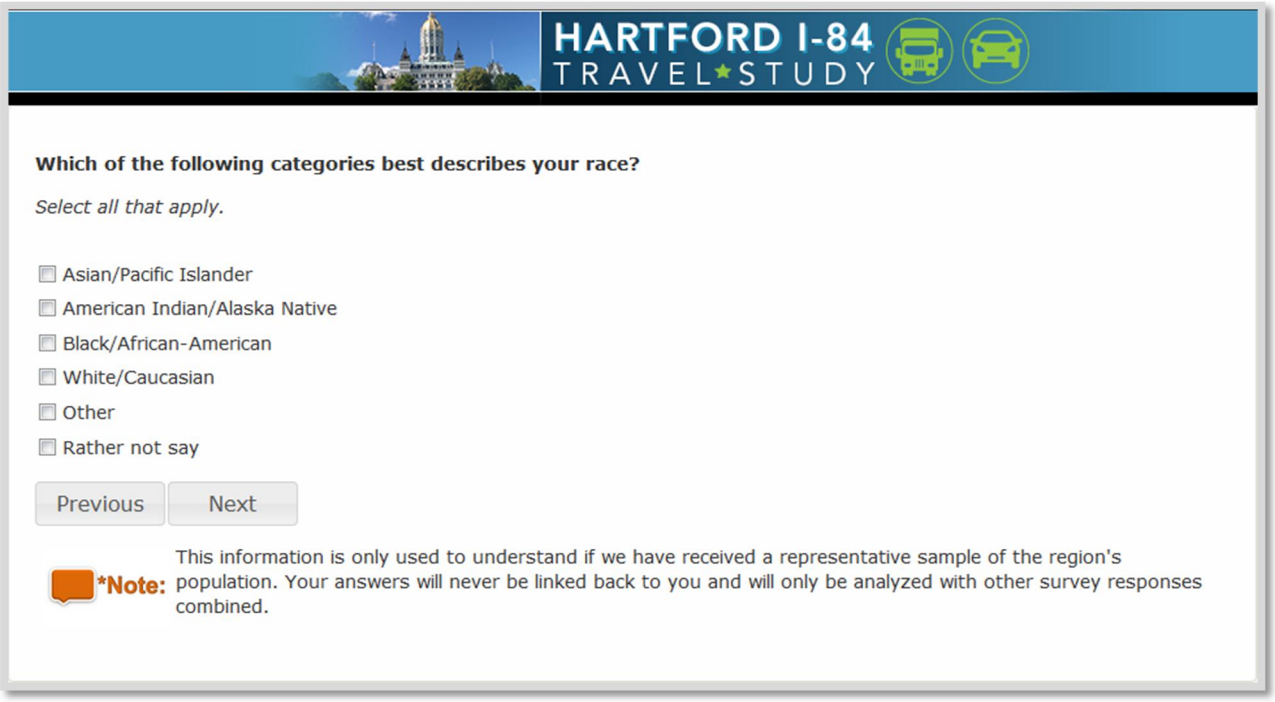


Figure 1-55: Future Studies

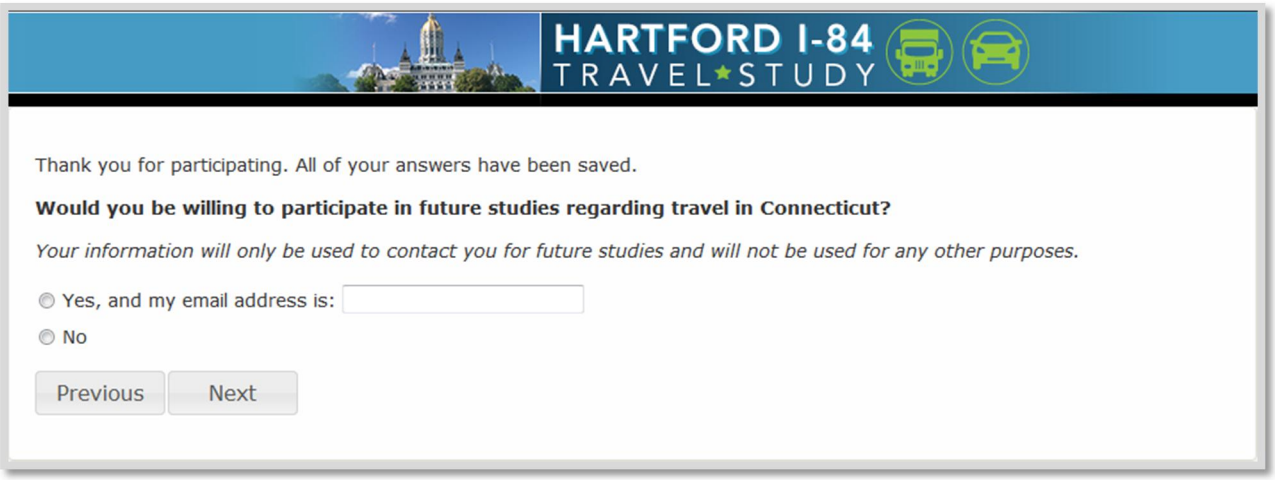
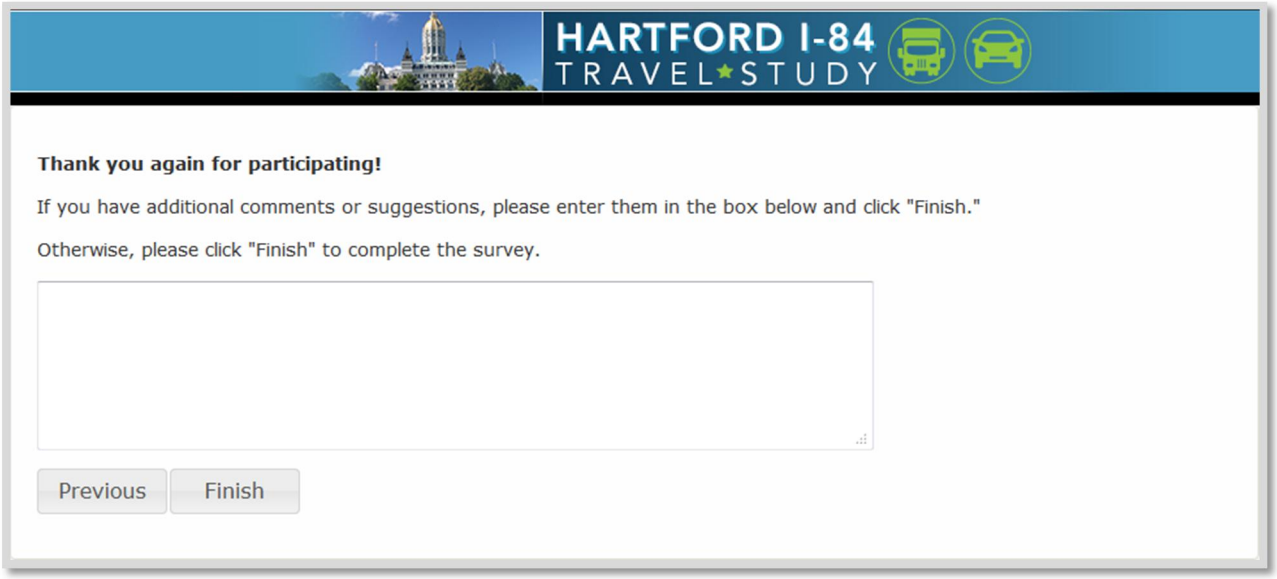


Figure 1-56: Survey Comments



2.0 COMMERCIAL VEHICLE SURVEY QUESTIONNAIRE

2.1 Introduction and Qualification Questions

Figure 2-1: Survey Instructions

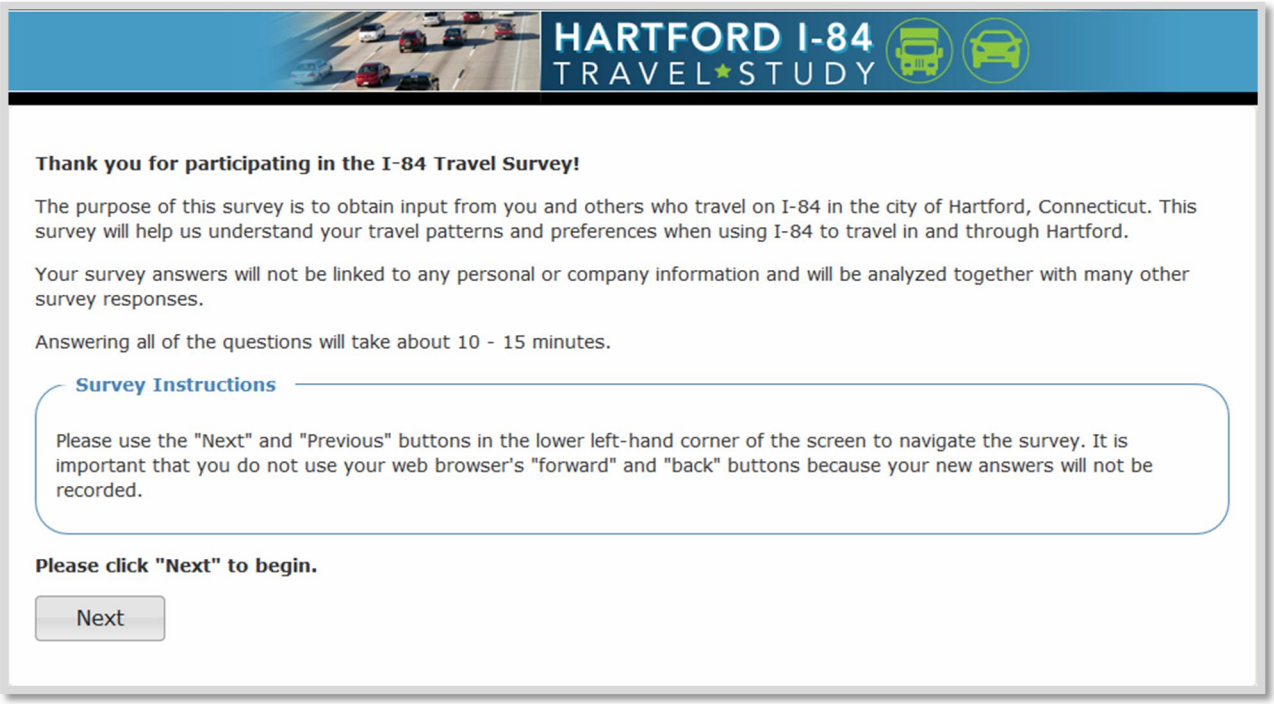


Figure 2-2: Primary Type of Work

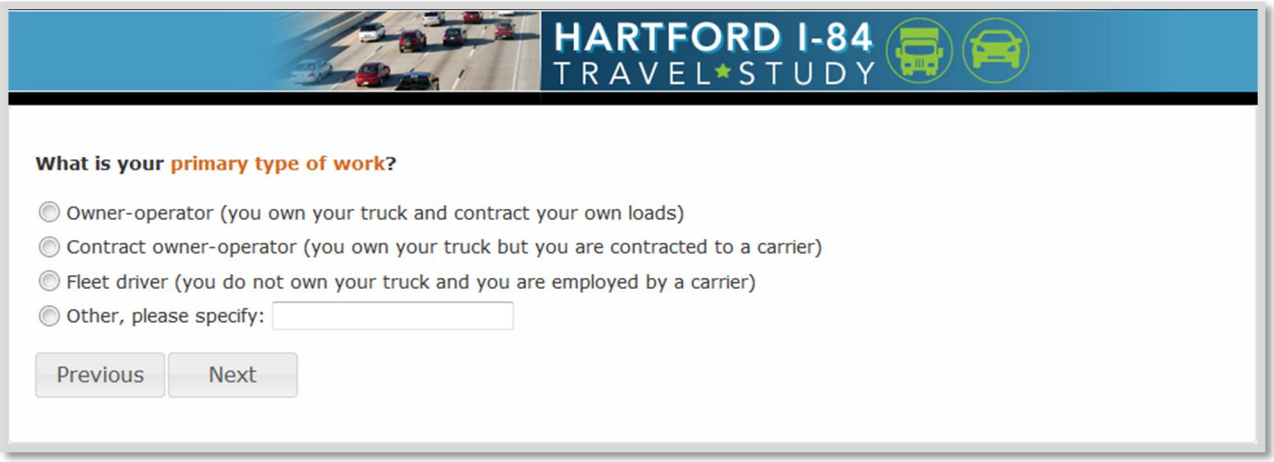


Figure 2-3: Responsibility for Routing Decisions

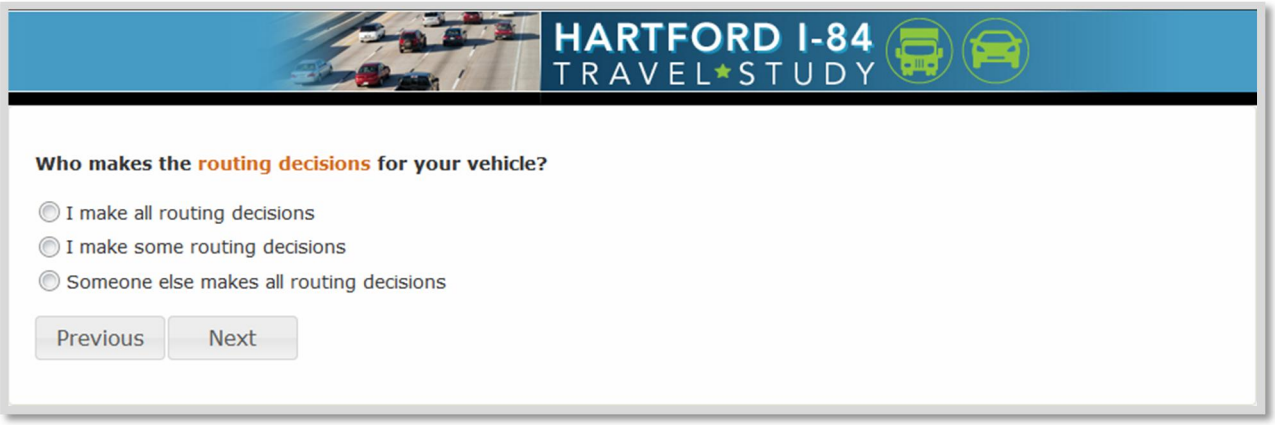
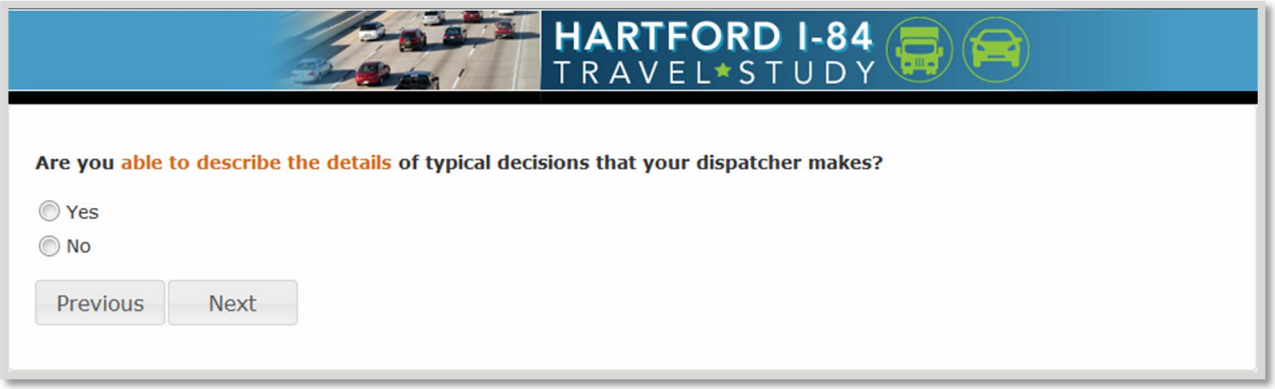


Figure 2-4: Ability to Describe Routing Decisions



If someone else makes routing decisions

Figure 2-5: Termination

If not able to describe the routing decisions

Figure 2-6: Trip Qualification

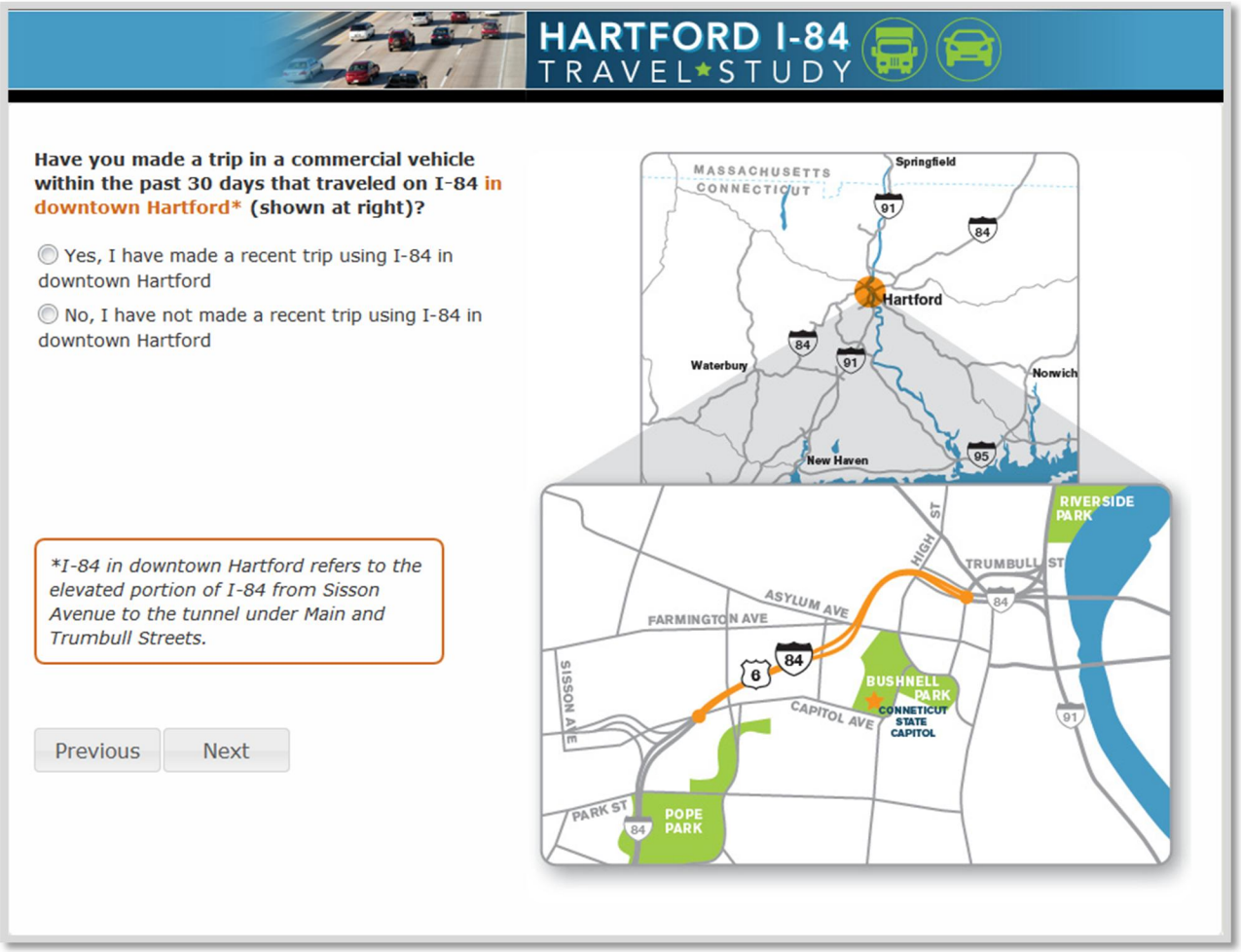
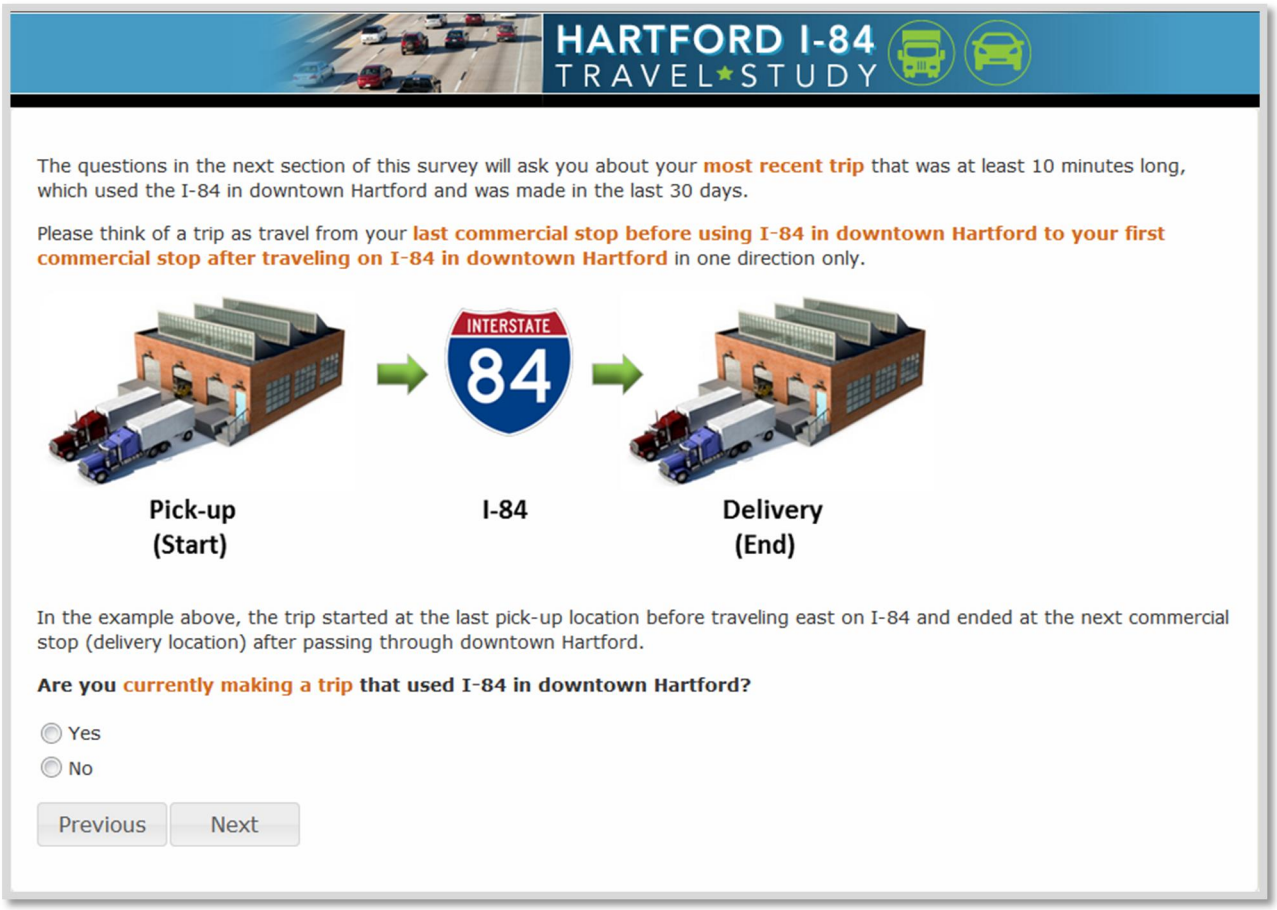


Figure 2-7: Trip Definition



2.1 Trip Characteristic Questions

Figure 2-8: Multi-day Trip

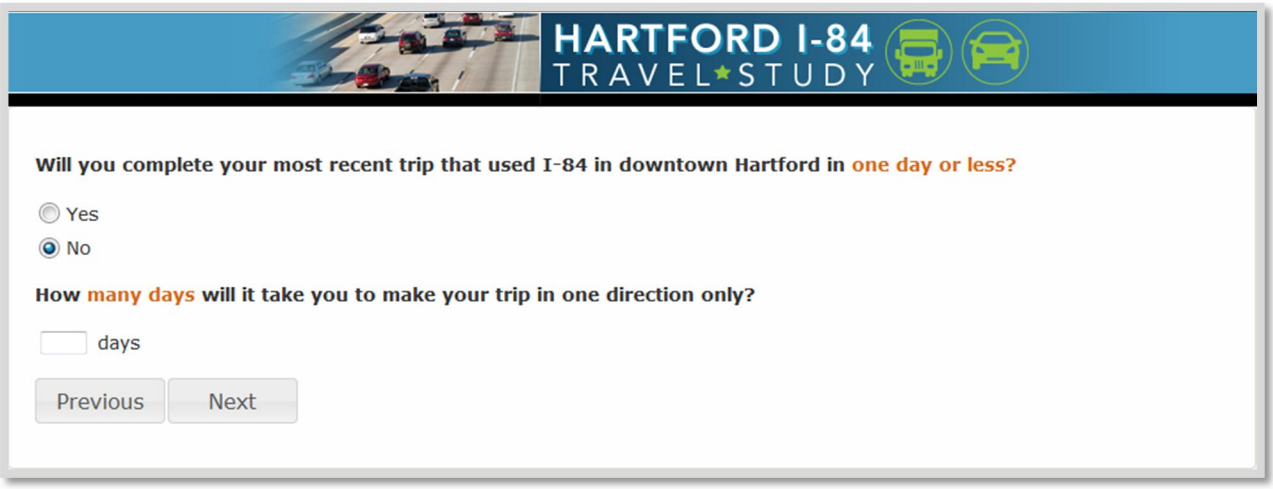
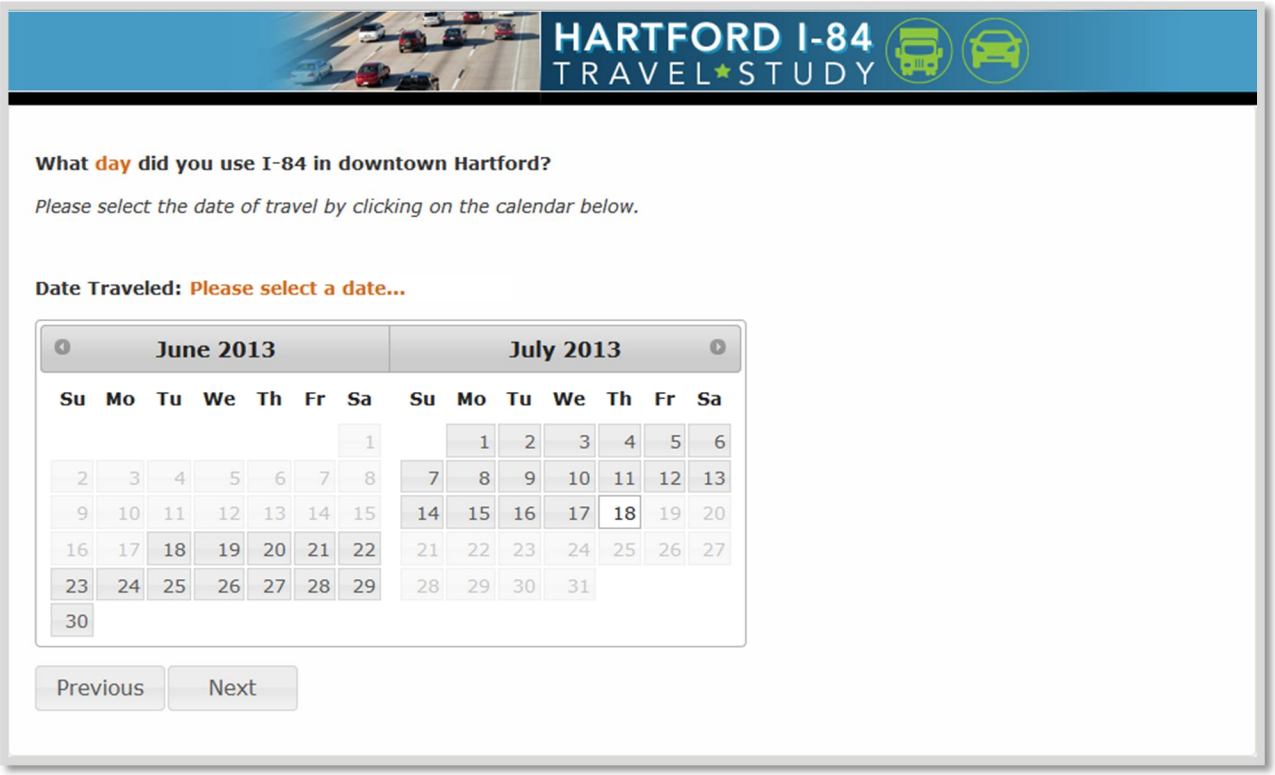


Figure 2-9: Travel Date



If recently made a trip that used I-84

Figure 2-10: Origin Address and Map Interface

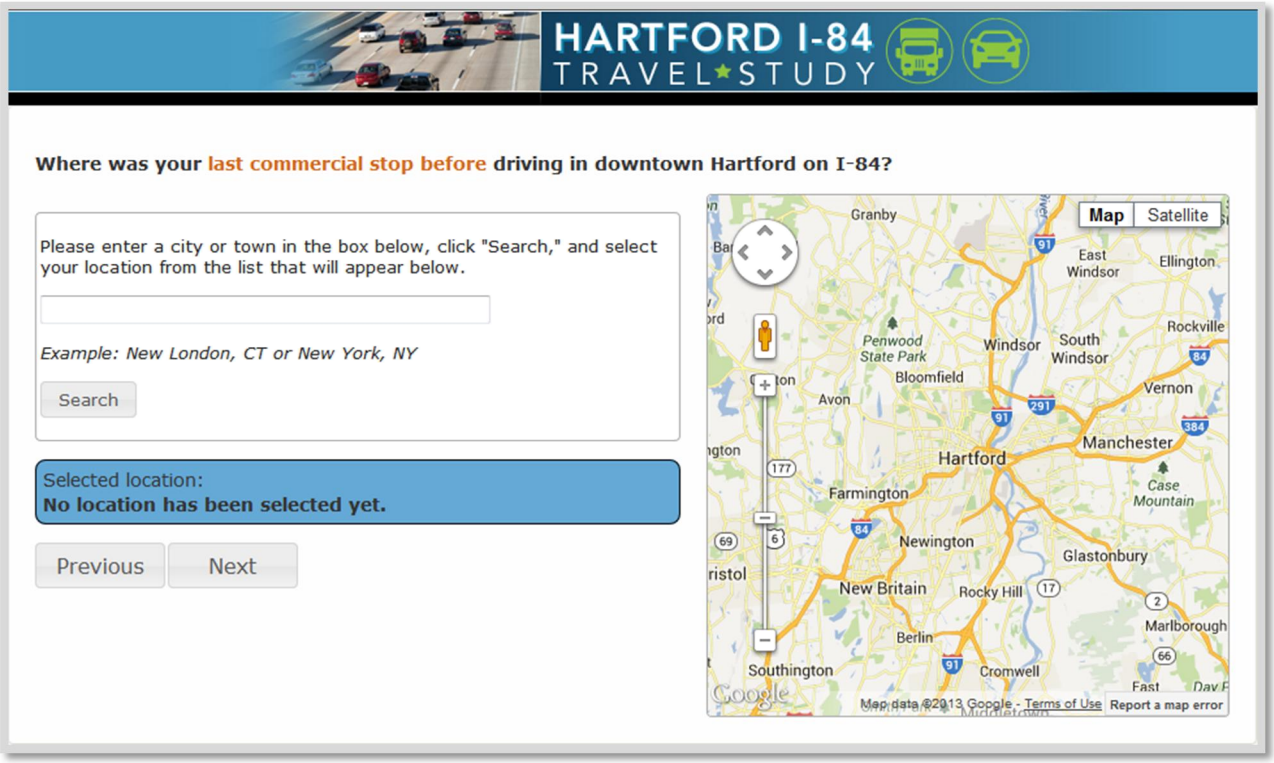


Figure 2-11: Destination Address and Map Interface

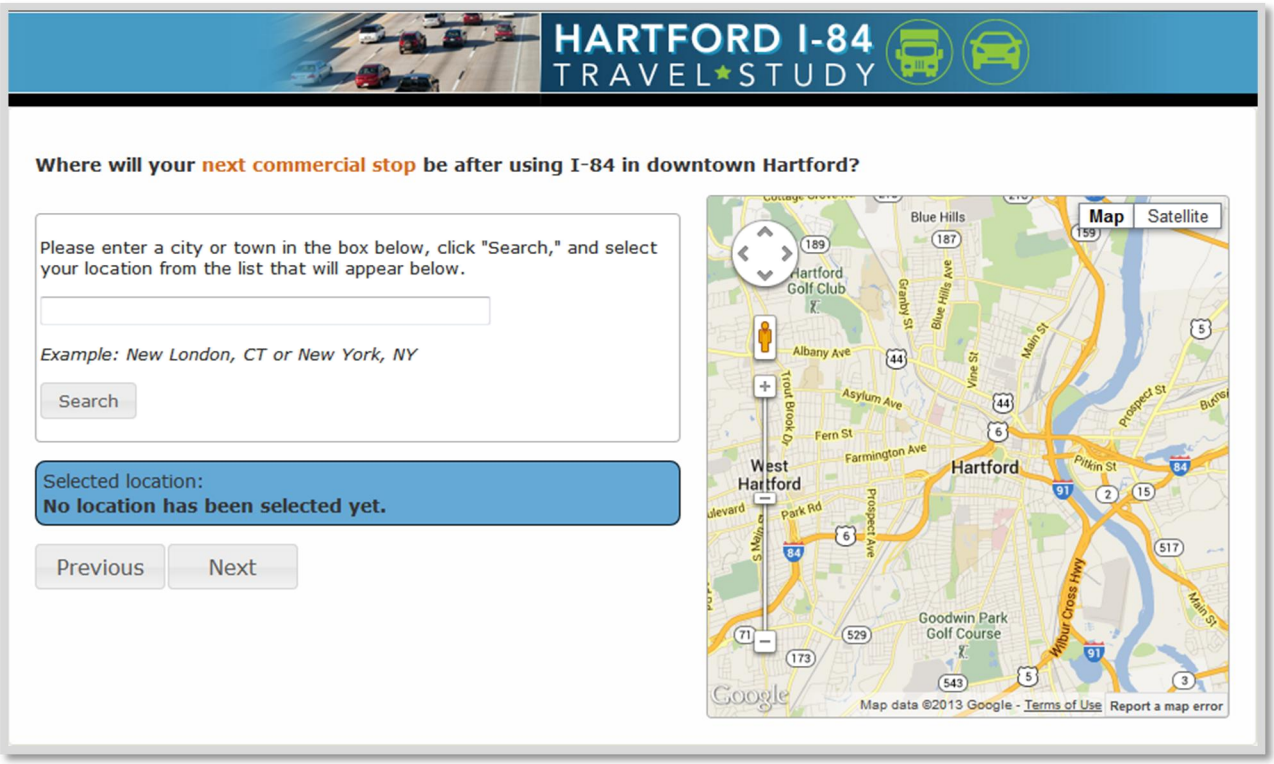


Figure 2-12: Trip Distance

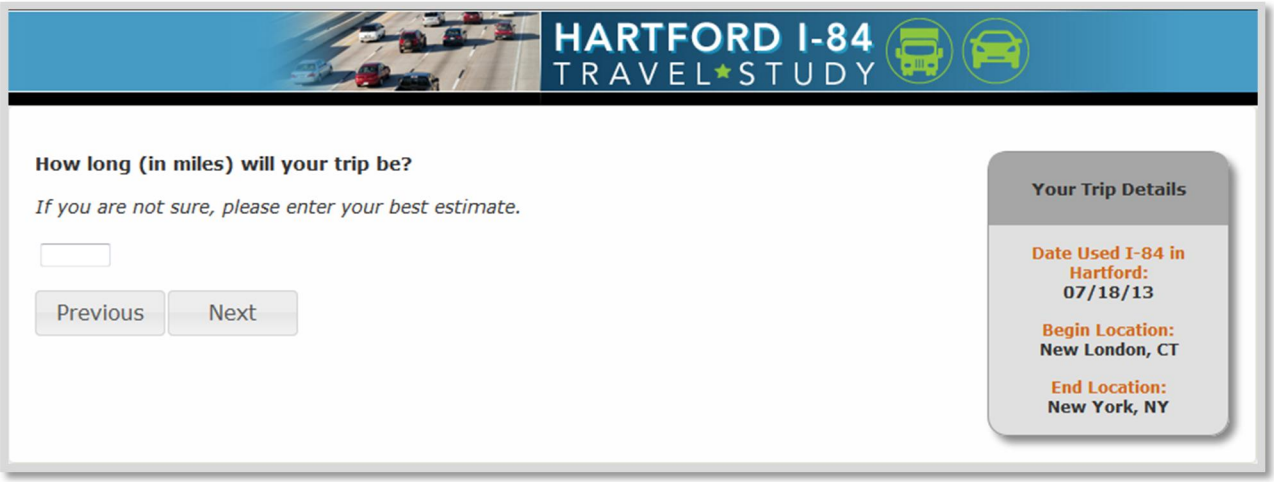
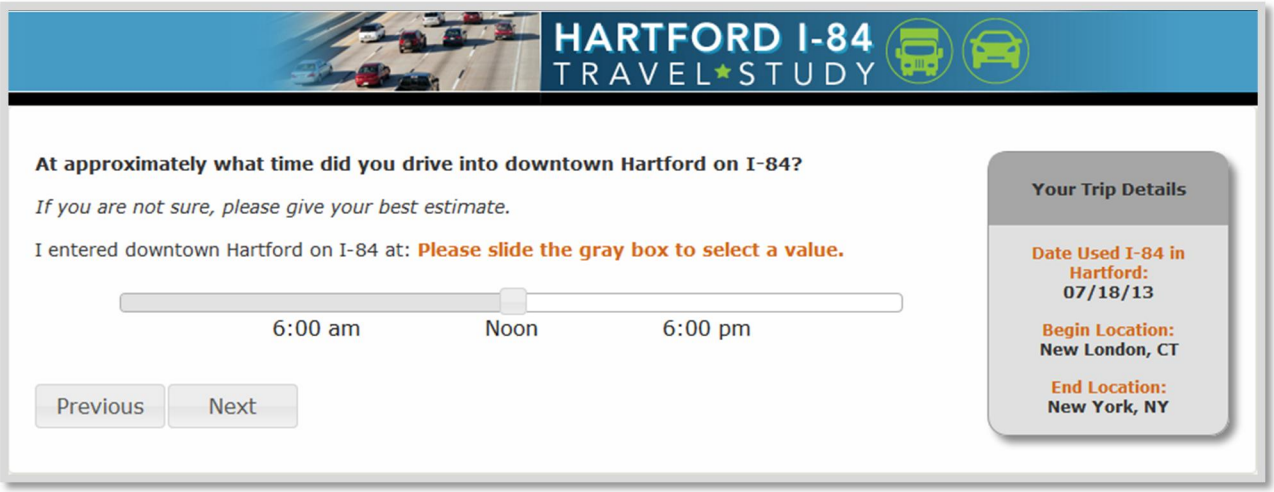
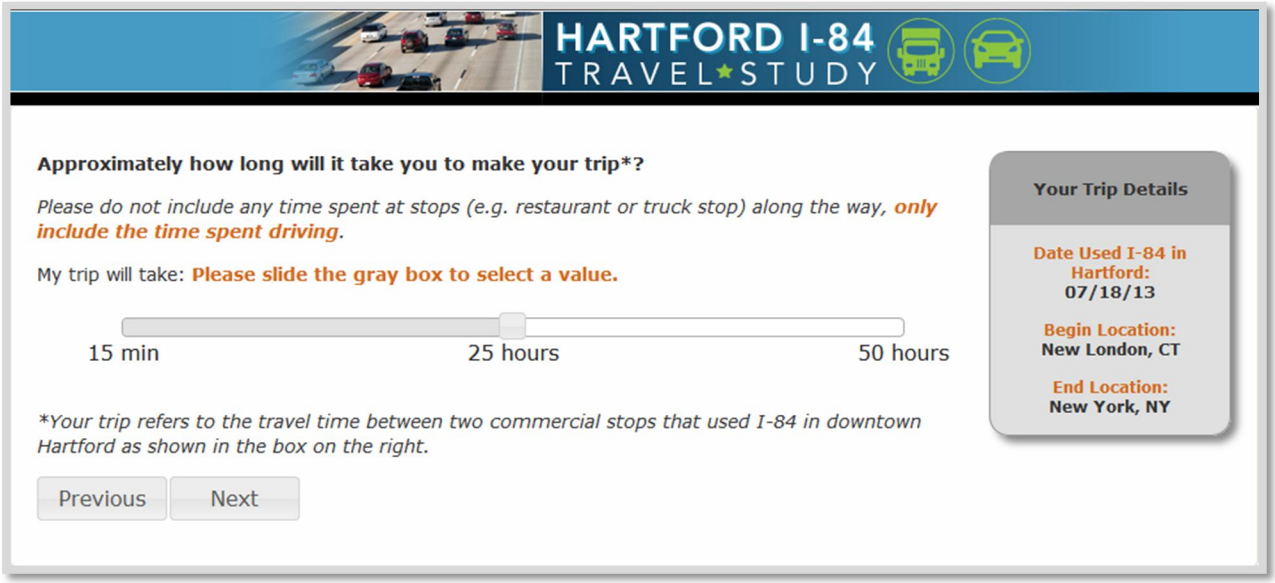


Figure 2-13: Time Entered in Downtown Hartford



If recently made a trip that used I-84

Figure 2-14: Travel Time



If currently making a trip that used I-84

Figure 2-15: Experienced Delay due to Traffic Congestion

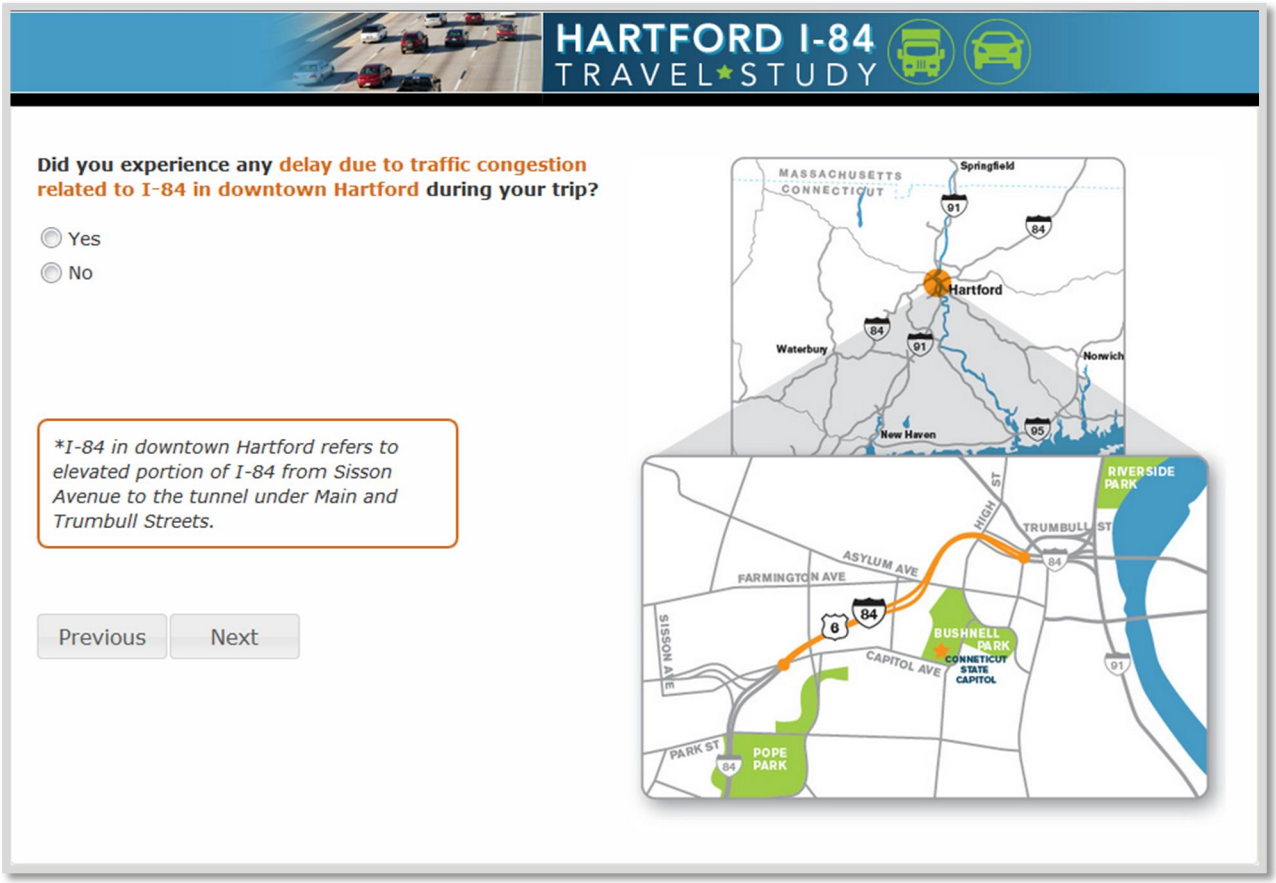


Figure 2-16: Travel Time without Delays

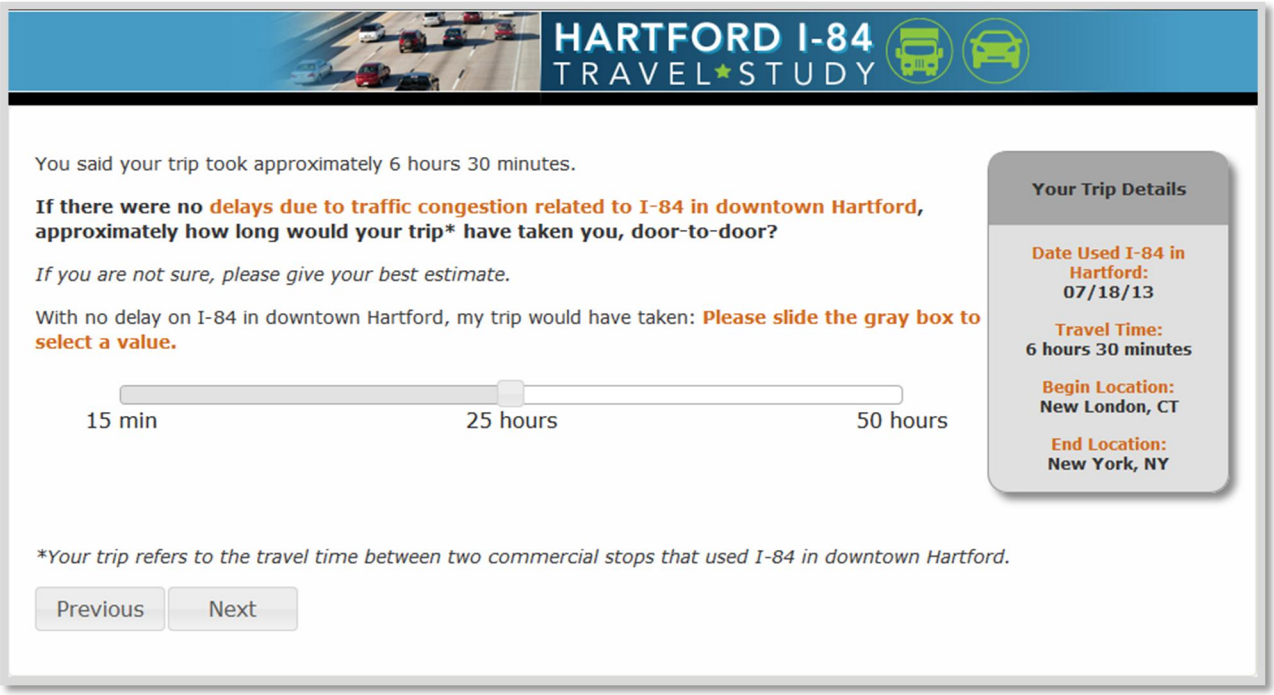


Figure 2-17: Tolls Paid

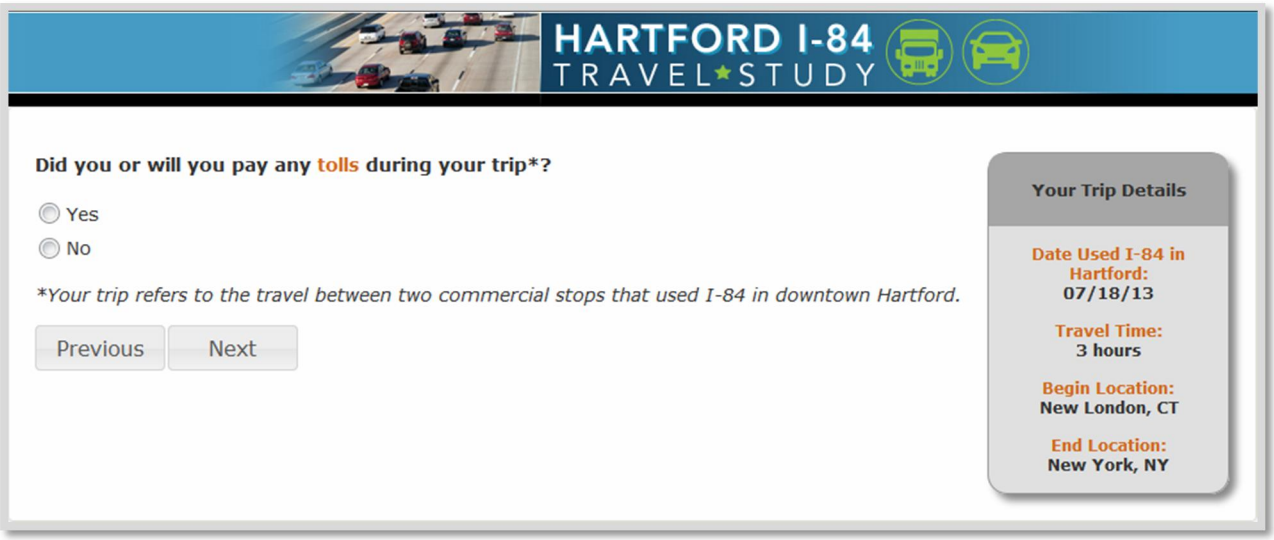
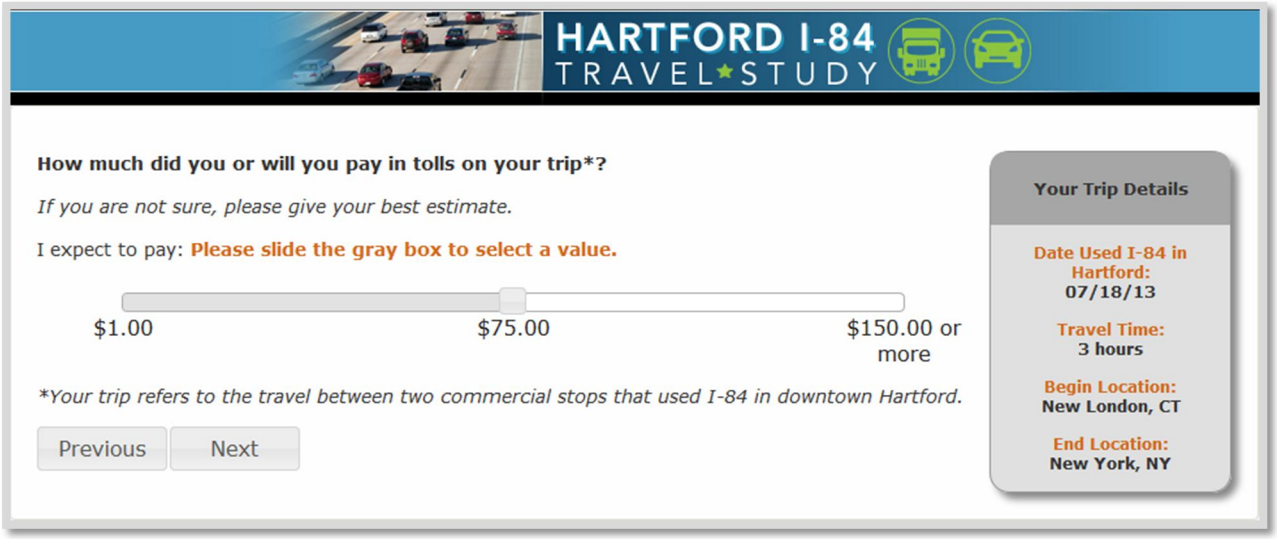


Figure 2-18: Toll Amount



If paid a toll

Figure 2-19: Number of Axles

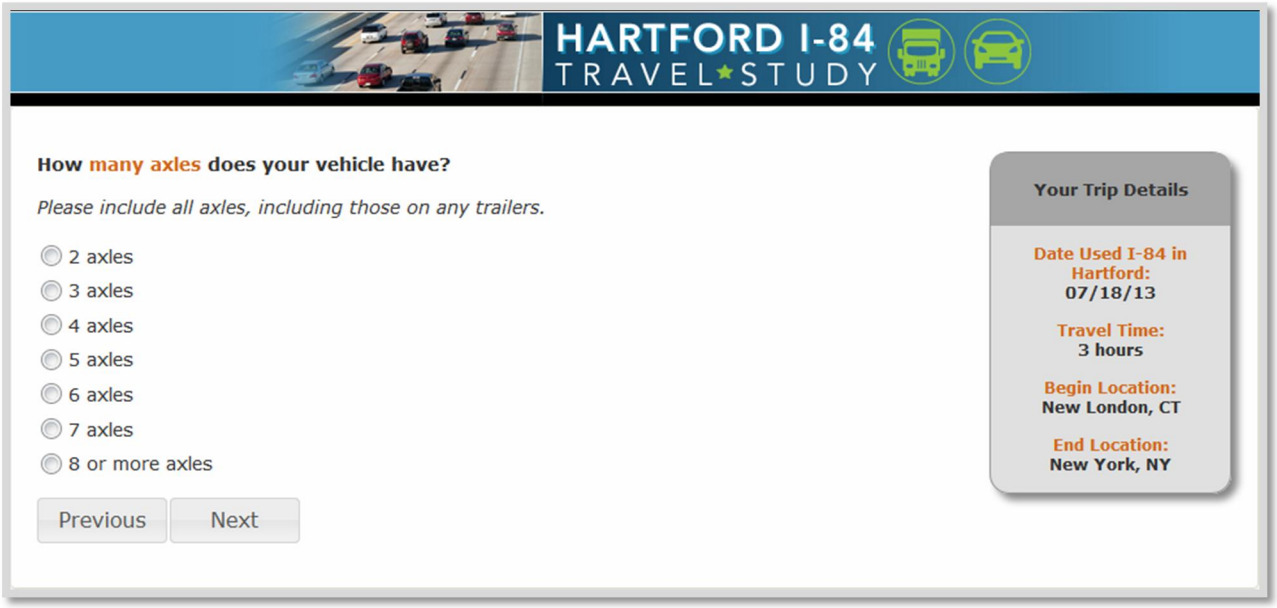


Figure 2-20: Trip Frequency

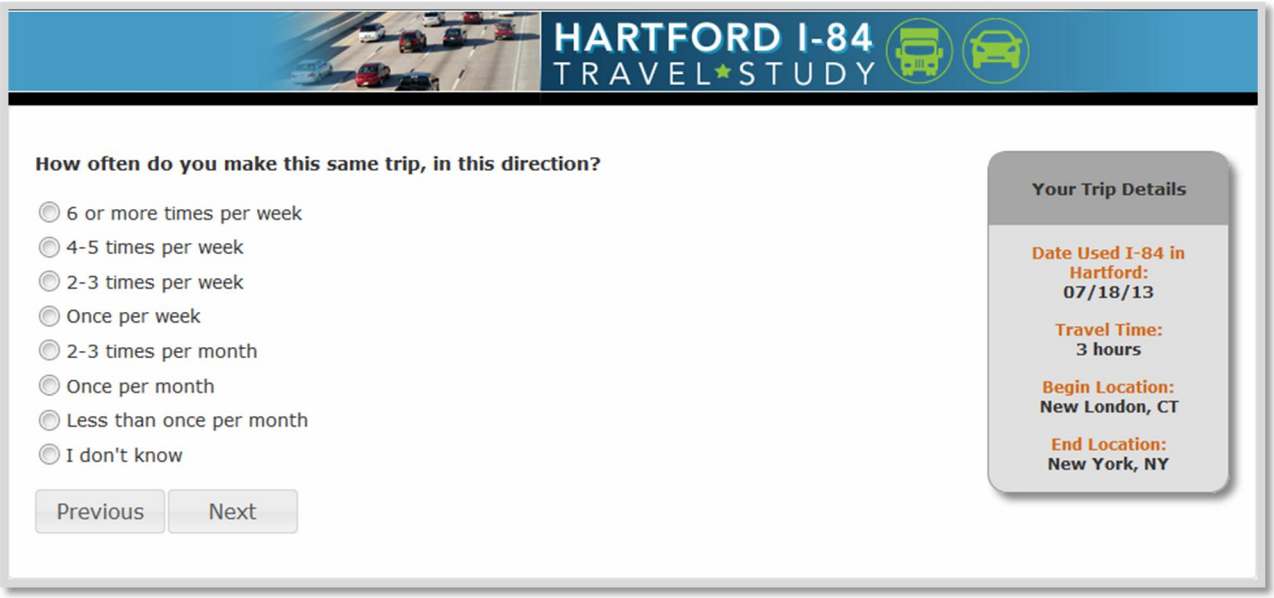


Figure 2-21: Use of I-91 or Alternate Routes to Avoid I-84 in Downtown Hartford

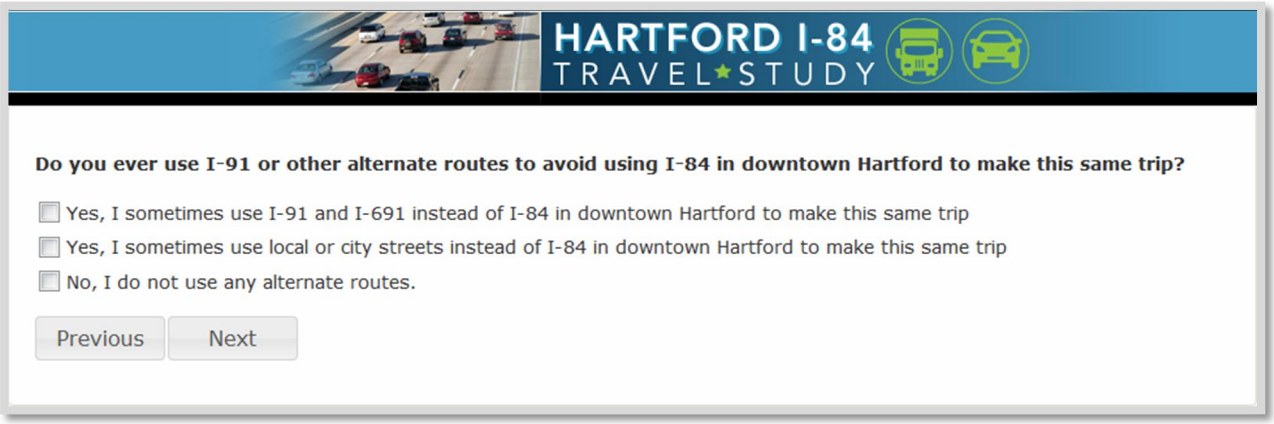
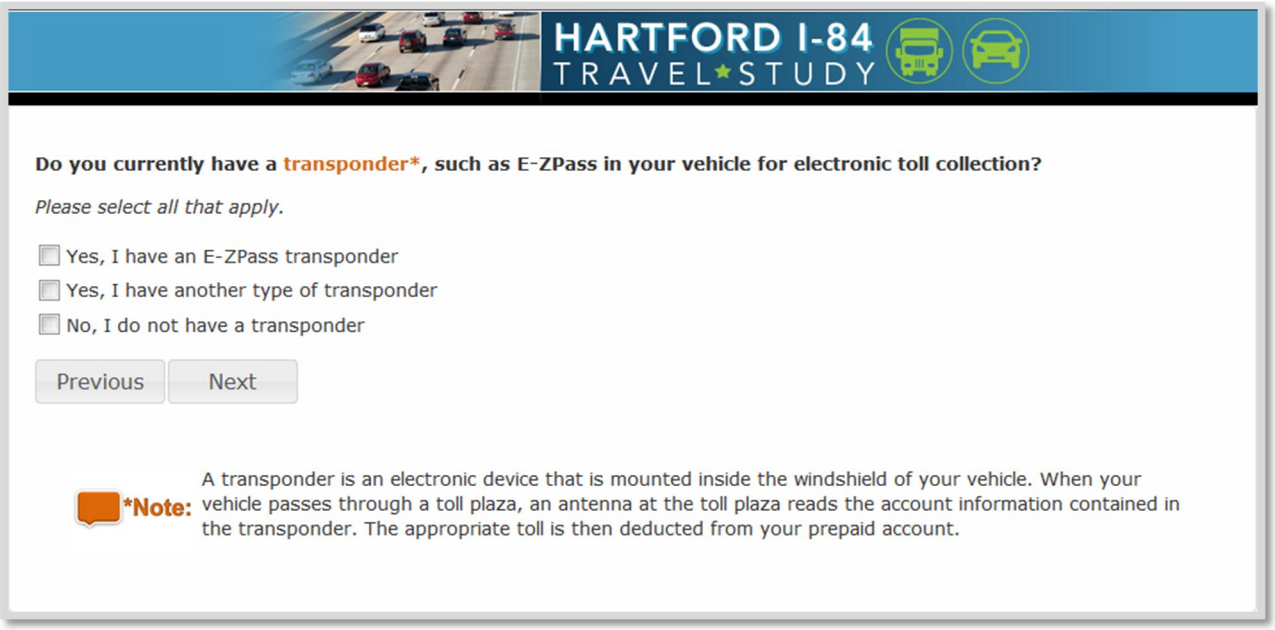


Figure 2-22: ETC Ownership



2.1 Stated Preference Questions

Figure 2-23: Project Description

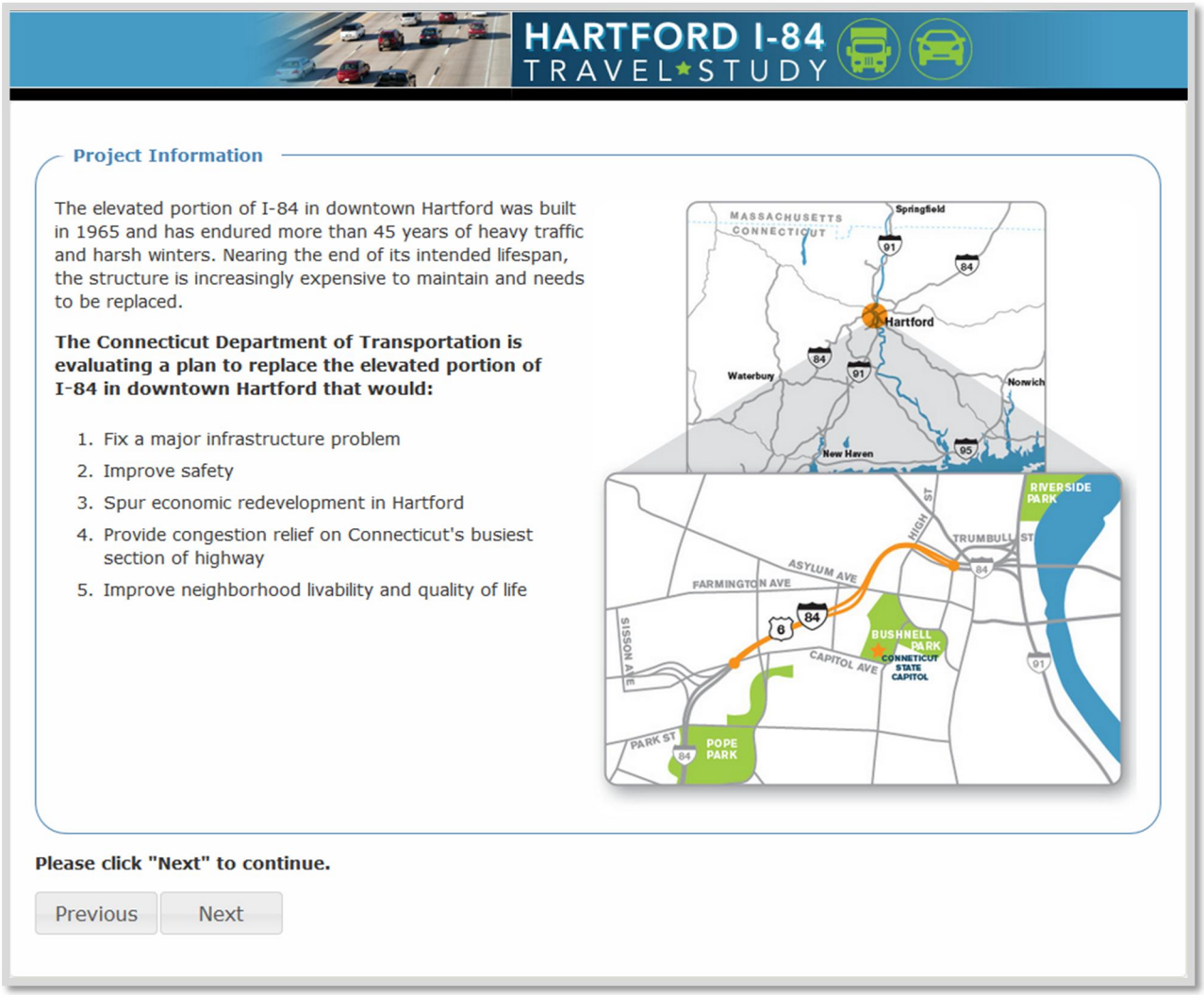


Figure 2-24: Value Pricing Description

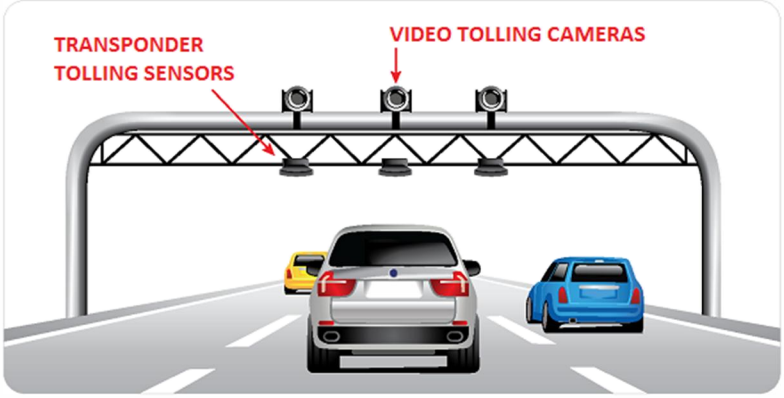
HARTFORD I-84
TRAVEL STUDY

Value Pricing

One option being evaluated is the use of **"Value Pricing"** in which variable tolls would be charged on a portion of I-84 in the Greater Hartford area to manage congestion in the corridor and to pay for reconstruction. Tolls would be higher during rush hour or other heavily congested times to manage traffic flow and congestion.

If Value Pricing were implemented, tolls on I-84 in the Greater Hartford area would be collected electronically at highway speeds. There would be no toll booths and drivers would not have to stop at a booth or gate to pay the toll. Two payment options would be available:

- **Transponder:** A transponder is mounted inside your vehicle's windshield and tolls would be deducted from a prepaid account each time you use I-84 in downtown Hartford.
- **Video tolling:** You do not need an account. Instead of having a transponder, your vehicle's license plate is read by a camera and bills are sent to the vehicle's registered owner. Video toll rates will include an additional surcharge.



Please click "Next" to continue.

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Figure 2-25: Stated Preference Instructions

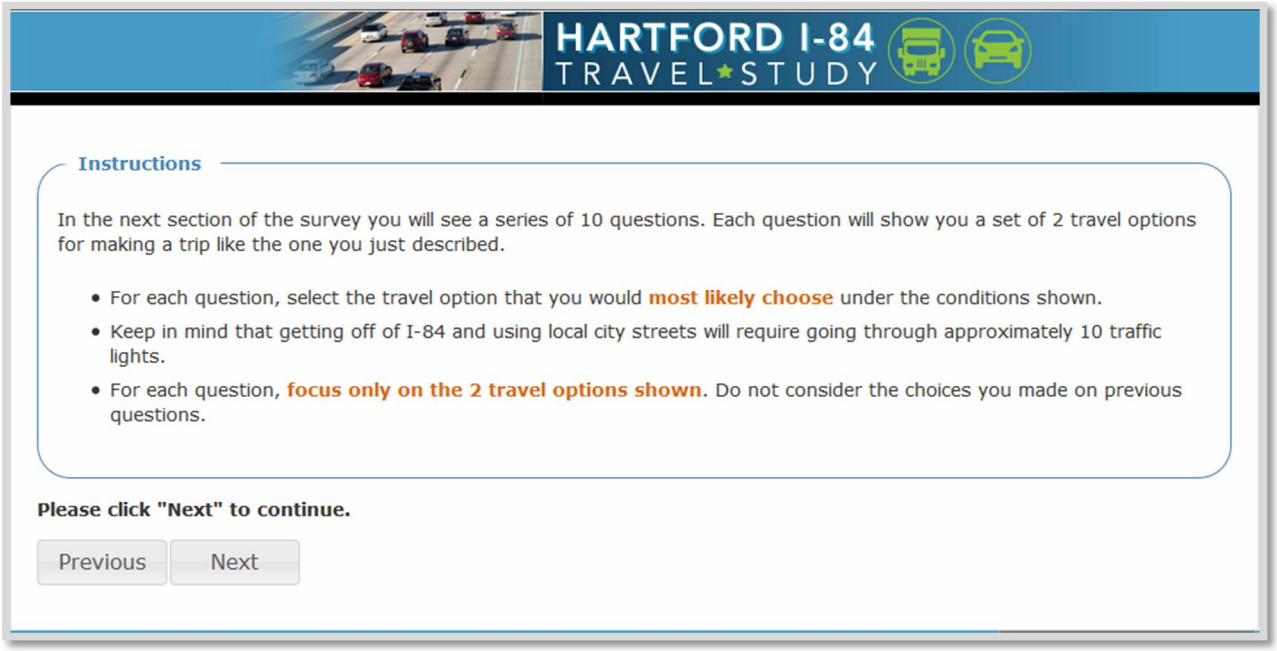


Figure 2-26: Stated Preference Experiment Example I

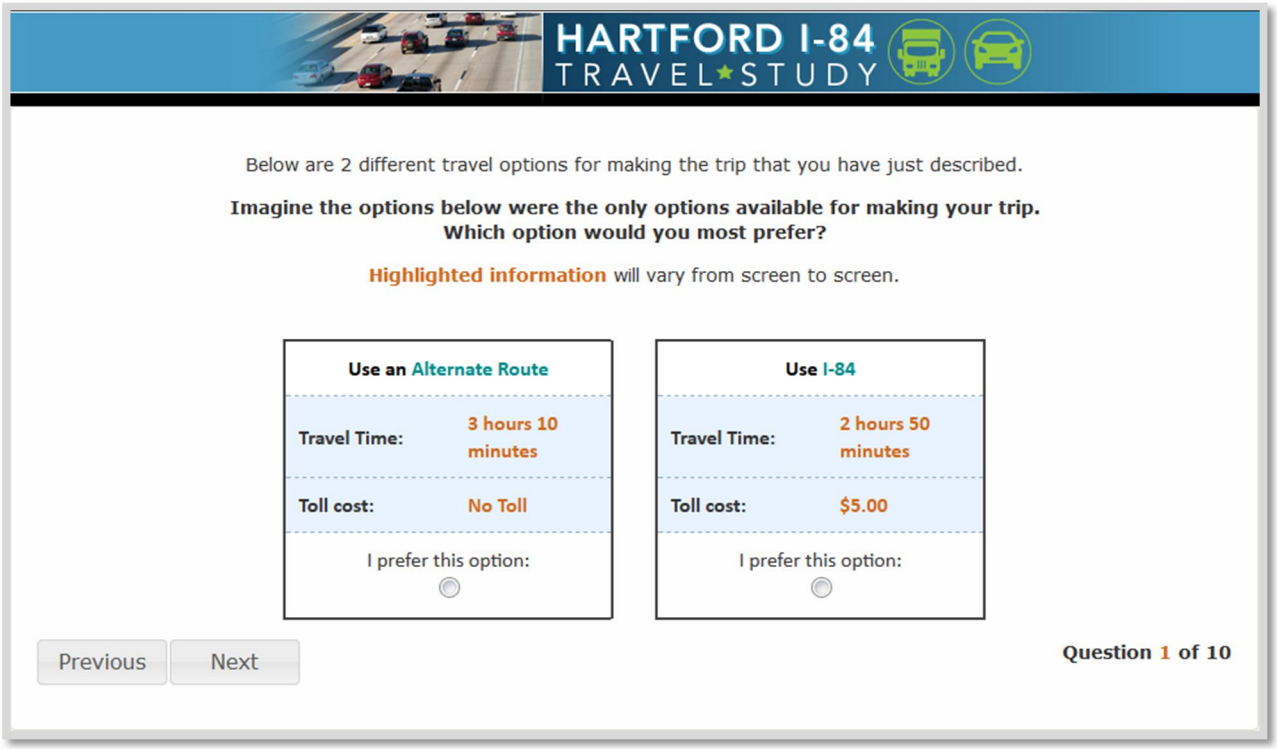


Figure 2-27: Stated Preference Experiment Example II

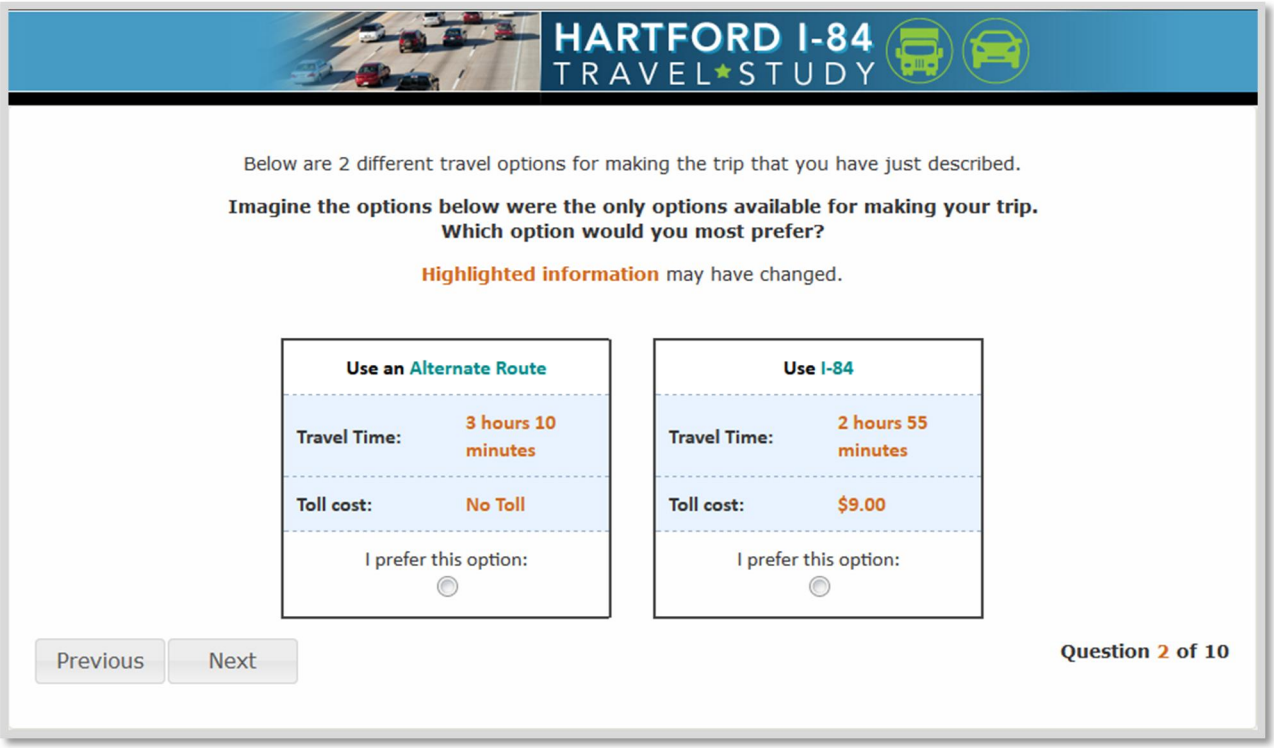


Figure 2-28: Stated Preference Experiment Example III

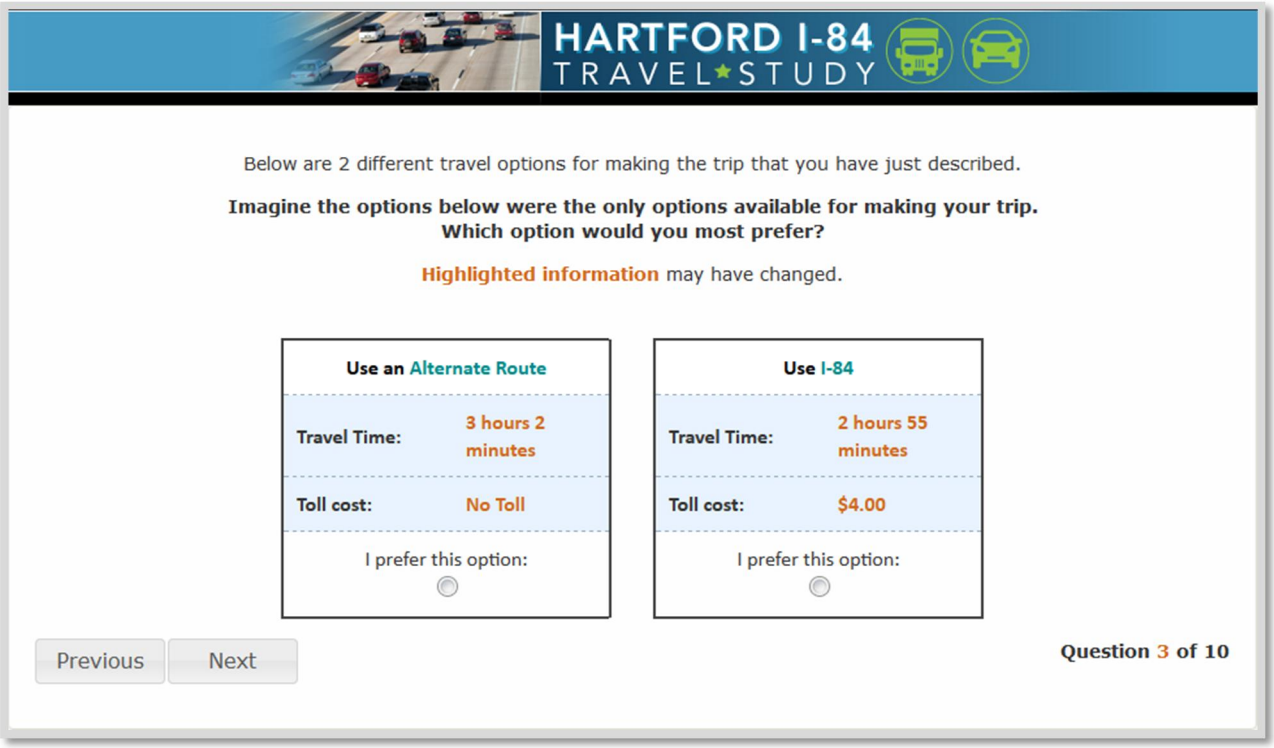
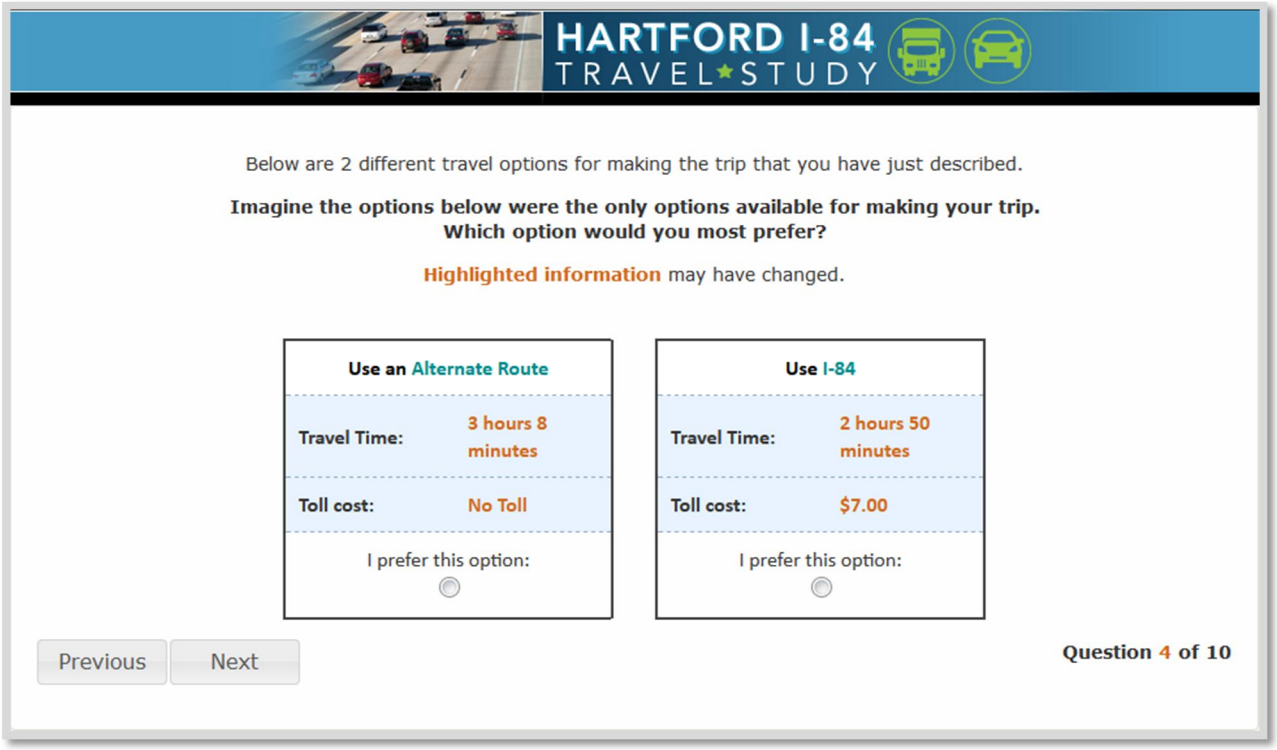
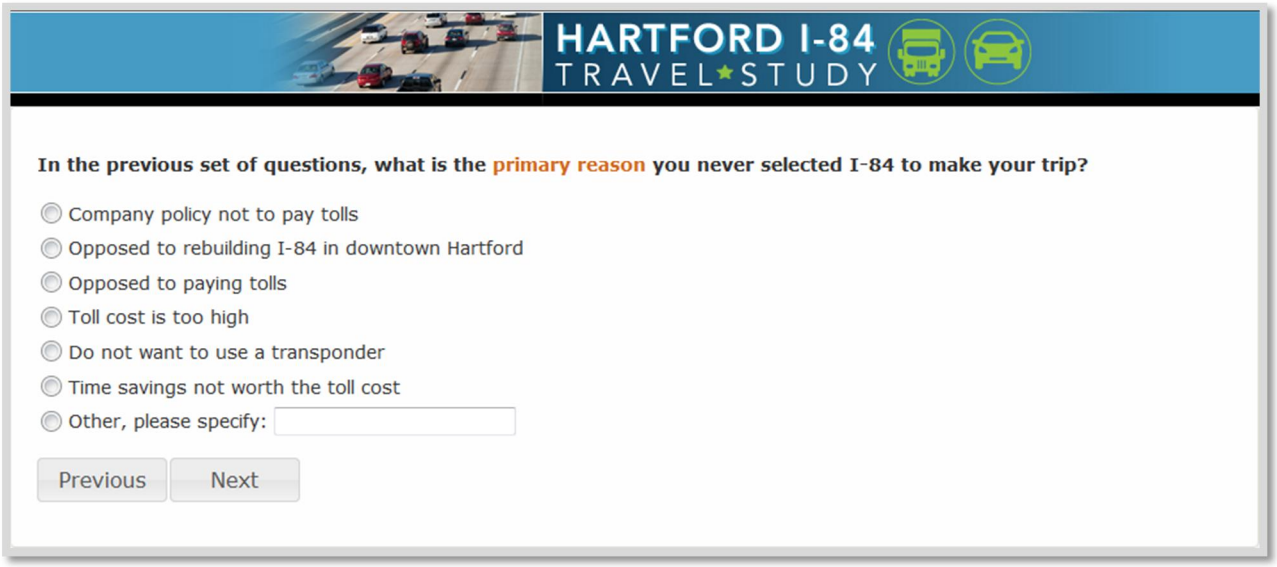


Figure 2-29: Stated Preference Experiment Example IV



2.1 Debrief and Opinion Questions

Figure 2-30: Primary Reason for Never Choosing I-84



If never chose an I-84 alternative in the stated preference experiments

Figure 2-31: Opinion of Value Pricing on I-84

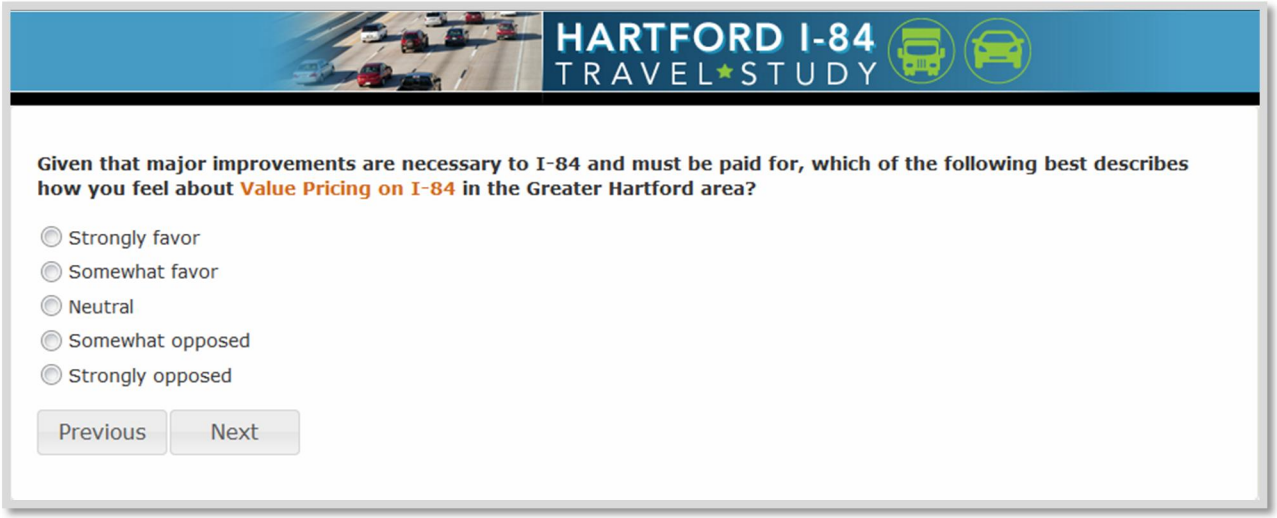
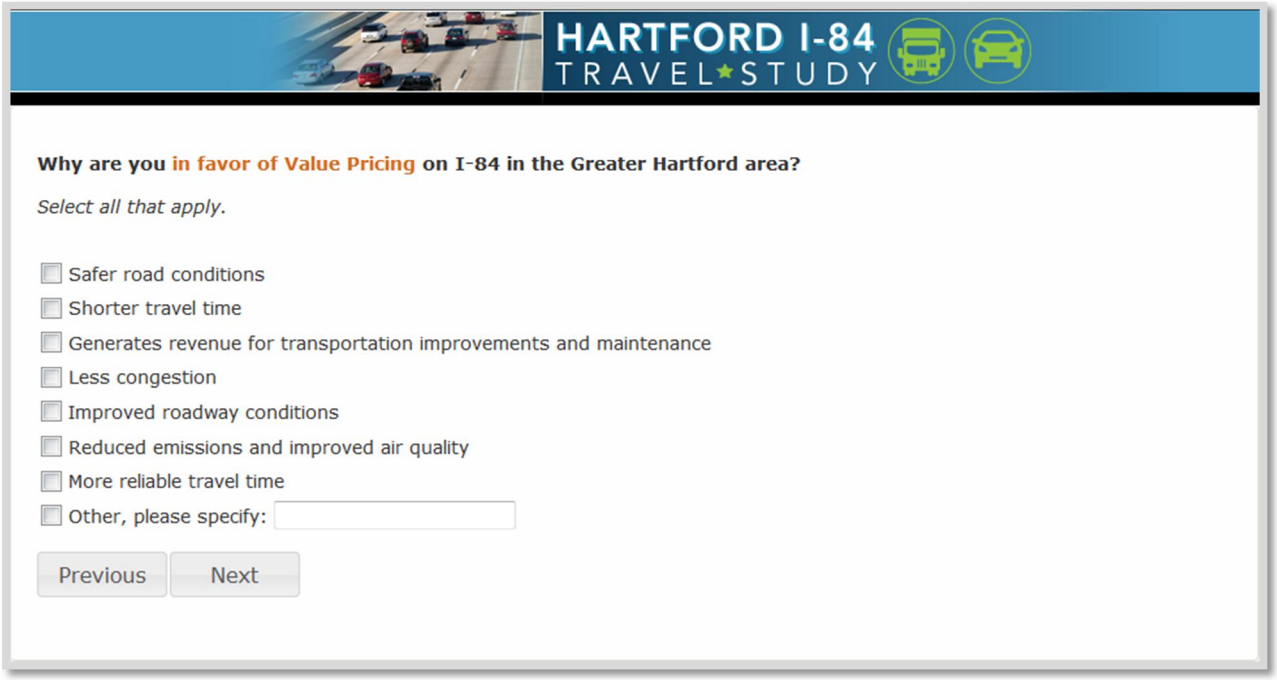
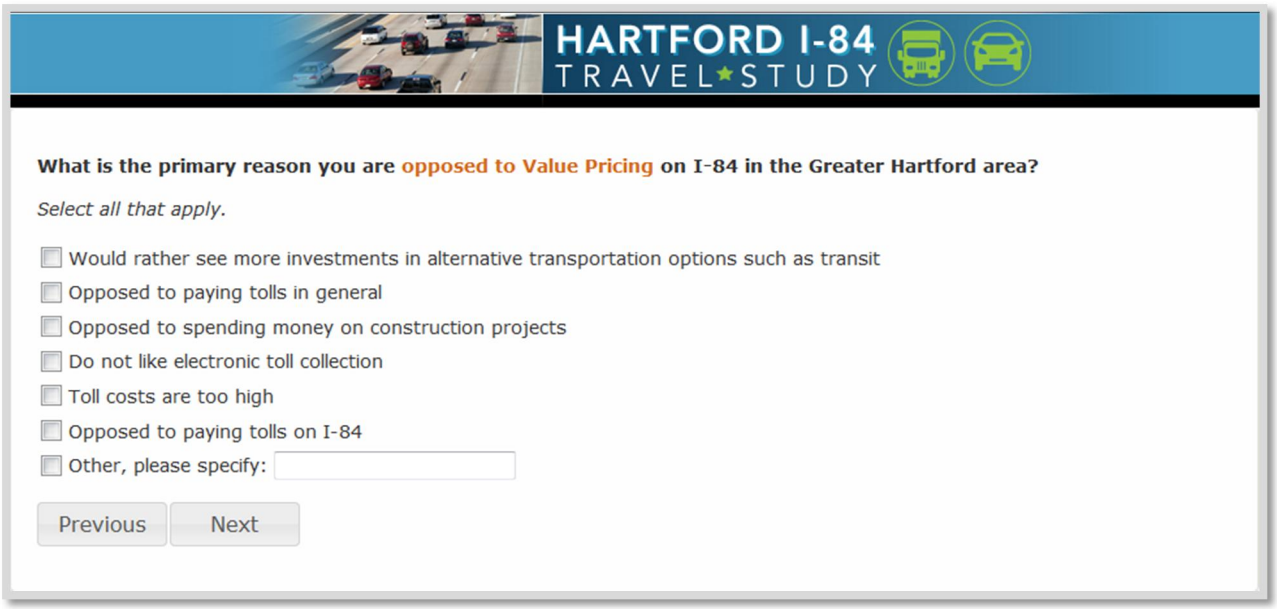


Figure 2-32: Reason for Favoring Value Pricing on I-84



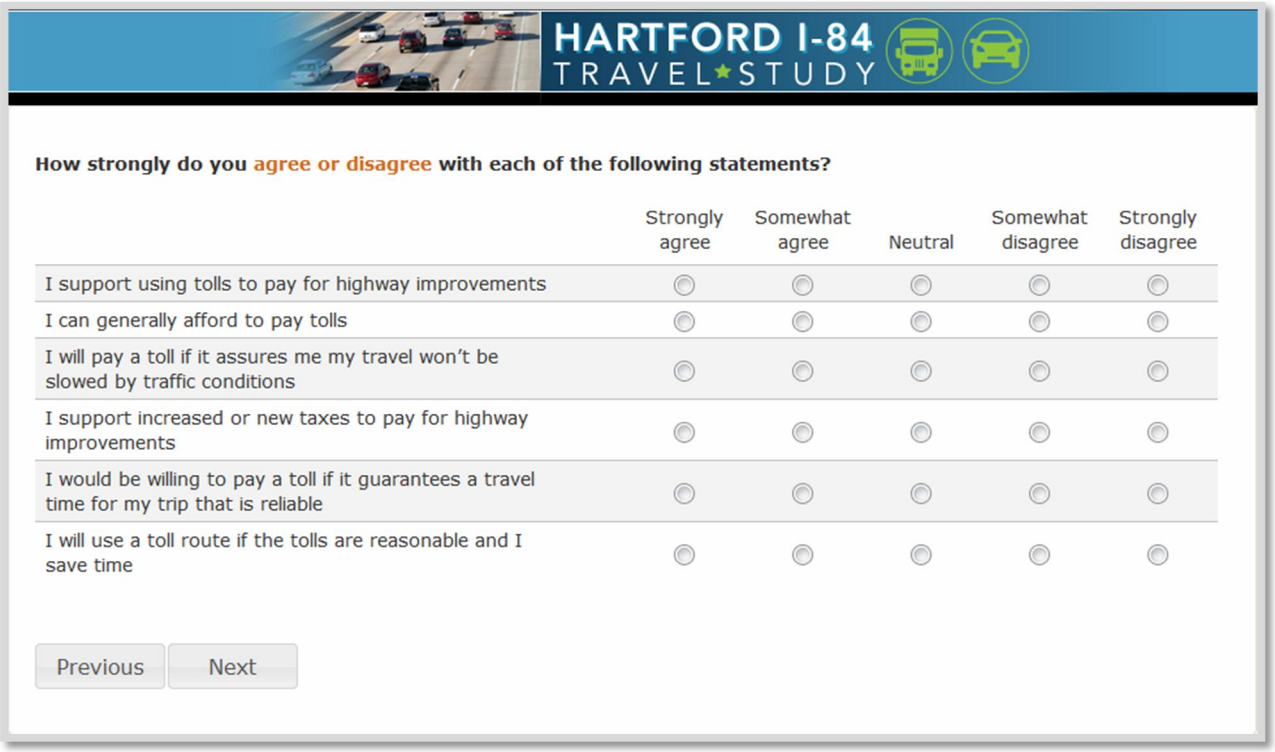
If strongly or somewhat favors value pricing on I-84

Figure 2-33: Reason for Opposing Value Pricing on I-84



If strongly or somewhat opposed to value pricing on I-84

Figure 2-34: Toll Attitudes



HARTFORD I-84
TRAVEL STUDY

How strongly do you agree or disagree with each of the following statements?

	Strongly agree	Somewhat agree	Neutral	Somewhat disagree	Strongly disagree
I support using tolls to pay for highway improvements					
I can generally afford to pay tolls					
I will pay a toll if it assures me my travel won't be slowed by traffic conditions					
I support increased or new taxes to pay for highway improvements					
I would be willing to pay a toll if it guarantees a travel time for my trip that is reliable					
I will use a toll route if the tolls are reasonable and I save time					

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2.1 Company Information Questions

Figure 2-35: Company Location

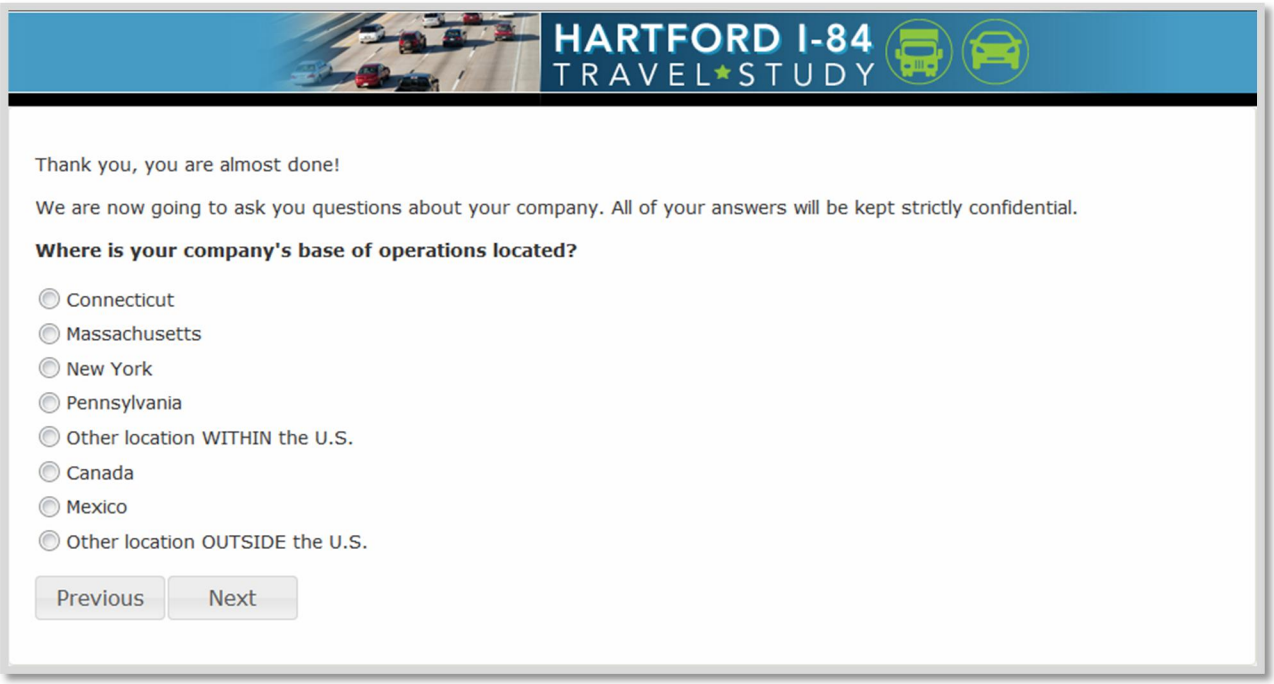


Figure 2-36: Typical Trip Length

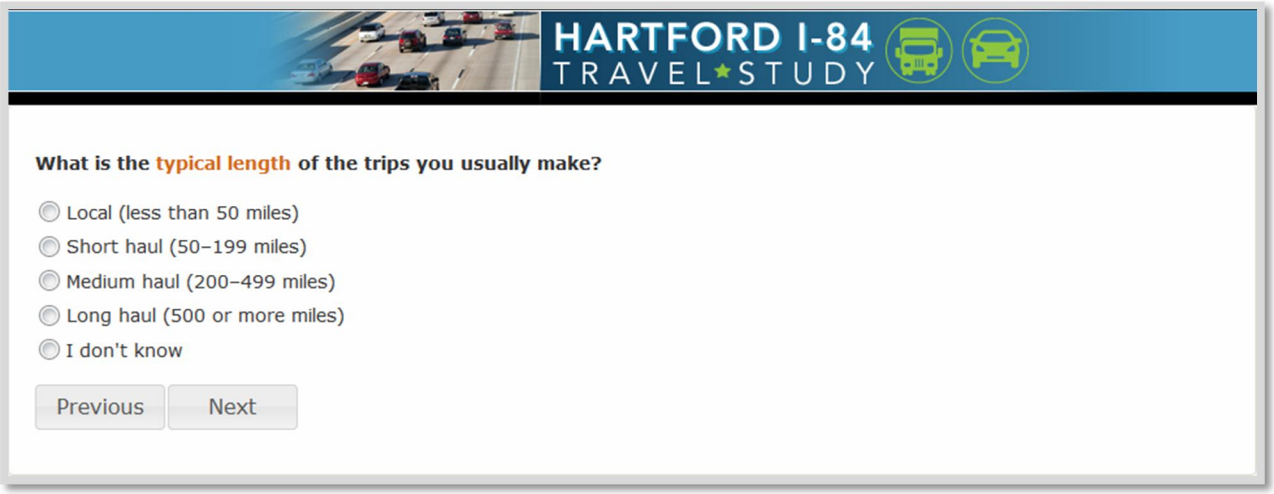


Figure 2-37: Flexibility in Delivery Schedule

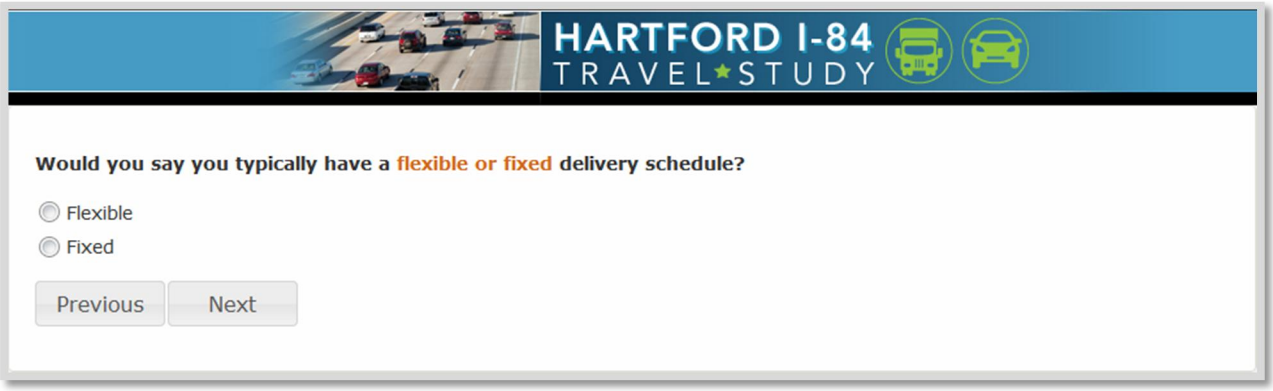
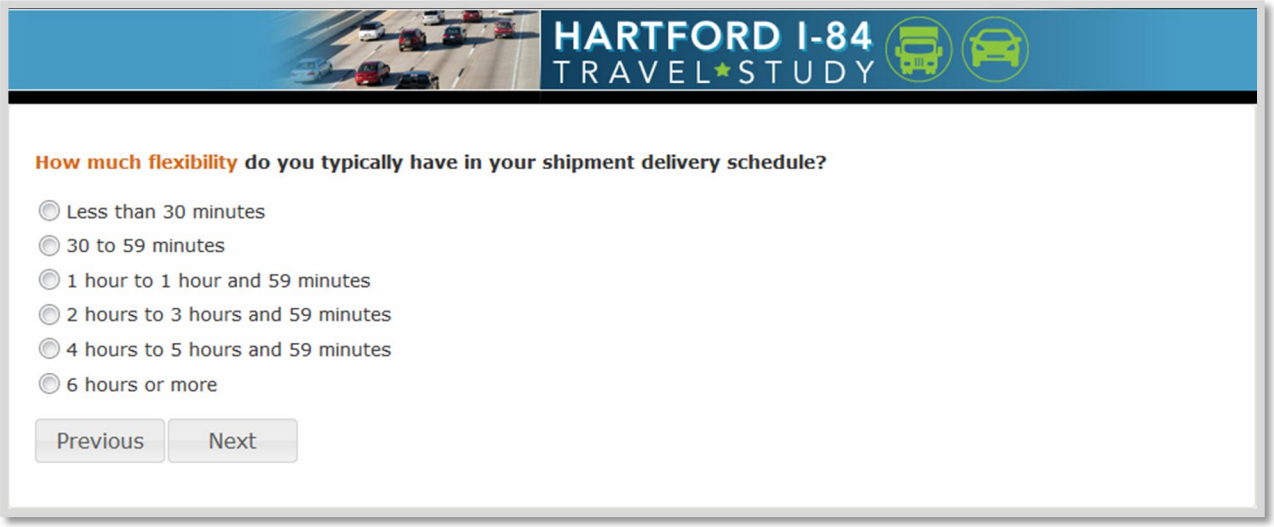


Figure 2-38: Amount of Flexibility in Delivery Schedule



If flexible delivery schedule

Figure 2-39: Penalty or Incentive Structure

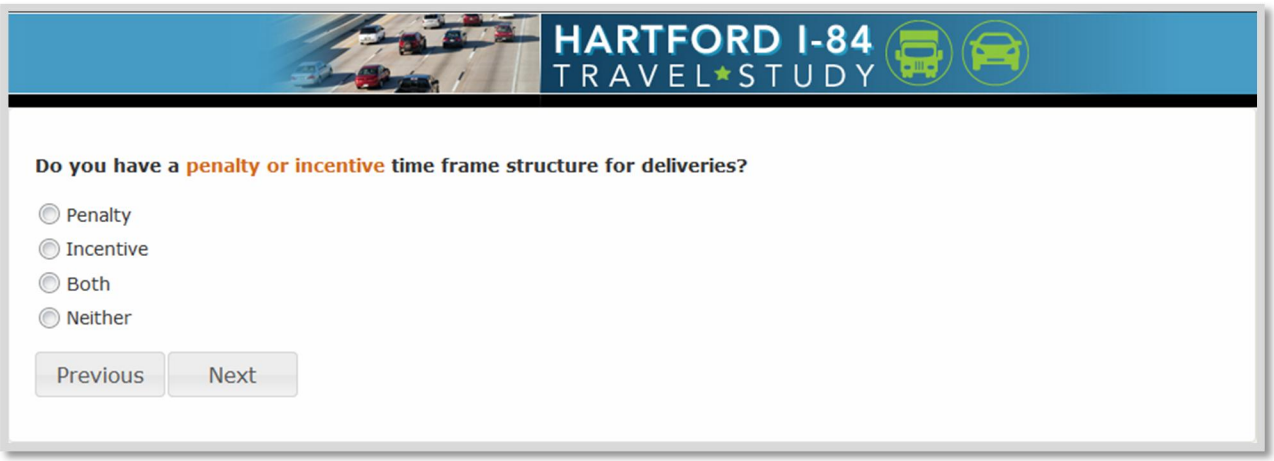


Figure 2-40: Responsibility for Paying Tolls

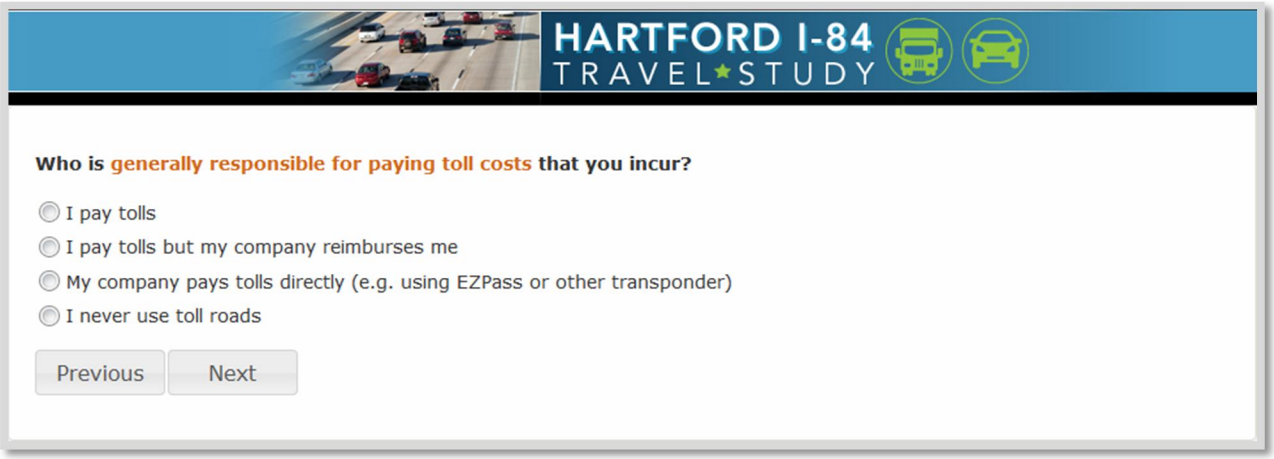


Figure 2-41: Charge Customers for Tolls

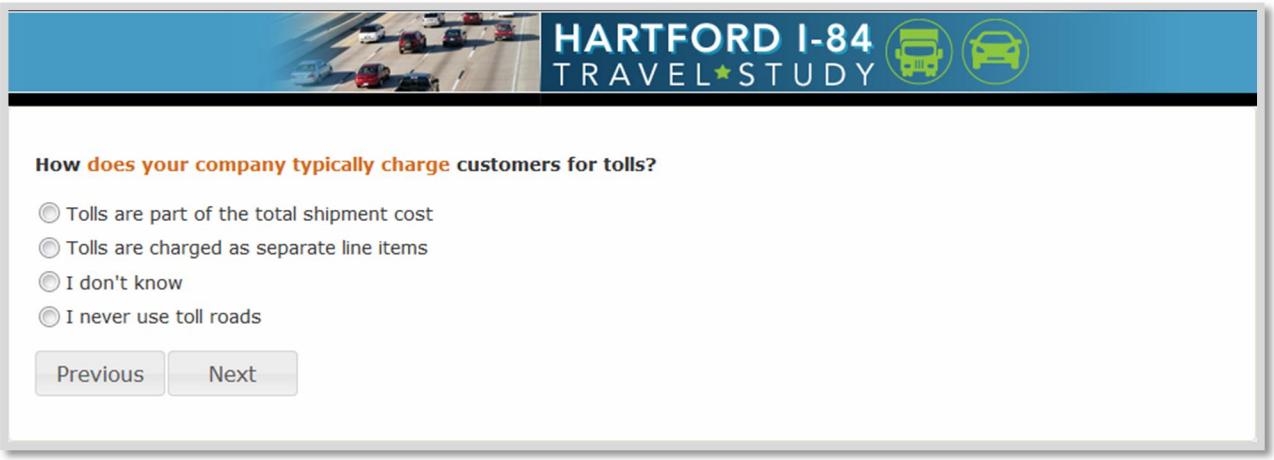


Figure 2-42: Information Sources Used for Routing Decisions

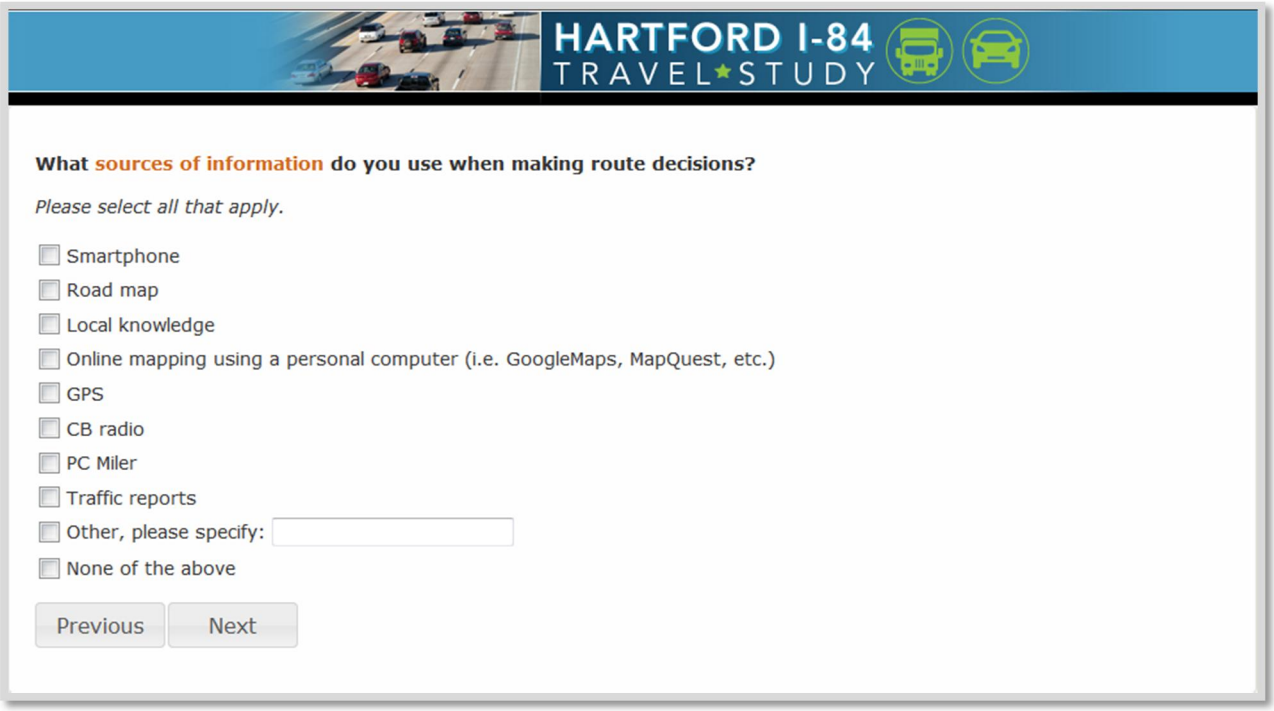


Figure 2-43: Comments

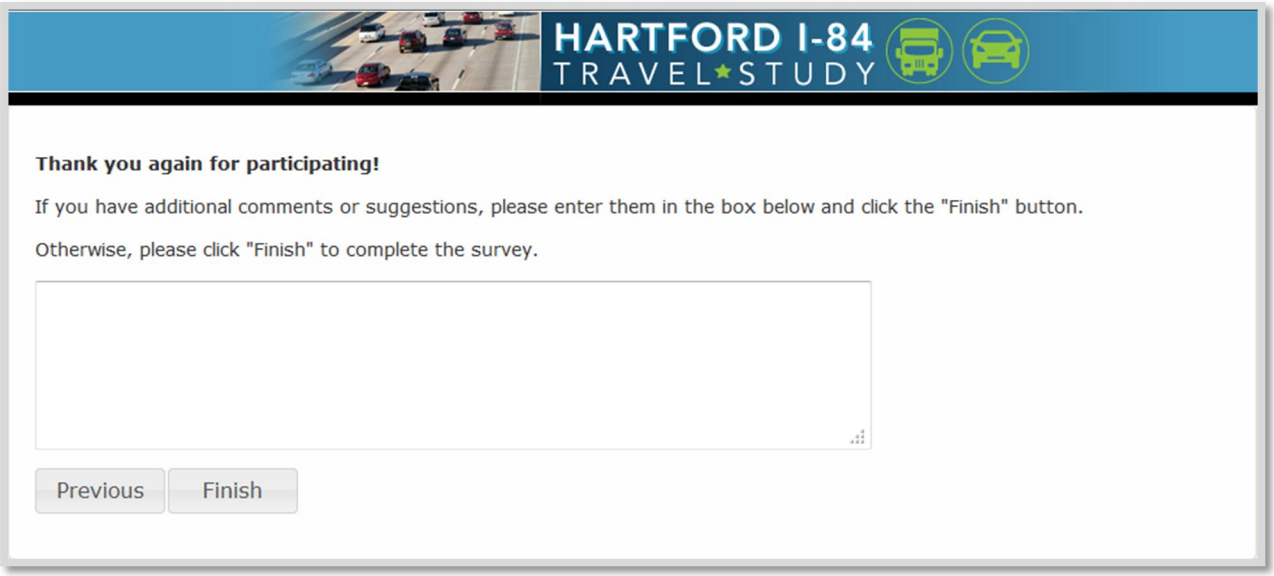


Figure 2-44: End

RSG INC.
TRANSPORTATION

Connecticut I-84 Value Pricing Stated Preference Survey

Appendix B: Survey Tabulations

September 2013

DATA ■ ANALYSIS ■ SOLUTIONS

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1.0 PASSENGER VEHICLE SURVEY TABULATIONS

Recruitment Source

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Online Panel	126	6.9%	39	12.8%	153	40.8%	167	41.4%	485	16.7%
Field Intercept	170	9.4%	58	19.1%	108	28.8%	153	38.0%	489	16.9%
Business Recruit	1522	83.7%	207	68.1%	114	30.4%	83	20.6%	1926	66.4%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

1.1 Trip Characteristic Questions

What day was your most recent trip that used I-84 in downtown Hartford?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Monday	692	38.1%	83	27.3%	45	12.0%	54	13.4%	874	30.1%
Tuesday	309	17.0%	56	18.4%	71	18.9%	51	12.7%	487	16.8%
Wednesday	253	13.9%	47	15.5%	93	24.8%	84	20.8%	477	16.4%
Thursday	302	16.6%	57	18.8%	78	20.8%	55	13.6%	492	17.0%
Friday	262	14.4%	44	14.5%	88	23.5%	99	24.6%	493	17.0%
Saturday	0	.0%	12	3.9%	0	.0%	32	7.9%	44	1.5%
Sunday	0	.0%	5	1.6%	0	.0%	28	6.9%	33	1.1%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

What was the primary purpose of your most recent trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Go to/from work	1700	93.5%	225	74.0%	0	.0%	0	.0%	1925	66.4%
Business-related	118	6.5%	79	26.0%	0	.0%	0	.0%	197	6.8%
Go to/from school	0	.0%	0	.0%	41	10.9%	24	6.0%	65	2.2%
Go to/from the airport	0	.0%	0	.0%	19	5.1%	35	8.7%	54	1.9%
Shopping	0	.0%	0	.0%	38	10.1%	60	14.9%	98	3.4%
Social/Recreational	0	.0%	0	.0%	147	39.2%	175	43.4%	322	11.1%
Personal Business	0	.0%	0	.0%	130	34.7%	109	27.0%	239	8.2%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Where did your trip begin?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
My home	1466	80.6%	218	71.7%	268	71.5%	310	76.9%	2262	78.0%
My regular workplace	320	17.6%	63	20.7%	61	16.3%	29	7.2%	473	16.3%
Another place	32	1.8%	23	7.6%	46	12.3%	64	15.9%	165	5.7%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Where did your trip end?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
My home	256	14.1%	30	9.9%	33	8.8%	41	10.2%	360	12.4%
My regular workplace	1407	77.4%	192	63.2%	6	1.6%	2	.5%	1607	55.4%
Another place	155	8.5%	82	27.0%	336	89.6%	360	89.3%	933	32.2%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

What time did you start your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
12AM - 12:59AM	0	.0%	0	.0%	0	.0%	1	.2%	1	.0%
1AM - 1:59AM	0	.0%	1	.3%	0	.0%	0	.0%	1	.0%
2AM - 2:59AM	0	.0%	0	.0%	0	.0%	1	.2%	1	.0%
3AM - 3:59AM	0	.0%	2	.7%	0	.0%	0	.0%	2	.1%
4AM - 4:59AM	0	.0%	14	4.6%	0	.0%	5	1.2%	19	.7%
5AM - 5:59AM	0	.0%	99	32.6%	0	.0%	8	2.0%	107	3.7%
6AM - 6:59AM	432	23.8%	1	.3%	14	3.7%	0	.0%	447	15.4%
7AM - 7:59AM	638	35.1%	2	.7%	32	8.5%	3	.7%	675	23.3%
8AM - 8:59AM	332	18.3%	1	.3%	49	13.1%	3	.7%	385	13.3%
9AM - 9:59AM	93	5.1%	0	.0%	74	19.7%	4	1.0%	171	5.9%
10AM - 10:59AM	0	.0%	49	16.1%	0	.0%	73	18.1%	122	4.2%
11AM - 11:59AM	0	.0%	25	8.2%	0	.0%	70	17.4%	95	3.3%
12PM - 12:59PM	0	.0%	29	9.5%	0	.0%	58	14.4%	87	3.0%
1PM - 1:59PM	0	.0%	21	6.9%	0	.0%	62	15.4%	83	2.9%
2PM - 2:59PM	0	.0%	37	12.2%	0	.0%	70	17.4%	107	3.7%
3PM - 3:59PM	70	3.9%	0	.0%	50	13.3%	4	1.0%	124	4.3%
4PM - 4:59PM	118	6.5%	0	.0%	73	19.5%	3	.7%	194	6.7%
5PM - 5:59PM	100	5.5%	1	.3%	51	13.6%	3	.7%	155	5.3%
6PM - 6:59PM	35	1.9%	1	.3%	32	8.5%	0	.0%	68	2.3%
7PM - 7:59PM	0	.0%	9	3.0%	0	.0%	18	4.5%	27	.9%
8PM - 8:59PM	0	.0%	2	.7%	0	.0%	2	.5%	4	.1%
9PM - 9:59PM	0	.0%	4	1.3%	0	.0%	8	2.0%	12	.4%
10PM - 10:59PM	0	.0%	5	1.6%	0	.0%	5	1.2%	10	.3%
11PM - 11:59PM	0	.0%	1	.3%	0	.0%	2	.5%	3	.1%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Did you start your trip at <trip begin time> specifically to minimize the impact of traffic congestion on your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	861	47.4%	132	43.4%	155	41.3%	159	39.5%	1307	45.1%
No	957	52.6%	172	56.6%	220	58.7%	244	60.5%	1593	54.9%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

If there was no traffic congestion, what time would you have preferred to start your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
12AM - 12:59AM	0	.0%	1	.8%	0	.0%	0	.0%	1	.1%
1AM - 1:59AM	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
2AM - 2:59AM	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
3AM - 3:59AM	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
4AM - 4:59AM	0	.0%	1	.8%	0	.0%	0	.0%	1	.1%
5AM - 5:59AM	1	.1%	7	5.3%	0	.0%	3	1.9%	11	.8%
6AM - 6:59AM	100	11.6%	38	28.8%	4	2.6%	3	1.9%	145	11.1%
7AM - 7:59AM	441	51.2%	23	17.4%	30	19.4%	7	4.4%	501	38.3%
8AM - 8:59AM	187	21.7%	19	14.4%	27	17.4%	32	20.1%	265	20.3%
9AM - 9:59AM	13	1.5%	4	3.0%	22	14.2%	28	17.6%	67	5.1%
10AM - 10:59AM	7	.8%	1	.8%	3	1.9%	9	5.7%	20	1.5%
11AM - 11:59AM	1	.1%	4	3.0%	2	1.3%	11	6.9%	18	1.4%
12PM - 12:59PM	0	.0%	5	3.8%	3	1.9%	17	10.7%	25	1.9%
1PM - 1:59PM	2	.2%	4	3.0%	3	1.9%	11	6.9%	20	1.5%
2PM - 2:59PM	4	.5%	12	9.1%	1	.6%	10	6.3%	27	2.1%
3PM - 3:59PM	14	1.6%	7	5.3%	6	3.9%	11	6.9%	38	2.9%
4PM - 4:59PM	52	6.0%	5	3.8%	24	15.5%	9	5.7%	90	6.9%
5PM - 5:59PM	35	4.1%	1	.8%	25	16.1%	3	1.9%	64	4.9%
6PM - 6:59PM	2	.2%	0	.0%	3	1.9%	2	1.3%	7	.5%
7PM - 7:59PM	1	.1%	0	.0%	2	1.3%	2	1.3%	5	.4%
8PM - 8:59PM	0	.0%	0	.0%	0	.0%	1	.6%	1	.1%
9PM - 9:59PM	1	.1%	0	.0%	0	.0%	0	.0%	1	.1%
10PM - 10:59PM	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
11PM - 11:59PM	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
Total	861		132		155		159		1307	

If chose trip departure time to minimize traffic congestion

Approximately how long did it take you, door-to-door, to drive from <begin location> to <end location>?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than 20 minutes	135	7.4%	54	17.8%	31	8.3%	58	14.4%	278	9.6%
20 to 29 minutes	402	22.1%	88	28.9%	68	18.1%	98	24.3%	656	22.6%
30 to 39 minutes	482	26.5%	64	21.1%	73	19.5%	57	14.1%	676	23.3%
40 to 49 minutes	360	19.8%	46	15.1%	72	19.2%	53	13.2%	531	18.3%
50 to 59 minutes	172	9.5%	19	6.3%	36	9.6%	29	7.2%	256	8.8%
One hour or more	267	14.7%	33	10.9%	95	25.3%	108	26.8%	503	17.3%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Did you experience any delay due to traffic congestion on I-84 in downtown Hartford during your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	1169	64.3%	66	21.7%	213	56.8%	110	27.3%	1558	53.7%
No	649	35.7%	238	78.3%	162	43.2%	293	72.7%	1342	46.3%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Amount of delay experienced due to traffic congestion on I-84 in downtown Hartford

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
No delay	649	35.7%	238	78.3%	162	43.2%	293	72.7%	1342	46.3%
Less than 15 minutes	546	30.0%	30	9.9%	91	24.3%	51	12.7%	718	24.8%
15 to 29 minutes	501	27.6%	31	10.2%	88	23.5%	43	10.7%	663	22.9%
30 minutes or more	122	6.7%	5	1.6%	34	9.1%	16	4.0%	177	6.1%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

If experienced delay

Could you have arrived at your destination earlier?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
No, I could not have arrived any earlier	697	38.3%	163	53.6%	183	48.8%	176	43.7%	1219	42.0%
Yes, up to 15 minutes earlier	493	27.1%	69	22.7%	104	27.7%	93	23.1%	759	26.2%
Yes, up to 30 minutes earlier	316	17.4%	26	8.6%	48	12.8%	40	9.9%	430	14.8%
Yes, up to 1 hour earlier	193	10.6%	11	3.6%	22	5.9%	37	9.2%	263	9.1%
Yes, up to 2 hours earlier	56	3.1%	12	3.9%	6	1.6%	14	3.5%	88	3.0%
Yes, more than 2 hours earlier	63	3.5%	23	7.6%	12	3.2%	43	10.7%	141	4.9%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Could you have arrived at your destination later?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
No, I could not have arrived any later	923	50.8%	159	52.3%	169	45.1%	150	37.2%	1401	48.3%
Yes, up to 15 minutes later	379	20.8%	59	19.4%	88	23.5%	90	22.3%	616	21.2%
Yes, up to 30 minutes later	277	15.2%	23	7.6%	50	13.3%	64	15.9%	414	14.3%
Yes, up to 1 hour later	153	8.4%	27	8.9%	37	9.9%	34	8.4%	251	8.7%
Yes, up to 2 hours later	46	2.5%	14	4.6%	8	2.1%	17	4.2%	85	2.9%
Yes, more than 2 hours later	40	2.2%	22	7.2%	23	6.1%	48	11.9%	133	4.6%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Did you pay to park at any time during your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	852	50.1%	90	40.0%	N/A	N/A	N/A	N/A	942	48.9%
No	848	49.9%	135	60.0%	N/A	N/A	N/A	N/A	983	51.1%
Total	1700	100.0%	225	100.0%	N/A	N/A	N/A	N/A	1925	100.0%

If work commute trip

How much do you pay per day to park?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than $1.00	297	34.9%	29	32.2%	0	.0%	0	.0%	326	34.6%
$1.00 to $4.99	315	37.0%	33	36.7%	0	.0%	0	.0%	348	36.9%
$5.00 to $9.99	153	18.0%	19	21.1%	0	.0%	0	.0%	172	18.3%
$10.00 or more	87	10.2%	9	10.0%	0	.0%	0	.0%	96	10.2%
Total	852	100.0%	90	100.0%	0	0.0%	0	0.0%	942	100.0%

If work commute trip and paid to park

After parking, how did you get from your vehicle to your final destination?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Walked	1626	95.6%	209	92.9%	0	.0%	0	.0%	1835	95.3%
City bus	1	.1%	0	.0%	0	.0%	0	.0%	1	.1%
Shuttle van/private shuttle bus	33	1.9%	8	3.6%	0	.0%	0	.0%	41	2.1%
Other, please specify:	40	2.4%	8	3.6%	0	.0%	0	.0%	48	2.5%
Total	1700	100.0%	225	100.0%	0	.0%	0	.0%	1925	100.0%

If work commute trip

Including you, how many people were in the vehicle on your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1 (I drove alone)	1654	91.0%	275	90.5%	195	52.0%	194	48.1%	2318	79.9%
2 people	129	7.1%	25	8.2%	131	34.9%	158	39.2%	443	15.3%
3 people	18	1.0%	2	.7%	32	8.5%	29	7.2%	81	2.8%
4 people	7	.4%	2	.7%	8	2.1%	16	4.0%	33	1.1%
5 people	3	.2%	0	.0%	7	1.9%	5	1.2%	15	.5%
6 people or more	7	.4%	0	.0%	2	.5%	1	.2%	10	.3%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How often have you made this same trip, in this direction, between <begin location> and <end location> in the past 3 months (90 days)?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
5 or more times per week	890	49.0%	97	31.9%	24	6.4%	14	3.5%	1025	35.3%
4 times per week	311	17.1%	51	16.8%	14	3.7%	12	3.0%	388	13.4%
2-3 times per week	373	20.5%	53	17.4%	40	10.7%	41	10.2%	507	17.5%
1 time per week	61	3.4%	15	4.9%	28	7.5%	29	7.2%	133	4.6%
2-3 times per month	68	3.7%	38	12.5%	75	20.0%	91	22.6%	272	9.4%
1 time per month	51	2.8%	12	3.9%	59	15.7%	76	18.9%	198	6.8%
Less than 1 time per month	64	3.5%	38	12.5%	135	36.0%	140	34.7%	377	13.0%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Do you ever use alternate routes or transit to avoid using I-84 in downtown Hartford to make this same trip from <begin location> to <end location>? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I sometimes use I-91 and I-691 instead of I-84 in downtown Hartford to make this same trip	279	15.3%	54	17.8%	73	19.5%	90	22.3%	496	17.1%
Yes, I sometimes use local or city streets instead of I-84 in downtown Hartford to make this same trip	834	45.9%	128	42.1%	152	40.5%	141	35.0%	1255	43.3%
Yes, I sometimes use transit to make this same trip	63	3.5%	9	3.0%	6	1.6%	18	4.5%	96	3.3%
No, I do not use any alternate routes	791	43.5%	135	44.4%	166	44.3%	189	46.9%	1281	44.2%
Total	1818		304		375		403		2900	

Do you currently have an electronic toll transponder, such as E-ZPass, in your car for electronic toll collection? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I have an E-ZPass transponder	839	46.1%	112	36.8%	152	40.5%	164	40.7%	1267	43.7%
Yes, I have another type of transponder	15	.8%	0	.0%	3	.8%	4	1.0%	22	.8%
No, I do not have a transponder	966	53.1%	192	63.2%	220	58.7%	236	58.6%	1614	55.7%
Total	1818		304		375		403		2900	

Are you familiar with the public transit systems in and around Hartford?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	1108	60.9%	167	54.9%	179	47.7%	191	47.4%	1645	56.7%
No	710	39.1%	137	45.1%	196	52.3%	212	52.6%	1255	43.3%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How often do you use public transit in the Hartford area?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
5 or more days per week	4	.4%	3	1.8%	6	3.4%	2	1.0%	15	.9%
3-4 days per week	28	2.5%	4	2.4%	5	2.8%	8	4.2%	45	2.7%
1-2 days per week	28	2.5%	1	.6%	1	.6%	4	2.1%	34	2.1%
1-3 days per month	26	2.3%	6	3.6%	9	5.0%	14	7.3%	55	3.3%
Less than one day per month	108	9.7%	16	9.6%	29	16.2%	40	20.9%	193	11.7%
Never	914	82.5%	137	82.0%	129	72.1%	123	64.4%	1303	79.2%
Total	1108	100.0%	167	100.0%	179	100.0%	191	100.0%	1645	100.0%

If familiar with transit in the study region

Before you began taking this survey, how informed were you about the planned CTfastrak bus system?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Not at all informed	90	25.4%	22	34.9%	25	43.1%	19	29.7%	156	28.9%
Somewhat informed	174	49.0%	28	44.4%	24	41.4%	32	50.0%	258	47.8%
Very informed	91	25.6%	13	20.6%	9	15.5%	13	20.3%	126	23.3%
Total	355	100.0%	63	100.0%	58	100.0%	64	100.0%	540	100.0%

If trip is within CTfastrak corridor

1.2 Debrief and Opinion Questions

In the previous set of questions, what is the primary reason you never selected I-84 to make your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Toll cost is too high	38	6.5%	5	4.6%	10	8.7%	5	3.6%	58	6.2%
Opposed to paying tolls	347	59.7%	71	65.1%	64	55.7%	66	48.2%	548	58.2%
Opposed to rebuilding I-84 in downtown Hartford	2	.3%	1	.9%	2	1.7%	4	2.9%	9	1.0%
Time savings not worth the toll cost	134	23.1%	19	17.4%	26	22.6%	43	31.4%	222	23.6%
Do not want to set up a transponder account	4	.7%	0	.0%	0	.0%	3	2.2%	7	.7%
Do not want to use a transponder	2	.3%	0	.0%	2	1.7%	4	2.9%	8	.8%
Other, please specify:	54	9.3%	13	11.9%	11	9.6%	12	8.8%	90	9.6%
Total	581	100.0%	109	100.0%	115	100.0%	137	100.0%	942	100.0%

If never selected I-84 in SP experiments

Would you be more likely to travel before <peak period start time> or after <peak period end time>?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Travel before the peak	231	42.3%	0	.0%	54	37.5%	1	25.0%	286	41.2%
Travel after the peak	202	37.0%	1	100.0%	63	43.8%	2	50.0%	268	38.6%
Not Sure	113	20.7%	0	.0%	27	18.8%	1	25.0%	141	20.3%
Total	546	100.0%	1	100.0%	144	100.0%	4	100.0%	695	100.0%

If selected at least one time shift option in SP section

In the previous set of questions, what is the primary reason you never chose to change the departure time of your trip?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Do not have flexibility in arrival time due to work, school schedule, etc.	284	25.6%	1	20.0%	33	17.8%	1	8.3%	319	24.3%
Do not have flexibility in departure time due to work, school schedule, etc.	294	26.5%	1	20.0%	40	21.6%	0	.0%	335	25.5%
Parking cost or availability	15	1.4%	0	.0%	1	.5%	1	8.3%	17	1.3%
Time savings not enough	64	5.8%	1	20.0%	18	9.7%	3	25.0%	86	6.5%
Cost savings not enough	63	5.7%	1	20.0%	24	13.0%	1	8.3%	89	6.8%
Time required to shift current trip is too great	36	3.2%	1	20.0%	4	2.2%	0	.0%	41	3.1%
Other appointments prevent changing travel time	45	4.1%	0	.0%	15	8.1%	0	.0%	60	4.6%
Prefer my current departure time	244	22.0%	0	.0%	36	19.5%	4	33.3%	284	21.6%
Other, please specify:	66	5.9%	0	.0%	14	7.6%	2	16.7%	82	6.2%
Total	1111	100.0%	5	100.0%	185	100.0%	12	100.0%	1313	100.0%

If never selected time shift option in SP section

What improvements to transit in the Hartford region would make you more likely to consider transit for your trips in the Hartford region? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Transit stop closer to origin/destination	339	30.7%	53	31.2%	58	32.6%	37	20.3%	487	29.8%
More frequent transit service	319	28.9%	46	27.1%	48	27.0%	39	21.4%	452	27.7%
More reliable transit service	173	15.7%	36	21.2%	34	19.1%	32	17.6%	275	16.8%
Guaranteed ride home program in case of an emergency	264	23.9%	38	22.4%	26	14.6%	19	10.4%	347	21.2%
Lower cost	232	21.0%	36	21.2%	34	19.1%	43	23.6%	345	21.1%
Other, please specify:	248	22.5%	37	21.8%	38	21.3%	35	19.2%	358	21.9%
None of the above	321	29.1%	61	35.9%	51	28.7%	69	37.9%	502	30.7%
Total	1103		170		178		182		1633	

If never selected transit option in SP section

If the toll was <toll from toll alternative plus $1 as surcharge> for video tolling but <toll from toll alternative> if you had a transponder, how would you pay the toll?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Very likely to pay the toll with a transponder	149	74.1%	27	64.3%	31	63.3%	27	58.7%	234	69.2%
Somewhat likely to pay the toll with a transponder	27	13.4%	3	7.1%	3	6.1%	6	13.0%	39	11.5%
Not sure	22	10.9%	7	16.7%	13	26.5%	9	19.6%	51	15.1%
Somewhat unlikely to pay by video tolling (would not get a transponder)	0	0.0%	1	2.4%	0	0.0%	0	0.0%	1	0.3%
Very unlikely to pay by video tolling (would not get a transponder)	3	1.5%	4	9.5%	2	4.1%	4	8.7%	13	3.8%
Total	201	100.0%	42	100.0%	49	100.0%	46	100.0%	338	100.0%

If respondent does not own ETC and selected at least one I-84 alternative

If the toll was <toll from toll alternative plus $2 as surcharge> for video tolling but <toll from toll alternative> if you had a transponder, how would you pay the toll?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Very likely to pay the toll with a transponder	139	72.0%	24	68.6%	25	65.8%	34	59.6%	222	68.7%
Somewhat likely to pay the toll with a transponder	21	10.9%	6	17.1%	8	21.1%	9	15.8%	44	13.6%
Not sure	28	14.5%	3	8.6%	5	13.2%	10	17.5%	46	14.2%
Somewhat unlikely to pay by video tolling (would not get a transponder)	4	2.1%	0	0.0%	0	0.0%	2	3.5%	6	1.9%
Very unlikely to pay by video tolling (would not get a transponder)	1	0.5%	2	5.7%	0	0.0%	2	3.5%	5	1.5%
Total	193	100.0%	35	100.0%	38	100.0%	57	100.0%	323	100.0%

If respondent does not own ETC and selected at least one I-84 alternative

If the toll was <toll from toll alternative plus $3 as surcharge> for video tolling but <toll from toll alternative> if you had a transponder, how would you pay the toll?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Very likely to pay the toll with a transponder	177	81.6%	29	76.3%	38	66.7%	22	56.4%	266	75.8%
Somewhat likely to pay the toll with a transponder	20	9.2%	6	15.8%	8	14.0%	2	5.1%	36	10.3%
Not sure	18	8.3%	2	5.3%	10	17.5%	11	28.2%	41	11.7%
Somewhat unlikely to pay by video tolling (would not get a transponder)	0	0.0%	0	0.0%	1	1.8%	3	7.7%	4	1.1%
Very unlikely to pay by video tolling (would not get a transponder)	2	0.9%	1	2.6%	0	0.0%	1	2.6%	4	1.1%
Total	217	100.0%	38	100.0%	57	100.0%	39	100.0%	351	100.0%

If respondent does not own ETC and selected at least one I-84 alternative

Which of the following best describes why you would be unlikely to pay the toll with a transponder?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Do not know enough about electronic toll collection	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
Will not use I-84 in downtown Hartford enough	0	.0%	1	12.5%	2	66.7%	3	25.0%	6	18.2%
Do not like the idea of electronic tolling	0	.0%	0	.0%	0	.0%	0	.0%	0	.0%
Do not want a transponder in my car	3	30.0%	4	50.0%	0	.0%	2	16.7%	9	27.3%
Do not want to set up an account	0	.0%	0	.0%	0	.0%	1	8.3%	1	3.0%
Do not want to prepay tolls	0	.0%	1	12.5%	0	.0%	1	8.3%	2	6.1%
Too expensive	3	30.0%	2	25.0%	1	33.3%	2	16.7%	8	24.2%
Concerned about privacy	3	30.0%	0	.0%	0	.0%	1	8.3%	4	12.1%
Too difficult to maintain account	1	10.0%	0	.0%	0	.0%	0	.0%	1	3.0%
Other, please specify:	0	.0%	0	.0%	0	.0%	2	16.7%	2	6.1%
Total	10	100.0%	8	100.0%	3	100.0%	12	100.0%	33	100.0%

If respondent does not own ETC and selected at least one tolled alternative

Given that major improvements are necessary to I-84 and must be paid for, which of the following best describes how you feel about Value Pricing on I-84 in the Greater Hartford area?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly favor	138	7.6%	27	8.9%	31	8.3%	44	10.9%	240	8.3%
Somewhat favor	300	16.5%	61	20.1%	92	24.5%	93	23.1%	546	18.8%
Neutral	354	19.5%	52	17.1%	95	25.3%	88	21.8%	589	20.3%
Somewhat opposed	340	18.7%	58	19.1%	48	12.8%	69	17.1%	515	17.8%
Strongly opposed	686	37.7%	106	34.9%	109	29.1%	109	27.0%	1010	34.8%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Why are you opposed to Value Pricing on I-84 in the Greater Hartford area? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Opposed to paying tolls in general	415	40.4%	65	39.6%	54	34.4%	77	43.3%	611	40.1%
Opposed to paying tolls on I-84	447	43.6%	75	45.7%	84	53.5%	81	45.5%	687	45.0%
Toll costs are too high	267	26.0%	33	20.1%	39	24.8%	40	22.5%	379	24.9%
Do not like electronic toll collection	72	7.0%	14	8.5%	17	10.8%	28	15.7%	131	8.6%
Opposed to spending money on construction projects	79	7.7%	11	6.7%	12	7.6%	18	10.1%	120	7.9%
Would rather see more investments in alternative transportation options such as transit	139	13.5%	25	15.2%	24	15.3%	29	16.3%	217	14.2%
Other, please specify:	365	35.6%	52	31.7%	44	28.0%	42	23.6%	503	33.0%
Total	1026		164		157		178		1525	

If somewhat or strongly opposed to Value Pricing on I-84

Why are you in favor of Value Pricing on I-84 in the Greater Hartford area? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Shorter travel time	225	51.4%	45	51.1%	42	34.1%	60	43.8%	372	47.3%
More reliable travel time	192	43.8%	38	43.2%	41	33.3%	50	36.5%	321	40.8%
Less congestion	268	61.2%	54	61.4%	68	55.3%	77	56.2%	467	59.4%
Improved roadway conditions	248	56.6%	58	65.9%	71	57.7%	81	59.1%	458	58.3%
Safer road conditions	201	45.9%	42	47.7%	59	48.0%	66	48.2%	368	46.8%
Generates revenue for transportation improvements and maintenance	238	54.3%	57	64.8%	65	52.8%	98	71.5%	458	58.3%
Reduced emissions and improved air quality	118	26.9%	25	28.4%	26	21.1%	51	37.2%	220	28.0%
Other, please specify:	22	5.0%	4	4.5%	10	8.1%	16	11.7%	52	6.6%
Total	438		88		123		137		786	

If strongly or somewhat in favor of Value Pricing on I-84

How strongly do you agree or disagree the following statement?: I will pay a reasonable toll if it assures me my travel won't be slowed by traffic conditions

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	248	13.6%	40	13.2%	52	13.9%	70	17.4%	410	14.1%
Agree	637	35.0%	102	33.6%	164	43.7%	148	36.7%	1051	36.2%
Neutral	303	16.7%	45	14.8%	58	15.5%	78	19.4%	484	16.7%
Disagree	240	13.2%	41	13.5%	39	10.4%	47	11.7%	367	12.7%
Strongly Disagree	390	21.5%	76	25.0%	62	16.5%	60	14.9%	588	20.3%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How strongly do you agree or disagree with the following statement?: I can generally afford to pay tolls

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	281	15.5%	55	18.1%	68	18.1%	86	21.3%	490	16.9%
Agree	608	33.4%	97	31.9%	153	40.8%	145	36.0%	1003	34.6%
Neutral	380	20.9%	61	20.1%	75	20.0%	81	20.1%	597	20.6%
Disagree	252	13.9%	37	12.2%	37	9.9%	43	10.7%	369	12.7%
Strongly Disagree	297	16.3%	54	17.8%	42	11.2%	48	11.9%	441	15.2%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How strongly do you agree or disagree with following statement?: I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	226	12.4%	40	13.2%	41	10.9%	62	15.4%	369	12.7%
Agree	606	33.3%	96	31.6%	154	41.1%	146	36.2%	1002	34.6%
Neutral	314	17.3%	52	17.1%	69	18.4%	78	19.4%	513	17.7%
Disagree	250	13.8%	41	13.5%	44	11.7%	55	13.6%	390	13.4%
Strongly Disagree	422	23.2%	75	24.7%	67	17.9%	62	15.4%	626	21.6%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How strongly do you agree or disagree with the following statement?: I will use a toll route if the tolls are reasonable and I save time

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	255	14.0%	46	15.1%	55	14.7%	75	18.6%	431	14.9%
Agree	657	36.1%	102	33.6%	163	43.5%	146	36.2%	1068	36.8%
Neutral	320	17.6%	44	14.5%	63	16.8%	80	19.9%	507	17.5%
Disagree	215	11.8%	35	11.5%	37	9.9%	44	10.9%	331	11.4%
Strongly Disagree	371	20.4%	77	25.3%	57	15.2%	58	14.4%	563	19.4%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How strongly do you agree or disagree with the following statement?: I support using reasonably priced tolls to pay for highway improvements

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	160	8.8%	34	11.2%	37	9.9%	62	15.4%	293	10.1%
Agree	521	28.7%	93	30.6%	125	33.3%	137	34.0%	876	30.2%
Neutral	332	18.3%	42	13.8%	82	21.9%	72	17.9%	528	18.2%
Disagree	317	17.4%	49	16.1%	49	13.1%	60	14.9%	475	16.4%
Strongly Disagree	488	26.8%	86	28.3%	82	21.9%	72	17.9%	728	25.1%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How strongly do you agree or disagree with the following statement?: I support increased or new taxes to pay for highway improvements

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	102	5.6%	17	5.6%	21	5.6%	35	8.7%	175	6.0%
Agree	326	17.9%	47	15.5%	69	18.4%	76	18.9%	518	17.9%
Neutral	345	19.0%	58	19.1%	99	26.4%	88	21.8%	590	20.3%
Disagree	397	21.8%	71	23.4%	72	19.2%	99	24.6%	639	22.0%
Strongly Disagree	648	35.6%	111	36.5%	114	30.4%	105	26.1%	978	33.7%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

1.3 Demographic Questions

What is your gender?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Female	1010	55.6%	166	54.6%	227	60.5%	221	54.8%	1624	56.0%
Male	808	44.4%	138	45.4%	148	39.5%	182	45.2%	1276	44.0%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Which category best indicates your age?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
16–24	87	4.8%	13	4.3%	23	6.1%	34	8.4%	157	5.4%
25–34	392	21.6%	50	16.4%	51	13.6%	68	16.9%	561	19.3%
35–44	404	22.2%	59	19.4%	60	16.0%	57	14.1%	580	20.0%
45–54	537	29.5%	96	31.6%	93	24.8%	82	20.3%	808	27.9%
55–64	358	19.7%	68	22.4%	92	24.5%	89	22.1%	607	20.9%
65–74	38	2.1%	17	5.6%	49	13.1%	60	14.9%	164	5.7%
75 or older	2	.1%	1	.3%	7	1.9%	13	3.2%	23	.8%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

What is your employment status?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Employed full-time	1643	90.4%	244	80.3%	205	54.7%	191	47.4%	2283	78.7%
Employed part-time	80	4.4%	23	7.6%	32	8.5%	34	8.4%	169	5.8%
Self-employed	30	1.7%	18	5.9%	26	6.9%	32	7.9%	106	3.7%
Student	12	.7%	2	.7%	13	3.5%	10	2.5%	37	1.3%
Student and employed	34	1.9%	6	2.0%	9	2.4%	23	5.7%	72	2.5%
Homemaker	0	.0%	0	.0%	9	2.4%	13	3.2%	22	.8%
Retired	12	.7%	7	2.3%	63	16.8%	78	19.4%	160	5.5%
Disabled and unable to work	1	.1%	1	.3%	5	1.3%	6	1.5%	13	.4%
Unemployed and looking for work	6	.3%	3	1.0%	13	3.5%	13	3.2%	35	1.2%
Unemployed and not looking for work	0	.0%	0	.0%	0	.0%	3	.7%	3	.1%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How many people live in your household?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1 (I live alone)	241	13.3%	42	13.8%	71	18.9%	90	22.3%	444	15.3%
2 people	573	31.5%	110	36.2%	146	38.9%	162	40.2%	991	34.2%
3 people	368	20.2%	57	18.8%	63	16.8%	69	17.1%	557	19.2%
4 people	422	23.2%	62	20.4%	55	14.7%	51	12.7%	590	20.3%
5 or more people	214	11.8%	33	10.9%	40	10.7%	31	7.7%	318	11.0%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

How many vehicles are there in your household?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0 (no vehicles)	2	.1%	0	.0%	6	1.6%	4	1.0%	12	.4%
1 vehicle	378	20.8%	68	22.4%	100	26.7%	118	29.3%	664	22.9%
2 vehicles	815	44.8%	123	40.5%	172	45.9%	178	44.2%	1288	44.4%
3 vehicles	397	21.8%	66	21.7%	65	17.3%	61	15.1%	589	20.3%
4 vehicles	172	9.5%	31	10.2%	21	5.6%	30	7.4%	254	8.8%
5 or more vehicles	54	3.0%	16	5.3%	11	2.9%	12	3.0%	93	3.2%
Total	1818	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Are you a person of Hispanic, Latino or Spanish origin?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I am of Hispanic, Latino or Spanish origin	71	3.9%	20	6.6%	22	5.9%	21	5.2%	134	4.6%
No, I am not of Hispanic, Latino or Spanish origin	1687	92.8%	278	91.4%	347	92.5%	370	91.8%	2682	92.5%
Rather not say	60	3.3%	6	2.0%	6	1.6%	12	3.0%	84	2.9%
Total	1758	100.0%	304	100.0%	375	100.0%	403	100.0%	2900	100.0%

Which of the following categories best describes your race? (Select all that apply)

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Asian/Pacific Islander	79	4.3%	12	3.9%	12	3.2%	8	2.0%	111	3.8%
American Indian/Alaska Native	8	.4%	5	1.6%	2	.5%	7	1.7%	22	.8%
Black/African-American	58	3.2%	12	3.9%	23	6.1%	35	8.7%	128	4.4%
White/Caucasian	1441	79.3%	234	77.0%	292	77.9%	315	78.2%	2282	78.7%
Other	72	4.0%	16	5.3%	21	5.6%	20	5.0%	129	4.4%
Rather not say	177	9.7%	29	9.5%	27	7.2%	33	8.2%	266	9.2%
Total	1818		304		375		403		2900	

What category best indicates your 2012 household annual income before taxes?

	Peak Work		Off-peak Work		Peak Non-work		Off-peak Non-work		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than $15,000	13	.8%	9	3.2%	10	2.9%	24	6.6%	56	2.1%
$15,000–$24,999	17	1.0%	6	2.2%	14	4.0%	16	4.4%	53	2.0%
$25,000-$34,999	39	2.3%	12	4.3%	16	4.6%	26	7.1%	93	3.5%
$35,000–$49,999	88	5.2%	23	8.2%	35	10.1%	35	9.6%	181	6.8%
$50,000–$74,999	290	17.3%	40	14.3%	66	19.0%	64	17.5%	460	17.2%
$75,000–$99,999	296	17.7%	57	20.4%	63	18.2%	65	17.8%	481	18.0%
$100,000–$124,999	295	17.6%	48	17.2%	60	17.3%	52	14.2%	455	17.0%
$125,000–$149,999	199	11.9%	33	11.8%	28	8.1%	33	9.0%	293	11.0%
$150,000-$199,999	240	14.3%	30	10.8%	35	10.1%	29	7.9%	334	12.5%
$200,000-$249,999	99	5.9%	11	3.9%	11	3.2%	13	3.6%	134	5.0%
$250,000 or more	101	6.0%	10	3.6%	9	2.6%	9	2.5%	129	4.8%
Total	1677	100.0%	279	100.0%	347	100.0%	366	100.0%	2669	100.0%

2.0 COMMERCIAL VEHICLE SURVEY TABULATIONS

2.1 Trip Characteristic Questions

What is your primary type of work?

	Count	Percent
Owner-operator (you own your truck and contract your own loads)	42	17.2%
Contract owner-operator (you own your truck but you are contracted to a carrier)	28	11.5%
Fleet driver (you do not own your truck and you are employed by a carrier)	173	70.9%
Other, please specify:	1	.4%
Total	244	100.0%

Who makes the routing decisions for your vehicle?

	Count	Percent
I make all routing decisions	166	68.0%
I make some routing decisions	58	23.8%
Someone else makes all routing decisions	20	8.2%
Total	244	100.0%

Are you currently making a trip that used I-84 in downtown Hartford?

	Count	Percent
Yes	197	80.7%
No	47	19.3%
Total	244	100.0%

<Did/Will> you complete your most recent trip that used I-84 in downtown Hartford in one day?

	Count	Percent
Yes	186	76.2%
No	58	23.8%
Total	244	100.0%

How many days <did/will> it take you to make your trip in one direction only?

	Count	Percent
1	5	8.6%
2	30	51.7%
3	10	17.2%
4	7	12.1%
5	4	6.9%
6	1	1.7%
10	1	1.7%
Total	58	100.0%

If trip took more than one day

How long (in miles) <was your trip/will your trip be>?

	Count	Percent
Less than 100 miles	19	7.8%
100 to 249 miles	52	21.3%
250 to 499 miles	56	23.0%
500 to 749 miles	43	17.6%
750 to 999 miles	17	7.0%
1000 miles or more	57	23.4%
Total	244	100.0%

At approximately what time did you drive into downtown Hartford on I-84?

	Count	Percent
12AM - 12:59AM	2	.8%
1AM - 1:59AM	4	1.6%
2AM - 2:59AM	6	2.5%
3AM - 3:59AM	3	1.2%
4AM - 4:59AM	8	3.3%
5AM - 5:59AM	9	3.7%
6AM - 6:59AM	9	3.7%
7AM - 7:59AM	5	2.0%
8AM - 8:59AM	13	5.3%
9AM - 9:59AM	7	2.9%
10AM - 10:59AM	16	6.6%
11AM - 11:59AM	17	7.0%
12PM - 12:59PM	27	11.1%
1PM - 1:59PM	24	9.8%
2PM - 2:59PM	24	9.8%
3PM - 3:59PM	21	8.6%
4PM - 4:59PM	19	7.8%
5PM - 5:59PM	10	4.1%
6PM - 6:59PM	3	1.2%
7PM - 7:59PM	4	1.6%
8PM - 8:59PM	4	1.6%
9PM - 9:59PM	4	1.6%
10PM - 10:59PM	2	.8%
11PM - 11:59PM	3	1.2%
Total	244	100.0%

Approximately how long <did/will> it take you to make your trip?

	Count	Percent
Less than 2 hours	18	7.4%
2 to 4 hours	37	15.2%
4 to 6 hours	41	16.8%
6 to 8 hours	37	15.2%
8 to 10 hours	23	9.4%
10 to 12 hours	31	12.7%
12 hours or more	57	23.4%
Total	244	100.0%

Did you experience any delay due to traffic congestion on I-84 in downtown Hartford during your trip?

	Count	Percent
Yes	133	54.5%
No	111	45.5%
Total	244	100.0%

Amount of delay experienced due to traffic congestion

	Count	Percent
No delay	111	45.5%
Less than 30 minutes	37	15.2%
30 to 59 minutes	43	17.6%
One hour or more	53	21.7%
Total	244	100.0%

If experienced delay

<Did you/Will you> pay any tolls during your trip?

	Count	Percent
Yes	175	71.7%
No	69	28.3%
Total	244	100.0%

Toll amount paid on recent or current trip

	Count	Percent
No tolls	69	28.3%
Less than $10.00	12	4.9%
$10 to $19.99	47	19.3%
$20 to $29.99	28	11.5%
$30 to $39.99	14	5.7%
$40.00 or more	74	30.3%
Total	244	100.0%

If paid a toll

How many axles <did your vehicle have for your trip/does your vehicle have>?

	Count	Percent
2 axles	8	3.3%
3 axles	4	1.6%
4 axles	8	3.3%
5 axles	207	84.8%
6 axles	8	3.3%
7 axles	2	.8%
8 or more axles	7	2.9%
Total	244	100.0%

How often do you make this same trip, in this direction?

	Count	Percent
6 or more times per week	6	2.5%
4-5 times per week	10	4.1%
2-3 times per week	50	20.5%
Once per week	37	15.2%
2-3 times per month	51	20.9%
Once per month	23	9.4%
Less than once per month	53	21.7%
I don't know	14	5.7%
Total	244	100.0%

Do you use any alternate routes instead of I-84 to make the same trip? (Select all that apply)

	Count	Percent
Yes, I sometimes use I-91 and I-691 instead of I-84 in downtown Hartford to make this same trip	158	64.8%
Yes, I sometimes use local or city streets instead of I-84 in downtown Hartford to make this same trip	14	5.7%
No, I do not use any alternate routes.	78	32.0%
Total	244	

Do have an electronic transponder to pay for any tolls? (Select all that apply)

	Count	Percent
Yes, I have an E-ZPass transponder	162	66.4%
Yes, I have another type of transponder	5	2.0%
No, I do not have a transponder	78	32.0%
Total	244	

2.2 Debrief and Opinion Questions

In the previous set of questions, what is the primary reason you never selected I-84 to make your trip?

	Count	Percent
Toll cost is too high	16	12.4%
Opposed to paying tolls	64	49.6%
Company policy not to pay tolls	7	5.4%
Opposed to rebuilding I-84 in downtown Hartford	2	1.6%
Time savings not worth the toll cost	29	22.5%
Do not want to use a transponder	5	3.9%
Other, please specify:	6	4.7%
Total	129	100.0%

If never selected I-84 in SP experiments

Given that major improvements are necessary to I-84 and must be paid for, which of the following best describes how you feel about Value Pricing on I-84 in the Greater Hartford area?

	Count	Percent
Strongly favor	17	7.0%
Somewhat favor	34	13.9%
Neutral	61	25.0%
Somewhat opposed	32	13.1%
Strongly opposed	100	41.0%
Total	244	100.0%

Why are you in favor of Value Pricing on I-84 in the Greater Hartford area? (Select all that apply)

	Count	Percent
Shorter travel time	18	35.3%
More reliable travel time	19	37.3%
Less congestion	25	49.0%
Improved roadway conditions	30	58.8%
Safer road conditions	21	41.2%
Generates revenue for transportation improvements and maintenance	16	31.4%
Reduced emissions and improved air quality	12	23.5%
Other, please specify:	2	3.9%
Total	51	

If strongly or somewhat in favor of Value Pricing on I-84

Why are you opposed to Value Pricing on I-84 in the Greater Hartford area? (Select all that apply)

	Count	Percent
Opposed to paying tolls in general	63	47.7%
Opposed to paying tolls on I-84	25	18.9%
Toll costs are too high	41	31.1%
Do not like electronic toll collection	8	6.1%
Opposed to spending money on construction projects	7	5.3%
Would rather see more investments in alternative transportation options such as transit	4	3.0%
Other, please specify:	30	22.7%
Total	132	

If strongly or somewhat opposed of Value Pricing on I-84

How strongly do you agree or disagree with the following statement: I will pay a toll if it assures me my travel won't be slowed by traffic conditions

	Count	Percent
Strongly agree	52	21.3%
Somewhat agree	67	27.5%
Neutral	42	17.2%
Somewhat disagree	17	7.0%
Strongly disagree	66	27.0%
Total	244	100.0%

How strongly do you agree or disagree with the following statement: I can generally afford to pay tolls

	Count	Percent
Strongly agree	54	22.1%
Somewhat agree	61	25.0%
Neutral	44	18.0%
Somewhat disagree	32	13.1%
Strongly disagree	53	21.7%
Total	244	100.0%

How strongly do you agree or disagree with the following statement: I would be willing to pay a toll if it guarantees a travel time for my trip that is reliable

	Count	Percent
Strongly agree	50	20.5%
Somewhat agree	58	23.8%
Neutral	43	17.6%
Somewhat disagree	22	9.0%
Strongly disagree	71	29.1%
Total	244	100.0%

How strongly do you agree or disagree with the following statement: I will use a toll route if the tolls are reasonable and I save time

	Count	Percent
Strongly agree	54	22.1%
Somewhat agree	80	32.8%
Neutral	35	14.3%
Somewhat disagree	21	8.6%
Strongly disagree	54	22.1%
Total	244	100.0%

How strongly do you agree or disagree with the following statement: I support using tolls to pay for highway improvements

	Count	Percent
Strongly agree	33	13.5%
Somewhat agree	51	20.9%
Neutral	41	16.8%
Somewhat disagree	20	8.2%
Strongly disagree	99	40.6%
Total	244	100.0%

How strongly do you agree or disagree with the following statement: I support increased or new taxes to pay for highway improvements

	Count	Percent
Strongly agree	29	11.9%
Somewhat agree	51	20.9%
Neutral	44	18.0%
Somewhat disagree	29	11.9%
Strongly disagree	91	37.3%
Total	244	100.0%

2.3 Company Detail Questions

Where is your company's base of operations located?

	Count	Percent
Connecticut	18	7.4%
Massachusetts	7	2.9%
New York	6	2.5%
Pennsylvania	28	11.5%
Other location WITHIN the U.S.	174	71.3%
Canada	3	1.2%
Mexico	1	.4%
Other location OUTSIDE the U.S.	7	2.9%
Total	244	100.0%

Approximately how many vehicles does your company operate?

	Count	Percent
19 or fewer vehicles	34	19.5%
20 – 99 vehicles	35	20.1%
100 – 499 vehicles	34	19.5%
500 or more vehicles	63	36.2%
I don't know	8	4.6%
Total	174	100.0%

What is the typical length of the trips you usually make?

	Count	Percent
Local (less than 50 miles)	1	.4%
Short haul (50–199 miles)	11	4.5%
Medium haul (200–499 miles)	44	18.0%
Long haul (500 or more miles)	185	75.8%
I don't know	3	1.2%
Total	244	100.0%

Would you say you typically have a flexible or fixed delivery schedule?

	Count	Percent
Flexible	152	62.3%
Fixed	92	37.7%
Total	244	100.0%

How much flexibility do you typically have in your shipment delivery schedule?

	Count	Percent
Less than 30 minutes	20	13.2%
30 to 59 minutes	27	17.8%
1 hour to 1 hour and 59 minutes	19	12.5%
2 hours to 3 hours and 59 minutes	26	17.1%
4 hours to 5 hours and 59 minutes	6	3.9%
6 hours or more	54	35.5%
Total	152	100.0%

If flexible schedule

Do you have a penalty or incentive time frame structure for deliveries?

	Count	Percent
Penalty	56	23.0%
Incentive	11	4.5%
Both	47	19.3%
Neither	130	53.3%
Total	244	100.0%

Who is generally responsible for paying toll costs that you incur?

	Count	Percent
I pay tolls	74	30.3%
I pay tolls but my company reimburses me	34	13.9%
My company pays tolls directly (e.g. using E-ZPass or other transponder)	135	55.3%
I never use toll roads	1	.4%
Total	244	100.0%

How does the company typically charge customers for tolls?

	Count	Percent
Tolls are part of the total shipment cost	49	20.1%
Tolls are charged as separate line items	20	8.2%
I don't know	173	70.9%
I never use toll roads	2	.8%
Total	244	100.0%

What sources of information do you use when making route decisions? (Select all that apply)

	Count	Percent
GPS	182	74.6%
Smartphone	51	20.9%
Road map	126	51.6%
Online mapping using a personal computer (i.e. Google Maps, MapQuest, etc.)	35	14.3%
PC Miler	19	7.8%
CB radio	46	18.9%
Local knowledge	68	27.9%
Traffic reports	47	19.3%
Other, please specify:	8	3.3%
None of the above	1	.4%
Total	244	

RSG INC.
TRANSPORTATION

Connecticut I-84 Stated Preference Survey Report

Appendix C: Comments

September 2013

DATA ■ ANALYSIS ■ SOLUTIONS

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Before clicking the "End Survey" button on the last page of the survey, respondents had the opportunity to leave open-ended comments. These comments about the project and the survey itself are presented below, edited only for profane or inappropriate remarks. Comments are presented separately for the passenger and commercial vehicle surveys and have been categorized according to content.

1.0 PASSENGER VEHICLE SURVEY OPEN-ENDED COMMENTS

1.1 Positive or Neutral Comments about the Project

- I am strongly in favor of tolls wherever necessary in order to insure that all roadways are safe and allow traffic to move at a reasonable rate of speed thereby reducing emissions and protecting to ozone.
- I'm not opposed to paying tolls, but I am opposed to video taping the highway. I think it's a breach of privacy and am afraid it will also be used to distribute tickets.
- I am willing to pay tolls as long as it does not increase time.
- Reasonable payments to me are below $.50. That section doers need to be replaced and is in danger of collapse, so I've been told.
- Bring back tolls to support the roads but ONLY with efficient, high speed transponder system similar to Atlanta GA highways
- I think they are very good. The transit they have for the people - a very good idea. People do get older and you never know when you need.
- Connecticut should have been brought back tolls to lessen the taxes on its residence.
- Strongly agree with tolls; out-of-state people are getting a "free ride" there should be tolls for them too not just people who live here. The money obtained from the tolls should be used for the road maintenance.
- I like the idea of having an option to pay a SMALL TOLL to eliminate traffic backups - similar to Henry Hudson Parkway in Manhattan.
- Tolls should not more than 30 cents around Hartford, CT area.
- We should have kept the tolls at the borders and dedicate revenue to highway improvement, upkeep
- Think we should have tolls in CT
- Tolls are okay if revenue is dedicated toward reasonably priced road improvements and toll plazas are not required
- I do not mind paying a toll, as long as it is not too high. The higher the toll, the more likely I would try to find an alternate route.....
- road needs to be fixed
- I feel that tolls should be placed in the state to pay for road work and improvements. We need an avenue to lower taxes in CT, this would be a step in the right direction.
- If it can reduce congestion then I am for it.
- I support tolls in general, but I can't afford it.
- I support use of reasonable tolls for infrastructure financing, but I also would like to see more equitable taxation of the very wealthy who are not paying their share.

- I do agree that people that use the highway should pay for the repairs by tolls and should not be paid by increased taxes. People that don't use them shouldn't pat. The tolls should be reasonable though for the daily traveler. We don't need anymore reasons to make it harder on workers to afford living in our state.
- I am in favor of major improvements for I84 intersect with I91. Since Connecticut has a high gas tax, my concern is that this tax should also be discussed as part of this proposed "value priced" toll. Also, I think options for HOV lanes to generate income should also be included in this discussion.
- I strongly support the installation of electronic tolls on all major, high-traffic highways in Connecticut, especially at the borders of New York and Massachussetts. There is much traffic from these states that comes through CT, and we also must pay to enter and leave these states.
- Glad you are researching this! We need tolls for the major highways in the State of Connecticut to help our revenue base to improve transit and our highways. It's unacceptable that this is done soley via taxes. Non-residents that use our roads should be paying!
- The merging of I-84 and I-91 in downtown Hartford is a disaster and needs to be rethought and redesigned. I don't mind paying tolls or higher taxes to travel more safely.
- Get it done soon, these roads suck!
- good luck! You are figthing an up hill battle
- I would be willing to pay a small toll, .25 or so to help with the costs...more than that would be a burden to many.
- I think Connecticut should have tolls, but not in Hartford! Using an advanced toll system, like some in New Jersey or New York would be great. But, only put then at the entry points to the state. Not in Hartford, so mostly Connecticut commuters have to pay for everything. It wouldn't be fair to us! We pay tolls in New York, New Jersey and Massachusetts when we're there. Why shouldn't travelers and truckers pay a toll for using Connecticut roads? It would be the fairest way to pay for highway maintenance and repairs.
- While I generally support tolls in CT, I do not think I-84 in Hartford is the location that should be considered, not because I use it, but because it is too easy for drivers to get off the highway for an exit or two to avoid the toll.
- I am opposed to tolls that get to high and outprice many, to save time and congestion. I am in favor of a moderate toll to fund the roads.
- I am not apposed to tolls in Connecticut. I do not believe they belong in downtown Hartford.
- I support tolls but only at the State borders so out of state drivers & truckers don't use our state roads for free...
- Speed up the completion of CT Fast Track
- I agree that constuction is necessary on 84, on and off ramp changes along would greatly impoved the traffic pattern, as most congestion is because people are trying to get on the highway while others are trying to get off, (merging is not something people like to do in CT). I however, do not believe tolls are the way to fund this. There are many people that commute long distances to work in Hartford the price of gas,and vehicle maintenance alone is rising, we don't need an added expense just to get to work. If you add tolls, not only am I paying for my gas, parking and maintenance now your adding several more dollars a weeks to drive on 1 mile of highway. There are many MA residents who work in Hartford, it may be beneficial for you to look at improving train and bus service to an from Hartford and Springfield, similar to the bus line you are creating from Hartford to New Britian.
- I do not mind tolls and taxes, it would be nice to have roads that are well planned out, dont take 25-30 years to complete (E.g. I-95 south/north), and if taxes are raised make it for a valid enough reason that also means they don't stay high forever and are used as intended and described. Also final bit would be

not to use the video tolls to monitor traffic violations and other info that they weren't intended for as i know sometimes people need to jump out of the way or hit brakes because of other inconsiderate drivers. As long as everything mentioned is implemented as close to or exactly as described i would have no problem with this system, 84 tends to be really congested and there have been a lot more times that its taken 35-45 mins to get to work on a 15 min trip. Thanks.

- Nice work and good luck.
- The key here is "reasonable" toll cost as the taxes level in this state is aleady at a level which makes it diffcult to make ends meet. I would be more supportive of toll cost if the gas tax was reduced as well.
- I would be more willing to pay tolls (or pay higher tolls) for improvements to I-84 if the design were substantially different, such as lowering/burying the highway and creating a "green" area or park next to/above it.
- Using today as an example for travel time was not an average example due to a crash near 84/384 on july 15. Typically my travel time is 15 min to at the most 30 min. I need the flexibility of driving because I have children and that is the primarly reason I won't consider bus service. I do not mind tolls as long as it doesn't slow the commute. There is no reason with ezpass that we need traffic to come to a grinding halt to pay tolls. Any cash lanes will cause that to happen as people try to jockey to get into those lanes. The traffic patterns for the 84/91 merge, the brige and the tunnel already impact the traffic and I would hate to see more of that. I do not have the luxury of picking an alternate commute time because I have an obligation for my children for school and my employer. Good luck with your analysis. Hartford is a small city and shouldn't have to have grid lock.
- I support implementation of tolls to pay for road improvements and maintenance over a specified period of time. I DO NOT support the open-ended continuation and increased charges of toll services. People need to know what they will pay for, how much it will cost and when the charges will end because the project is paid for as projected.
- I am in favor of tolls in CT becuase I want the income from out-of-state drivers. Just as Mass. does! CT is missing out on vital income and these out-of-state drivers are not buying gas in CT either! But it must be reasonably priced otherwise I see drivers coming thru the backroads of Hartford and creating new congestion problems!. Also, I work for a major Hartford in employer. In the last 3 years I have been hit with new parking fees (1,200. per year), 5 less vacation days, and no raise! A Hartford toll would make Hartford more business unfriendly. Keep it under .25 cents!
- Agree that 25 cent tolls for I-84 travel are appropriate. Beyond that I would take alternate surface streets - as would others which would cause bottlenecks on surface streets. Raising taxes slightly would be best vs. a toll system. Hartford needs light rail system. Buses less popular (unfortunately) and slower. Also, please put "no passing" or "stay in lane" sign prior to the downtown I-84 overpass... people ignore the solid white lines at 84E/91S interchange and change lanes under the overpass - causing a lot of slowdowns and delays.
- A small toll would be ok like less than a dollar

1.2 Negative Comments about the Project

- I-84 should be buried so that it does not split the city of Hartford in two. Bring back the river like so many other cities have done. Why is there NO vision. Every major city my wife and I visit has a transit rail line, and we are spending untold millions on a BUS transit line? How backwards can you be ????? Typical Connecticut.
- This is a bad idea. By lowering the road, you will again cut the city of Hartford in half that they have been working to eliminate. You should make the road safer by eliminating left exits. The area from before the tunnel until Sisson Avenue exit is atrocious. Anyone entering from I91 southbound has to get over several lanes and during heavy traffic it's a life threatening situation. Just how will cars traveling

through the state be billed for a toll? What deterrent would be in place that would encourage out of staters to pay up? Are you really going to bill someone for twenty-five or fifty cents, or even a dollar? Just the administration of this bill would cost more than toll. Get your head out of the sand.

- If you leave the design up,to the DOT, I guarantee not only will it be stupid, useless, poor design, not take any further increase in traffic into consideration and a horrid nightmare. If you do not believe that then all I say is look at the ramp on exit 29 from 91 to charter oak bridge. It is backed up for miles every day, people drive to front of line and cut in slowing it down even further. Before you build it you better think of future traffic and rush hour. My money goes for stupid design, sorry but track record speaks for itself. Glad I do not commute.
- Its going to creat a problem commute entering hartford downtown area
- Really - with all the difficulties we have lived through using tolls in CT - I was at the Stratford toll booth accident. So lets make our roads even more dangerous?? Are you serious?? Constructing a toll booth IS NOT your solution. We do need to construct and reconstruct the roads - they were never designed to handle the increase in the population. Shame on the them for not being forward thinking. You will not pay for the construction with tolls. Having had traveled on many roads with tolls, the other states roads are no better than what I have seen here. Be glad to give more information.
- It is not the money that is the issue. I will go out of my way to travel then pay more in Connecticut. I think it is about time Connecticut took care of the people who live here instead of charging and taxing everything. My opinion, charging the people in Connecticut for necessary construction will piss a lot of people off.
- If roads was done properly and was upkept I wouldn't mind paying the tolls, but the government waste money they on themselves selfishly therefore I am not helping to give back to this damn state, exspecially when they cheat the citizens that live here.
- Putting a toll in Connecticut is a good idea, but I-84 in the middle of downtown Hartford (who does the think at DOT, clear not a good idea)Bad IDEA. I-91 is a better idea as a local I would avoid I-84 altogether its not worth it to pay to save less than 10 minutes. Again, who does the thinking a DOT. On top of property tax I would have to buy a transponder, NOT Doing that. NO WAY. Thanks.
- Find another area to put a tolling system, downtown Hartford is wicked busy and this will just slow traffic down so much more. You could put one at each end of the state that might work out better for everyone.
- 84 is a crumbling mess and has destroyed Hartford's cohesiveness as a city. Let the [edited] collapse and invest in better public transportation.
- How would you put a toll on the highway and the city hartford cannot afford swings sets on sigourney street park or city kids free lunch or paid school trips or city maintenance workers to clean brook street park or trees on albany aveanue,the state cannot afford help residence with housing clean nieghbor hoods college scholarships cleaner parks more speed bumps in the oneway areas in the local residential area's
- dumb idea
- This is the stupids ideas pick another hwy
- I am not opposed to tolls; I am opposed to tolls near downtown.
- NO, NO, NO....
- I am concerned about equity issues...city folks rely on I-84 for short trips & most are low or moderate income. Dispersal into neighborhoods will lead to lower quality of life for city dwellers. There should be a system that enables folks most seriously affected by tolling (city residents) to get a pass or seriously

reduced rates if tolling is instituted. Perhaps allow x time of free trips/month based on a reasonable formula.

- Find a different way. The traffic is bad enough as it is without construction. You should have kept a light rail system. Buses are too slow, nowhere nearby and too slow.. It's like a milk run. Any express systems? First use your existing road systems for alternatives. Widen them or build new roads. Once you have those in place to absorb the traffic then fix I84. If you wasted the money on the busway system from New Britain to Hartford and now looking for money from commuters forced to go through Hartford I find that to be a real problem. Work with employers to straddle work hours to help with traffic. Don't allow work construction anywhere during high traffic times. School buses are a big problem in slowing traffic in the surrounding towns. Work on that issue too. Also do something with the traffic light system. They need to work in a consistent and efficient manner. As in New York City one an avenue turn green all the lights are in sync. Here it's a mess since you get one light red, the next green, then red. It's stop and go and stop and go. What a waste of gas and time.
- I would probably be willing to pay a reasonable toll, but not for an extended period of time. I'd probably be more likely to seek an alternate route.
- I don't believe that building CTfastrak will alleviate traffic on I-84 to Hartford. I travel to and from work on this highway every single day and have been for the past 2 years. The problem is, is that there are way too many cars on the highway and 95% of the cars all only have 1 person in the car(the driver). There aren't even any car pool lanes even if people did want to car pool. (Keep in mind that I am refering to New Britain to Hartford and back) To alleviate the traffic, I believe the only answer would be that the highways need to be widened some how. There is a need for more lanes. As I mentioned, there are too many cars on the highway. If I could, I would take public transit but I am a mother with young children and would not be able to go to and from work on public tranportation. I have to pick them up right after work and most times I am off to some sports practice or game. So people that have other "things" to do after work on a daily basis is also something that needs to be taken into consideration during this whole I-84 traffic disaster. TOO MANY CARS ON THE HIGHWAY!!!!
- First, I think it's absurd to offer the option of paying tolls for lanes that will go faster. The government can not prevent traffic accidents, snow storms or other factors that affect existing HOV lanes. Second, I moved to CT in Summer 2009. There has been road work on 84 at different times and different places almost every month. I see no improvements and a big waste of money. Third, adding in a toll, any toll, is a big deal to a lot of people. Even if it's just 50 cents, 5 days a week, 50 weeks a year, two ways, that's a $250 charge. That's a car payment for me. I already pay higher gas than our neighboring states. I would consider public transportation if it was reliable, earlier and responably timed, but that is out of the question.Many people are driving into Hartford for very low paying jobs" janitors and cafeteria staff for example. It's unfair to put hard working people who are trying their best in this situation. Finally, finding work in this state is hard enough. Why make it harder by putting tolls in the way. It may not seem like a big deal to someone who is employed, but when you get laid off, every expense is a big deal.
- Quit screwing around. Finish the beltway around Harford for I-84 / 1-91. We're 50% done with 291 & 9. Connect the Run a commuter train system (or that stupid bus thing), from the beltline into the city. Tear down the current elevated portion of I-84 in Hartford - it does not work!
- Putting a toll on I-84/downtown Hartford is a DUMB idea. It will deaden central CT worse then the 'flyover' severed the city of Hartford. Here's how you pay for the new highway: ---"Ctfastrak" needs to accomadate more than buses. Have businesses such as FedEx, UPS, or any other companies that own cube vans, and limos/taxis/bus companies pay for an "EZ pass" to use ctfastrak. ---Instead of tolls have a dedicated lottery ticket game specifically for the new I-84. ---Ask the Mohegan and/or the Mashantucket Pequot tribes for money, and in return they get "naming rights" to the highway ---Have the major businesses in Hartford (Aenta, The Hartford, ect...) sponser the on/off ramps. Have them pay for those naming rights.

- I don't like the idea of tolls in CT at all, but if they are absolutely necessary, having them in Hartford doesn't seem like it will decrease congestion by determent, instead some people will inconvenience themselves by taking another route around and increasing congestion in other areas of Hartford which have traffic problems also. The lights are horribly timed and spaced and there are places that should have a green turn arrow light because taking a left is nearly impossible and creates back-up. The majority of the highway congestion in Hartford is due to people commuting for work into the city; it seems counterintuitive to charge them to get in and out of the city, also. Recreational driving should be tolled, not for required business. People may be deterred from seeking employment in the area also. If there are tolls and required e-zpass, it would be a good idea to create and ez-pass lane for the diamond lane also.
- Putting a toll on 84 places an undue burden on people who commute from one side of the river to the other. And since the State has cut hospital spending, hospital employees did not get raises this year but did have increases to the cost of their benefits so we are all actually making less than last year so now we have less money to spend on everything!! Including tolls!!
- These were hard to answer because I'm not sure what "improvement" means. I strongly support the idea of getting rid of the overhead viaduct, which carves the city in half, and either sinking the road* or making an accessible beltway. *My favorite, if someone figures out how to get to the other side of the river.
- I personally feel tolls will only further congest the area. So now people will be paying to sit in traffic.
- Would have rather seen investments in the new haven - springfield commuter rail than requiring tolls on the only method of transportation for many commuters. New Britan bus line does not cover enough territory and carpools do not fit many schedules. City should request employers decrease parking costs in order to help employees pay for these tolls if they come to pass.
- My only concern would be that tolls on I-84 might drive more traffic off of I-84 and onto city streets. Clogged city streets degrade the quality of life for those who live in Hartford and endanger their lives by slowing the response times of emergency vehicles.
- Appropriate money in advance (forecast)to avoid reckless spending and additional cost to the public!
- If you put tolls on 84, you will soon find the back roads all around Hartford filled with commuters not wanting to pay the tolls. Between the Federal and State Government, I find it hard to believe that you can't budget the repairs without imposing these tolls. A toll through Hartford is unreasonable. I would support a toll such as 95 that is a transit route but not for Hartford.
- I believe that there are other alternatives. For example...connect I-84 to I-91 south thru Bushnell park and then to the Conlon-Whitehead highway. This is much better than putting traffic through the tunnel. This would alleviate a huge backlog. Create new entrance ramps that for east bound I-4 that enter on the left side of the highway for people goingin straight though. Also, if you created some type of floating / adjustable screen that follows the sun in the places where the sun glare occurs near sunset time it would have a huge benefit. This could happen in multiple places.
- I do not think the working class can continue to support all of these projects that all residents enjoy the benefit of. I think it is unfortunate that I struggled to put gas in my car to make my daily commute and pay to park in the city. To add another burden such as tolls is unreasonable and could be the cause of many people being unable to get to work at all. Imagine that workers calling out because they can't afford the tolls.
- come ooooooonn.
- We shouldn't punish the travelers of I-84 for passing through the city. There is such a push to revitalize downtown Hartford that--quite frankly--is failing miserably. How do you expect to increase commerce in Hartford when you would literally be charging admission to the city? Young people--especially students--with limited income will find other places to enjoy in their spare time.

- Very concerned about the quality of life impact that placing tolls on I-84 will have on the neighborhoods around the highway resulting from individuals like me who will prefer to take local roads as opposed to pay tolls.
- As part of any changes to I-84, I hope planners consider how local streets will be affected. Maybe consider a change in traffic patterns of local streets (change to one-way from two-way)to increase flow and efficiency... it appears this was NOT done with the recent busway construction (Flower Street was closed with no consideration on its effect on remaining streets. Farmington Avenue and Broad Street are MUCH WORSE than before - to the point where its now easier to get on the highway at Sigourney Street rather than dealing with the massive congestion on Farmington Ave. in front of Aetna).
- I wondered when asked if I'd take an alternate route... I think I would probably find that a lot of people will take alternative routes, clogging them up and making them even slower. Why can't we just get rid of the scar that is I-84 and make a circle route around Hartford?
- I cannot imagine a feasible application of toll booths on I-84 in Hartford that would not negatively affect traffic congestion and movement.
- The road construction in Connecticut NEVER ENDS - and I have lived here since 1984. There are delays on I-95 and I-91 - both direcions - almost daily. This has been going on for years. You can never get anywhere on time without factoring in additional time for road construction. Just as bad is the never-ending weekend road construction. Twice in the past month, I have sat for ONE HOUR between exits 5 and 9 on I-95N (Stamford area) on a Sunday night. There are also two more road contruction areas after this, heading north. When I finally reach the actual construction areas, there are just one or two workmen doing who-knows-what. The legislators who propose tolls obviously don't commute very far to Hartford or they would realize how foolish the idea is. Maybe a legislative committee should be formed for the sole purpose of commuting during rush hours. They would probably forget the idea when they are stuck in traffic like everyone else. Also, tolls always create backups. The estimated time savings you propose in this survey are not realistic in my experience. Without mandatoy EZ Pass use, the cash tolls will always be backed up. Look for other ways to pay for construction - like taking away the annual "longevity" bonuses and raises for state employees.

1.3 General Comments about the Project

- Something needs to be done about the traffic / congestion / accidents / road conditions on I84 in and around Hartford. It has become unacceptable and unreliable and totally unsafe.
- hopeful trafficn congestion would be reduced
- There's no easy solution to this or any financial situation. My problem with any solution is there'll be a group of people that feel that the solution isn't fair. An example is if it adversely affects (police, fire, security, etc.) safety or some people will pay more (those working in Hartford from East Hartford) than (those working not needing to travel the sections that will have tolls) others. As a Productivity Specialist & a man ahead of his (excuse my language) behind I think you should ask for written ideas and/or involve 'reSET', innovators, collaborators, entrepreneurs and others wanting to brainstorm. In addition, tolls will adversely affect the Hartford economy and maybe part of the solution to the Hartford parking problem with increased use of mass transit and free parking outside of the downtown Hartford area.
- Others in my family travel to or through Hartford daily. The amount of money they would spend on daily tolls would really add up and they might look for alternate routes to avoid tolls two or four times a day.
- Worried that increased traffic on local roads will destroy the roads. Will the city be compensated for the increased upkeep costs?
- this idea would be very inconvenient for students traveling to and from school
- Put I-84 underground.

- If tolls are to be installed, they should be at entering and exiting the staate in all directions!
- I would be more willing to pay to get there quicker if I were using the highway for work. However, for recreational purposes, which is what I use it for I would probably change my route to avoid any extra costs Even if it took more time.
- Please dont put up cameras and tolls in the city. make toll booths at border of state and create jobs with people not cameras
- Apparently, the purpose of this tolling system is to more heavily gain funds from out-of-state drivers, and more specifically, large trucks. Her are some issues with that concept: 1. Truckers may only pass through once, and be tolled once, while local residents will go through them twice for each trip. This skews funding toward state residents. 2. The location is far from all state borders, and thus will not affect all out-of-state drivers. It would be more efficient to put in tolls on each state border, like other states do. 3. This is in the middle of a large business district, so many people will be driving in and out of Hartford multiple times per day. I for one drive through this area on average 6-10 times daily, even on weekends. This places a larger burden on local taxpayers. 4. Alternate routes are available, but are already congested. This would likely shift a large amount of traffic to these alternate routes, which would effectively shut down an area that already suffers from massive congestion for several hours every day. 5. It was argued that the cameras will not cause a slowing of traffic, but in reality these camera systems are not that reliable. Likely, speed limits will have to be lowered to force people to drive at a speed where the cameras will work, and people won't. They won't drive slower. It won't happen. 6. License plates can be identical if they are from different states. Will this system be able to identify out-of-state plates? 7. Will any reduction in state licensing fees be given to offset the cost to local drivers? Since this is supposed to get funding from out-of-state sources, this incentive would make the initiative more palatable.
- I'd rather a tax increase than a per-use toll. also, i'd like to see 84 brought down to ground level with extra lanes added.
- It is important that theI-84 viaduct be replaced, preferably at ground level. It is presumed, that like me, many would opt to take city streets for frequent trips presently using I-84, while those coming on their way thru town and not starting or ending in time would take the highway and be willing to pay the tolls.
- Is there a way to rebuild that section of 84 without tolls?
- Travelling to and from Hartford thru this section of I-84/6 Corridor is already a night-mare during the peak and non-peak hours. I understand the structural improvement are essential for safety, environment and economic reasons but a thorough study must be done before any implementation decision is taken and must be put to a ballot for the folks using this section of the highway on a daily basis for there approval of the project.
- This is a federal project how are portions funded at that level?
- I live in Manchester and Work in New Britain. I avoid i-84 in Hartford on a daily basis by taking route 5&15 from the Berlin Turnpike over the Charter Oak bridge to 84east in east hartford. I-84 through hartford is old, narrow, and congested. While I agree that improvements need to be made and paid for, I do not agree with tolls that would be paid daily by by CT residents that are lviing and working in the area. My husband works in Hartford and must already pay a yearly fee for parking, he should not also have to pay a twice daily toll for using the road on top of the property taxes for owning the car, high gas taxes and high State taxes. Toll trucks instead of passenger cars.
- Please keep the cost of this project low. The underground tunnel solution I have seen looks too expensive. I certainly would not support taxes or tolls for that option. Thank you for soliciting feeback; it is appreciated.
- When I don't drive to work I bicycle and your questions never gave me the option to indicate that as an alternative way for getting to work. Additionally, you did not ask about telecommuting, and for many

workers that is the reason they do not drive to work every day. When you asked for input about tolls, you did not leave enough room in the other category for my full response. Given that I84 is so heavily used by trucks who are just trying to get through Hartford, I don't think you should even consider tolling I84 till you have developed a suitable alternate route for through traffic.

- While there is a clear need to improve the I-84 downtown corridor, I am concerend about the potential impact to alternate roadways should tolls be implemented. Let's be sure this does NOT turn in the "Big Dig" debacle in Boston.
- When reconstructing I-84 through downtown Hartford, every effort should be made to mitigate traffic flow disruption due to frequency and difficulty of lane changes. Excessive curves, short sight lines, and frequent, difficult lane changes are the most significant impediments to smooth traffic flow in that area.
- If this is because the DOT has over 14 billion in necessary but unfunded projects, at least one of which is a bridge in this corridor, then what pisses me off is that CT just raised the gas tax by 4 cents yesterday, which tax when originally implemented was to go to the DOT for these projects but for which instead has gone into the general fund for goodness knows what. I am opposed to paying for a toll or anything else without either a repeal of the tax which was incredibly profitable for the state but which has not gone to its intended purpose or without that intended money going to the DOT and still being insufficient. There is also nothing in this toll business that leads me to believe that these funds would not go into a general fund that appears to me to be utterly wasteful.
- Your biggest hurdle will be ensuring that all funds collected, through whatever method, are guaranteed to be used ONLY for the purpose of highway maintenance and replacement and would NEVER be able to be diverted from this purpose to fund any other General Fund or other State shortfall. Without such assurances (and follow through) you can guarantee difficult passage, if any passage at all.
- I strongly favor burying the downtown section of I84 to reconnect the whole area and to spur significant economic growth. This has been done in many cities successfully. Bring back John Norquest, former Milwaukee Mayor to hear what happened there. He gives a great talk on this subject; he now is staff leader of Congress for New Urbanism. I am not opposed to tolls on I95.
- It would be nice if you could buy some sort of pass for people that travel on a daily basis. For example, the toll costs lets say $1.00, so 5 days of travel per week is $5.00. However, if you are working and will travel the route every day you can get some sort of a discount if you prepay, so you prepay $2.50 instead of having to pay the $5.00.
- All traffic lights approaching / surrounding 84 have been converted into "No Right on Red" lights and many of the left turn traffic light arrows have also been removed. This has created many traffic problems, but is very good for the City of Hartford revenue collections via situations
- Traffic eastbound heading into the tunnel is always slow during my commute time (4:15pm). I work at Saint Francis Hospital and live in South Windsor. For this reason, I regulary take 84 into work in the am (7am) and take back streets in the north end of Hartford to 291 in the afternoon, which is a longer trip. I would much prefer being able to safely and quickly ride through Hartford on 84 on my way home and would be willing to pay a reasonable daily toll (under $3 to do so). Thank you.
- Prior to moving to Connecticut I lived in the New York City, and frequently make the trip between the two states. I have noticed that traffic lights around the cities of CT are not well synchronized as NYC's which is one of major contributors of traffic congestion in the inner city, especially Hartford. Poor synchronization causes poor traffic flow and increases the chance for accidents. I have also noticed increased congestion off the Asylum exit ramp heading toward THe Hartford and St. Francis Hospital. The light change is to short which causes a hazardous backlog onto the highway and delays the traffic coming from downtown Hartford on Asylum street. Was there a change is the traffic light change? because I have sat there at the light which has changed over 3 times and not able to advance past.
- For people who have to travel 84 more than 5 times a week this can get expensive quick at the end of the year. These are rough times and any extra money spent on travel is a concern.

- If you're going to bring back tolls than it should be on all highways, not just I-84. If it's just I-84 people will just use the city streets to avoid I-84 creating more wear & tear on these roads. Transponders are definitely the way to go. Plus you could set it up so transponders registered to a CT car registration wouldn't have to pay the toll and only out-of-staters and non-transponder users would have to pay.
- Something has to be done about the Asylum Avenue exit 48 from I-84 going West when you are coming up 91 North to 84-West, Exit 32A.... There is often a back up of cars that spills on to the Exit ramp to the point that we have to redirect and get off the Trumbull Street exit instead. Exit 48 in I-84 is ridiculous; there are cars trying to get off I-84 to Asylum Street exit while at the same time cars are trying to get un to I-84 from antoher on ramp that spills into the same exit ramp we are using. It is a miracle more accidents do not happen there. This was an engineering hedious move on their part. Whoever designed it, must not have to get on or off at that exit ever. Very frustrating to deal with the traffice there daily. Most of the time have to go to the next exit (Sigourney Street) or not get on I-84, but take the Trumbull Street exit thru downtown. Someone should videotape traffic there from 8:00-8:30 AM during the regular work season (not summer as lots of people are on vacation). Two lanes come to a dead stop.
- The asylum street exit can be difficult to access heading westbound during rush hours in new plans for this area it would be helpful to have >1/4mile to cross 2 lanes of traffic to get off exit 48 when a driver is coming from the 84 in Manchester.
- Make 2 Lanes that turn onto 84 East from Broad Street. Just like there is on Sigurogny Street near Aetna. That will cut down on alot of congestion. also control lights better on off and on ramps
- Most people drive into the city early (5-7 AM) and are able to leave in the afternoon (2-3 PM) don't run into too much traffic, so it's hard to be asked to pay a toll when the majority of the time is smooth sailing. My suggestion is to have the top (i.e. 7) employers in Downtown Hartford to contribute to the project as it would benefit them greatly re: commute satisfaction and quality of life. Thank you!
- if tolls need to be imposed it needs to be a blanket toll covering all major highways. out of staters need to contribute to the upkeep of our roads if they choose to use them. road upgrades should only be made 1) when safety dictates; or 2) when federal dollars can be applied 1n a reasonable fashion. the burdon of paying for the upkeep of infrastructure in one city (town etc) should not fall on the backs of those folks alone but be shared. ALL UPGRADES SHOULD BE MADE WITH THE FUTURE IN MIND in 10 years I do not want to hear that the plan was shortsighted and the infrastructure needs to be modified again. jg
- The highway needs a redesign. too many on/off ramps too close together creating a very accident prone area leading to major congestion. Instituting tolls will not change the design of the roadway or make my trip go any faster. Possibly converting the HOV lane as an additional lane could help. Building a trucks only lane may help.
- Would prefer below grade roadway but the expense would probably be prohibitive due to the height of the water table here. Trip here is a one-time journey and is not representative of my commute--I live south of the city and travel 5/15 or surface streets. When I need to use 84 during rush hour (typically at leaving work end of the work day around 5 pm), I travel surface streets to access 91 at the Conlan/Whitehead. Will not get on 84 (at Broad St) at that time of day. If I'm travelling east from west of the city during rush hour, I use surface streets through West Hartford and Hartford. I'd always rather keep moving, hate crawling along. That having been said, if tolls are more than a modest amount ($1 or less), I think everyone will do that and the gridlock will just move to city streets--that's why the highway was built in the first place. So I would want the project to also make some improvements to surface streets in the viaduct area.
- I believe that if employers / administrators were more flexible regarding working from home and daily work schedules it would help some traffic congestion. Thank you.
- I would be interested in viewing routing alternatives that are being considered. When 84 was constructed, my grandparents, father and uncle had to move due to eminent domain. I would like a little more information this time. Thank you.

- I agree we need to pay with tolls but find it costly enough to get to work with the current gas prices. Maybe some sort of "deal" for people driving over a certain distance to work helping to keep toll/gas prices at bay.
- I live very near the area affected by the proposed highway construction. I would like the highway to be constructed so that it does not loom over the neighborhood and divide the neighborhood into dead, separate zones. I don't like living under a highway. (This is an exaggeration on my part. I don't actually live under I-84.) But I travel under it on a frequent basis to drive around my neighborhood and many areas are dead and deserted because of the highway. (The intersection of Laurel and Capitol, for example) The original construction of I-84 took rich people into account. They made the highway go south as it traveled west toward the West End and West Hartford. They put it right through my poor neighborhood and then steered it away from the rich people that shouldn't have to look at a dead and deserted neighborhood. In my neighborhood they tore down the housing that people could afford, forced the poor people to relocate and then put a behemoth of a highway in the poor people's neighborhood, leaving large areas dead and deserted. It makes me mad. I would like this situation to be corrected with the reconstruction of I-84.
- Please engineer the ramps. Presently the folks from Route 2 merge at the last minute before they are forced downtown. To get to the Asylum Ave exit we have to cross two solid white lanes in the tunnle and two on ramps to have any hope of exiting. I do not believe tolls will alleviate any congestion as people knowingly travel in the wrong lane so as to get ahead of the next guy and merge at the last minute causing braking. Lessening the lane movements is one of the only ways that I believe that you can correct the problem. Short sight lines in the tunnel make for a dangerous condition given the speeds and traffic volumes. People having to cross multiple lanes in short throws are a key issue that would need to be addressed to ease congestion. Lastly, the off ramps should be lengthened at Asylum to increase storage capacity and the queueing of traffic headed to St. Francis. The turning movements at Asylum, Farmington & Broad are horrible and 'blocking the box' is never enforced rewarding poor driving etiquite. Your survey asks questions about ways to pay for improvements. Why not use the money collected by taxes specifically through the gas tax for these copsts rather than routinely raiding the fund for General Fund overruns. Perhaps I should play Keno to pay for the viaduct repairs.
- Luckily I have little occasion to drive on 84 regularly especially through downtown Hartford. Left hand exits should never be allowed. Construction work should never take place during rush hour. If money is collected on the roads of Connecticut, that money should be ear marked for improving our roads and nothing else. Same with the gas tax. Good luck.
- Neighborhood quality of life issues are deeply important to this project. Integrate transportation and quality of life rather than focusing in just my individual needs to get somewhere quickly. I'm willing to put up with some travel issues if it helps the larger community.
- I strongly favor lowering the Aetna Viaduct to ground level and moving the railroad and its station a few blocks to the west. This project should be funded using Connecticut's general transportation funds and not billed to Hartford residents with a local toll. Are all future highway projects going to be funded by the local town the highway improvement is being made?
- According to census data, approximately 93, 00 people travel into Hartford for employment. Will they also bear some of the costs identified in this survey? Or are the costs designed solely to be incurred by local reasidents?
- It seems you only want to charge a toll for commuters coming from west on i84. Will commuters traveling to hartford on i91 and those coming from east on i84 be charged a toll also?
- could you really guarantee there would be no traffic delays pm the highway which help justify our willingness to pay the toll? Im not aware of a city that doesn't have traffic at rush hour. I wouldn't mind paying a little extra for no traffic but that seems like an unrealistic goal.

- As a resident within the area that would be tolled, I favor tolling that would discourage neighbors from using the highway for local trips, which is common now, and would fall mainly on commuters and long-distance users who do not need to be on our local streets. I hope that you are studying what effect tolling would have on parallel commercial streets such as Farmington Avenue.
- The issue with congestion is the poor design of the on and off ramps. Cars have to almost come to a complete stop before merging lanes. I am concerned that adding tolls will make the issue worse rather than help fix it.
- Coming from Manchester, we have EXTREMELY LIMITED ways of getting into Hartford! We don't have the luxury of multiple ways in like those living North/South/West. We must come across either the Bulkley Bridge or Founders into downtown. If everyone uses Founders to avoid tolls from East, it will be a congestion nightmare! Earlier than 6 am?? Are you serious? I'd have to wake up at 4:30am! Tolls should be put at all interstate entrances to the state and let EVERYONE who drives CT roads pay for it, not just commuters. I used to take the bus, and would still be doing it if it worked, but the bus system stinks. Over and hour to work and I have to change buses and walk. And limited options to get home for those of us who get stuck working late. THis is the most absurd thing I ever heard! PLUS, I pay $75 per month to park at work!! What about stopping Malloy's Magic Bus and using THAT money?! This is insane!!!
- I don't mind tolls for this project if the revenue generated is going to be used for this project. However there is a tendency to divert toll dollars to other uses - that is not appropriate and should be avoided. Not sure how it can be guaranteed that would not occur.
- If tolls are being considered to ease traffic congestion or pay for existing roadways I'm in favor. 91 N and S in Hartford is also a nightmare at the 4:30-5:30 time frame. A normal 15 min commute takes much longer due to traffic and congestion. That is why I take alternative routes even if it takes me longer to get home.
- The Asylum street exit (#48) on I-84 needs to be updated. There is always back-up. It seems as though most of the traffic on I-84 toward Hartford is because of this exit.
- Why not consider a "step down" toll? The initial outlay of money will be large and the eventually the tolls will pay for the construction. As that cost is paid off, the tolls would be reduced to a nominal charge to allow ongoing maintenance and maybe some more for a future large outlay. If you charge $1-$2, you will recoup the money and then can step down to $.50 or similar down the road. Otherwise, it becomes a cash cow for other interests to draw off of.
- My summer commute is different from my Sept-June commute due to camp bus pickups. And, I find it quite amusing that you asked about summer commutes which are lighter than the rest of the year. 2. I do not have issues with tolls. But why is the State of CT trying to hit its residents instead of all the out of state traffic that uses 84, 91 and 95? 3. New York currently has value priced tolls and I think they are a good idea. 4. Isn't it bad enough that the New Britain bus way has closed city streets and clogged the city of Hartford's roads (specifically around Aetna) (adding 10 minutes to my commute to go around one block!!), yet in this survey you offered no information on the construction, only charges of what it will cost me in MY TIME AND MONEY.
- In my experience tolls always cause delays at any heavy traffic time. Someone eventually cuts someone off as the toll comes up whether or not there are booths. The major problem is the interstate running through a city that twists and turns along with crazy on/off ramps. 84 would porbably better serve the public if it was redirected around the city and a highway for local hartford traffic replaced the current 84. Way too many people drive 84 through Hartford because it is the only good option to get to the other side of Hartford. There are more than a few who might even take a detoured 84 to the outskirts of the city because it is easier to get to their destination from a different side of the city. I have lived here my whole life and highly doubt that merely updating/expanding 84 through Hartford is going to spur any real investment in the city. All of the money that was poured into the city to revitalize it has led to some nice buidlings and still little interest from people to visit (especially my generation, the newest tax payers).

- In general my commute is not too bad. About eight miles each way. I tend to take I-84 and then take city streets once I'm over the CT river. You will not find me on a city bus as the current routes do not work for me and well, call me a snob but I'm not taking the bus. Thing is, I would take a train. If I were in charge, I would: - Forget about the bus routes and put in light rail going both north/south and east/west. - Put a highway loop around Hartford. - Bury I-84 in a tunnel just for the short city section.
- Please do something about all the merging of traffic from the tunnel on westbound I-84 - in particular, the traffic trying to get off on the Asylum St. exit (often backed up to tunnel) is competing with the traffic getting on I-84 just before that exit.
- There are few issues on 91 and 84 commute. 1. exit 25, the trafic slows down and can see the impact upto exit 23. 2. Major one is the exit 29 to 84, people slows down a lot and the line end up more than 2-3 miles, that slows down entire trafic. 3. Merging on 84 west exit 32A&B and merging on exit 48 on I84.
- I would REALLY like to see a connector for 91 & 84 OUTSIDE of the city (almost like a circle around the major downtown section). It would keep those who have no need to be within city limits OUT of it. I would like to see both Exit and Entrance ramps be a longer distance as currently we have too short a time to speed up/slow down as needed. Also, what about a single lane (with jersey barriers) that allow true commuters on 84 a lane where folks can't drive in/out that allow them a quick 'pass thru' the city? They would not need to worry about exiting or entering vehicles, which would keep their speed up, and provide room for us that need to exit/enter.
- What ever the design is please provide enough on and off ramp length. Also so it would be nice if the design could be underground and park space above the highway. Look at Boston and see how there space is being used afer the elavated express way was removed - very nice!!! Thanks for asking.
- All I really ask is that if you're going to redesign everything, make the 84/91 interchange less insane.
- We should be more judicious in the use of paying for capital improvements. There appears to be waste in government spending which needs to be addressed. For instance, Rt 4 thru Farmington has been a pothole, rut free road for many years, but is not being resurfaced, for no apparent reason. That is not a judicious use of funds.
- Traffic through the tunnel needs to be addressed. Traffic completely disregards the no passing zones in the tunnel and it I have had several near misses when semi-trailers merging from I-91 south to I-84 west go sailing across 3 lanes of traffic to avoid the exit only lanes for Sigourney St and Sisson Ave. Better signage and enforcement is needed.
- It is unfortunate that it takes up to 35-45 minutes to get into Hartford from WH. YOu closed Sygorney and Flower street exits to hartford from 84W to get to Aetna. YOu added a bike path on Capitol Ave to get to the 84W exit. All of these "moves" created bottle-neck off and on the exits. I think you should fire the civil engineers and whoever made these foolish decisions and use their salaries for the improvements. If you partnered with the hartford businesses instead of making it cumbersome to work in Hartford, you would not be looking for band-aids for your "project funding".
- Commuting time could be reduced at no cost by removing the multi-occupant requirementfor using the diamond lane. Those lanes are significantlyunder utilized because it is rare that people can car pool. Every day cars sit idling or crawling on both 84 & 91 while a handful of cars use the diamond lane and many of those are furstrated single occupant cars who have decided to risk the ticket. Before instituting tolls or raising taxes, get rid of the antiquated concept of car pool lanes and turn them into express lanes open to all vehicles.
- This work should also take into consideration the local roads for access to/from I84 including the timing/staging of traffic signals with major employers locations during rush hours. Travel time is more often impacted by taking 15 mins to go around the block (2 right hand turns) to get onto I84 access. Also, the current lane shifting/merging for I84 and I91 interchanges causes more congestion and delays as vehicles have to cross multiple lanes quickly in heavy traffic depending upon route. Perhaps having entrances that put I84E and I91 interchange traffic separate would allow for a smoother flow through

that stretch (e.g. Hartford tunnel). In the questions, you mention "guarantees" on time saving for commutes. Would be interesting if that could be ties to the transponder such that if the commute time did not meet its guarantee, no toll was charged.

- how about a premium travel lane that costs a little and guarantees time savings.
- traffic congestion at I-84 and I-91 interchanges will severely prohibit separate lanes for different methods of payment. Problem now is to get to proper lanes through the congestion. This will be exasurbated by specific lane changest to meet new toll requirements. I suggest planning on multiple paying methods per lane. e.g East bound, first check if transponder paid, then take picture if not paid by transponder. Lane switching is not a valid option.
- I cannot support ANY decisions made by the same people who approved the TOTAL, TOTAL waste of money being spent on the new New Britain - Hartford transit/busline. EVERYONE I talk to cannot believe that that project was approved, and taxpayers money (in ANY amount) is being used to fund this project which is doomed to fail!!!! That money could have and should be allocated to fund more important, more used roads (such as the I-84 tunnel section, a wrap-around around Hartford, another bridge so there is no I-84/I-91/Rt2 conjestion point, etc). Also, it is VERY frustrating being stuck/stopped in traffic and seeing little or no road work is being performed. If road construction is going to be performed in the I-84 tunnel corridor, then please contract with cost/time effective companies so that completion, funding and commuter frustration is significanly reduced.
- my commute is 8 miles - the CT Transit bus goes past my house @7:40 or 8:08 AM and would take 30 minutes prior to changing busses in downtown to go from Route #87 to the Capital shuttle to get to Aetna. The closest express shuttle would require that I go 5 miles in the other direction from Buckland Mall. It's always a parking lot getting 4 lanes of traffic into the 2 lanes going through the "tunnel" and the Asylum St exit ramp is dangerous to get to and is often backuped onto the merge from 91 south.
- Biggest issues is the timing of the traffic lights. This often backs traffic up onto travel lanes of I84.
- While reconstructing I-84 may be necessary, installing a toll to ease out traffic on it will not serve the purpose of reduced traffic on it, as the nearby local roads will get jammed. This is an unfair approach. A proper redesign of the nearby roads should be done to remove the bottlenecks.
- A 2nd route over the river would be preferable. With 84 as the only way into and out of Hartford, it really effects travel time if there is traffic or if there is an accident
- Put the 84 section underground through hartford and I'll gladly pay a toll. Fix what you all messed up when you ripped up parkville, frog hollow, front street, the area that contstitution plaza took, fix the fact that you have a highway blocking off our CT river, and then you can have my toll money. Take a look at what Portland Oregon did to fix their highway around the city by putting their highway underground and allowing people to access their waterfront. Then you can have my toll money!
- i think the problem with 84 is the mass lane shifting and twists in the road. frequently people need to cross 3 lanes of traffic in a short distance to get ot exits (going on 84W from east hartford to asylum, the have maybe 0.25 miles to cross 3 lanes)
- Just want to make sure we are building better and safer highway. My working hours being 10:15am to 7:00pm does not allow me to take a bus, so my travels are Rte 6 West to 684 West to I84 West and they are not all easy commute on certain days. Highway 84 West seems to have many backups around exit 56-50 under the tunnel many times. That's another area to check for safer road coming in and leaving Hartford. Thanks
- Driving into Hartford through the tunnel is a nightmare. Whoever designed on ramps and off ramps right next to each other just after the tunnel? You can't possibly wait until the end of the tunnel to change lanes - you won't be able to move over. Because as you are moving to the right, there is traffic merging with you from the city, and then another on/off ramp. There is so much traffic coming off onto exit 48 it takes two lanes - the lane that is the exit, and the lane next to it where everyone is trying to move over.

And then if you decide to take exit 47 instead, you end up at a dead stop on the highway, praying that the people behind you have enough time to see you so they don't slam into you. And then with the slightest bit of snow - total gridlock. How about some more sand and salt out there? And about the survey, I don't think it's fair to punish us for working in Hartford. We pay already pay a small fortune to park, and now you'll punish us even more? I thought you wanted people coming to the city to make it more lively and bring in people. Why would I come into the city if I had to pay a toll?

- There are other transportation projects that our tax dollars are being used for that I feel are only for the gain of certain groups of people, i.e. the New Britain busway project. The tolls (if there should be any built) should be on the state borders not through the Hartford area where everybody commutes daily. I see this as a penalty to those individuals who work in Hartford and as a deterrant to those who drive through Hartford. I will approach my employer if it comes to that an ask to be able to work at home because you will not be getting toll money from me or my family. Or I will also take back roads and increase my communte if necessary. I would rather pay extra to the CT gas tax!
- I am a part-time telecommuter. I come into the Aetna office two days per week. On the way into the office, I rarely take route 2 to I84, due to the traffic. Instead, I take route 2 to the Putnam Bridge, take I91 to the Capitol Area exit 29A, and then go via Capitol Ave to the Aetna parking lot. I generally use I84 only on the trip back home, and then, only because I choose to leave so late that there is no traffic. If/when I need to leave work for home earlier, I simply reverse my morning route and don't use I84.
- I do not think it would be fair to make tolls higher in rush hour because those are the people that HAVE to travel every day for work. Tolls over a dollar are way to expensive for people who have to use this road to and from work to make a living expecially bc we all have to already pay for parking too unlike people who don't work in the city. You should not have to pay more in rush hour it should be discounted to those folks. The tolls should be directed toward folks that typically don't use the highways or out of state portions like you have to do to get onto the mass Pike or what not. I support tolls to enter the highways for the state or near airports, but I don't think you should penalize the people the most that already pay taxes for roads and so forth it should be directed toward folks that don't use every day because it won't stop them from using the roads just to avoid tolls. I will use other roads to avoid paying these tolls.
- 1st, Divert 84 East to 91 South Traffic, with different connection, than current....and different than that for 91 Northbound..... Perhaps connect Route 84 Directly to Route 3, which would cross 91 South, and also connect to 2 East. Could shift flow and burden significantly, and be used in interim while existing 84 section is being re-built.
- I answered No to questions regarding woudl be willing to use toll road if it would guarantee no delays or faster time, because I do not believe this is possible to achieve, unless the tolls were set high enough to discourage use, in which case they would probably be too high for me as well. I do not support time of day-sensitive commuting tolls because most people, myself included, do not have the ability to adjust commuting times to avoid the tolls.
- Why not create a straight through on 1-84 West and East for those traveling through the city - not a HOV lane just an lane to get you through the city without having to deal with the local traffic. Too many on/off ramps without enough room to get to the needed travel lane i.e. East Bound from Sigourney Street entrance is TOO close to off ramp onto Capitol Avenue.
- I do not like the idea of having to pay a toll to get to work but if it is the only way to pay for this project and I have to pay, the project needs to solve the problem of congestion, make the ride more enjoyable and save time. Rush hour traffic is brutal. The merging and crossing of lanes is the biggest problem and people do not want to let you in. Public transit is not an option for me because it is too noisy. People talking on cell phones has become a real problem that seems to be ignored and makes me angry. Plus I like the flexibility of coming and going as I please and don't want to be tied to the bus' schedule.
- I generally have no issues with my commuting into work beside people not following the laws of the road, especially in the tunnel. However, I believe the problem actually lies in leaving the Hartford area. There are just too many areas where traffic has to merger multiple lanes in a short amount of time. I used

another route to leave Hartford about six months ago, but that was taken away (closure of Flower St). This forces my commute to route 84. I really do feel that the taxes collected during a budgeted year should be able to fund construction projects that are planned in CT.

1.4 Concerns about Value Pricing and Taxation

- While I understand the need to update and upgrade the section that you describe, it makes little sense to me to pay a toll for such a short drive. We pay such a high gasoline tax in this state, that I feel that some of that money should be going for highway construction and maintenance. Between that tax, personal property tax and the cost of gasoline, getting from one place to another is already very expensive. I plan all trips carefully to reduce my driving.
- It is very distressing that with all the revenue the state collects that none of it seems to go into the state. There is something very broken here that I am sure our current governor inherited from many generations past. We have more taxes than most states and seem to have poorer schools, roads and job prospects. As a citizen it seems that there is something shady going on with the money. Why is it that other states can function with only one of these extra revenue sources yet CT cannot? Businesses are leaving CT because we tax them to death and they get nothing in return. I think adding tolls will just cause more people to avoid CT!!
- I do not likre the traffic that tolls develop, even fast passes.
- Paying a toll that is not reimbursed by my employer will increase my existing desire to find employment located outside of downtown Hartford.
- dont raise my taxes until we make significant and substantial decreases to the $$ we are bleeding out to state union employees for their retirement and benefits. We need to teach them to pay their own way, like the rest of us!!
- While I agree that I-84 is in need of updating (congestion, left on-ramps - crazy), CT residents are already taxed much too much. I believe our gas tax is close to highest in the country. I think it would behoove the State to find the funds apart from tolls by reducing waste and wasteful non-essential spending.
- Please no tolls in the state of CT. All of the surrounding states (MA,NY) has them.
- Tolls and Taxes should be the last way to pay for the repairs. I see that you let Gas Taxes increase in the latest budget. Use part of that money for road improvement. Taxes are not going to go higher in Ct.
- No tolls please!!!!
- If our government would stop wasting money there would be plenty for road repair in our taxes.
- CT is taxed to death already! The Utilities are too high here as well for what we get! CT needs to cut back on spending and get it's fiscal house in order. Welfare is out of line and needs to be reigned in on people who expect the other guy to foot their bills. The ones who really need it, is another story, but they suffer because of the lazy people the state of CT does not go after.
- I strongly disagree with the use of tolls in any capicity
- no tolls
- Stop the bleeding and cut spending. Use the money planned for the New Britain to Hartford bus line, that will be less than 11% utilized and is totally someone's "Pork-barrel" concept, to fund road improvements. CT has been losing and is continuing to lose jobs, people, and its future standing due to high taxes, poor government direction, programs that recklessly spend taxpayer money, and policies and attitudes that are foreign to the foundations of this state. Now, the state wants to add Keno to the lottery system, is about to begin Sports Betting at the OTB facilities, and put tolls back on its roads. CT will see movement, but not moving it forward, and not in improving CT's financial position. It will see a continuation of exiting companies and of people leaving the state. Eventually, the only ones who will be able to live here

will be those who are wealthy or who are on State aid. The other 48% will have moved on to a place where sanity exists.

- I am against tolls for paying for infrastructure/highway improvements/maintenance. I have always been under the impression that our gasoline taxes were intended for that purpose. Why aren't these funds being used?
- Once you start introducing tolls in one part of CT, they will start popping up everywhere. We are already paying higher income taxes and gas prices in lieu of tolls, as was decided in the 1990s. Will those increases be reduced? The government in CT needs to start managing the money that already collect from the citizens in order to pay for standard highway repairs. This highway has a lifespan which was known from the time it was built. Provisions and funds should have been allocated before this so we don't have to deal with tolls now.
- Get the money to do highway repairs from money from the casinos, lotto, etc.
- We had tolls for YEARS,so I have no problem implementing a reasonable one, and I would definitely want an accounting of how and where the money is being spent.
- Tolls should be outside of the city like at our borders of ct. Ie..near mass and ny
- I regularly travel outside of the state and have to pay roles in almost every state. Ct should be charging to drive through our state the way the others charge me to go through theirs. Improved road conditions would be well worth the tolls.
- Instead of tolls government should stop spending.. Too much spending
- I thought CT had an account that they pulled from for road and bridge repairs. They need to use that money and NOT increase taxes or impose tolls!
- The government in this state needs to start cutting "the fat" in Hartford if they want to take on projects such as this and stop putting the burden on the taxpayers over and over again! I am sick of it and will move from this state before long!
- With the gas taxes being as high as they are in CT, shouldn't the gas tax money we are currently pay be used for I-84 improvements???
- Place on use tax on people working in Hartford to pay costs associated with road improvement
- Taxes are high enough. I am greatly opposed to incurring additional fees that go toward the state or town. The project cost should be paid out of motor vehicle and state taxes even if its over an extended period of time. Residents are being taxed at a high rate as is to then have additional monies go toward what taxes should cover.
- Ct is one of the few states left that has to pay a vehicle tax every year, this is the money that should be going for the roads, not tolls.
- higher taxes are not the answer to funding such a project. funding should be usage based
- another TAX - call it a toll if you want to. CONNECTICUT SUCKS
- We cannot afford any more taxes. Charging a toll isn't going to change behavior enough to make it work to the public's benefit. This is another way for the politicians and state to grab more money from its residents. Looking for money, cut out the State EITC that just started. Start looking at welfare fraud, EBT cards, Section 8 and other handout programs. Cut down on the number of State workers. Less chiefs and more Indians. Sick of the State stealing money from its residents. A little here, a little there begins to add up. CT, the worst state to retire, I wonder why.
- Toll booths are BAD. They create problems and accidents. The Mass Tpk is a good example of failed toll booths even with EZ Pass. The San Francisco experiment with rush hour tolls is a Failure and helps very little. Hartford needs a more comprehensive solution; whereas, tolls and varying price points don't solve

the basic problem. We may need a Belt-Way or more By-Pass solutions to keep transient traffic away from our cities. These comments also apply to Danbury/Waterbury/etc.

- Get your road improvement money somewhere else. I can barely afford gas to get my kid to school. My son can't get his license because he is 18 and can't afford insurance and I can't pay for it. We are on food stamps, I get medicare, they get Husky. wtf? I can't afford to put gas in the car to go to the grocery store, now you want to put tolls on the road so I can't afford to go to the f''ing store to buy the frigging food that I won't be able to afford to cook pretty soon! That's OK I suppose..in a couple of months I am going to be unable to pay rent any more so we aren't going to have a home anyhow. It sucks for my daughter who is an A student in high school but I guess that will be changing when we are homeless, if only we were black and lived in Hartford or New Haven to begin with. I see them on TV every year getting their free winter coats and just the other day getting their free bags and boxes of food packed into their brand new SUVs that they can afford cuz they live rent free and are promised college educations just for graduating high school.
- Taxes,taxes,taxes.highest gas tax in US where does that money go?every time I can I fill up in a surrounding state.$.40 or more savings by doing so.this state is pricing itself out for most people.none of my children returned after college due to cost. Now you want to add tolls. Just chipping away from dependable income. Can,t wait to move.
- I think in CT we are "taxed" to the limit now...no more taxes....we will not retire in CT because of all the taxes
- Tolls are not the answer for the poor quality of the roads in Connecticut. The amount it will cost to build and support the tolls will be far greater than the benefits.
- Taxes in CT are high enough already. Stop wasting money on stupid projects like the busway and giving money away to wealthy corporations like Bridgewater Financial and use the money for its intended purpose of maintaining safe roads and bridges.
- Since we pay one of the highest gas taxes in the nation why put them thru downtown Hartford? Should be on 95 and/or 15.
- I resent the idea of placing a toll in Hartford. It's pathetic to say you can't find the resources. It's a matter of priorities. I don't like that idea that this survey will be used for politics. Our state tax was supposedly for roads. It's no wonder people leave this state.
- We should put up tolls at the states borders on major highways like all of the rest of the states in the north east. CT. has the highest gas tax and everyone knows it so most out of state vehicles aren't stopping here for gas so we should use ez pass to collect something from them for the use of our roads.
- We pay to many taxes in this state!!! It is time to STOP giving handout to every illegal immigrant and start taking care of the people who live, work and pay taxes in this state!!!
- Getting close to the time that Connecticut will be bankrupt with the out of control spending
- The reconstruction needed can be paid for without tolls or increased taxes: simply cut spending on many of the wasteful items that are not necessary!
- Connecticut already taxes everything and its getting to expensive to live in this state. If you add tolls its just making the problem worst
- I strongly disagree with toll given the economic situation of the country. And the financial stress these place on the family!!!!
- tolls would be difficult for people who are on a fixed income and still have access to an automobile,
- no tolls at all

- I believe that value pricing will have an even great adverse effect on the growth, well being and the economy of Greater Hartford. It will adversely impact the working poor and middle class--it will divert dollars from education, and business development.
- Implementing new tolls is a bad idea. Cut spending first, we know there are programs to cut and stop pushing agenda items - take the money from there for road improvements.
- My suggestion is to take the money from the casinos and from the taxes of cigarettes and gas to help fund this project.
- When the casinos came into ct, the revenue was for education and road repair. Where has that money gone? Maybe it is time to start saving these revenues for this major project. I also remember when we had tolls on the bridges, the traffic was terrible--it was not deemed to be cost effective-- and removing the tolls was also costly. I also believe tolls on one of our major arteries in this state would leave a vastly negative impression with anyone travelling through our state when we are trying so hard to make a positive impression!
- Stop draining people dry! Find another way!
- Connecticut is very expensive and we cannot afford to pay for tolls. I do not feel more burdens should be placed on taxpayers.
- taxes are enough to pay for projects
- Poor people will be burdened by any new taxes. Maybe we could charge by type and age of car, like property taxes. If you have a 2013 Escalade, you pay more than someone with a 1998 Saturn.
- Better budgeting, spending and saving would result in money for road improvements -- stop foolish spending. Consider freezing state workers pensions, just about all other businesses no longer have pensions. that would save money.
- I think it would be a disaster placing tolls in downtown I-84
- There is a lot of wasteful spending in CT. If state government could rein back in on that waste, we would have enough tax dollars and income from the casinos to pay for repairs to RT 84.
- Tolls are not appropriate for local travel
- state needs to spend responsibly to cover all obligations, including road improvements.
- The State of Connecticut and the Governor waste mopney on pork barrel projects. Maybe they should eliminate these entitlements and repair the infastructure using that funding and the labor of those currently receiving state assistance.
- Gas tax funds collected should not go into the general fund but rather be used to pay for improvements needed, such as this.
- Tolls cause more congestion and rear end accidents as well as people being stupid upon switching lanes last minute. Video tolling should not be legal it is essentially survellience
- Put tolls on 84,91,95, 395 (or any highway that intersects with another state) just inside state borders to provide income to fund highway repairs. Make sure they are placed in non congested areas.
- Why do we pay taxes if the cost of the construction is going to come from tolls. Maybe dont have the workers sitting around doing nothing for hours every day and actual work to save costs. Most construction I pass by in CT no one is even doing anything.
- There is a reason why my husband and I are looking to move out of this state, and the taxes are number one on the list! We both have full time jobs that pay a decent salary, but the thought of buying a house and being stuck in this state is depressing. Our money will go much further some where else. The thought of being charged even MORE tax for something like this is maddening. I'm sure that this project is

something that has been in the works for years now, but instead of cutting spending in other areas to fund it, the cost will get passed off on to the residents instead. It is disgraceful.

- I think if you are going to have tolls, there need to be tangible improvements in a quick manner to the highways. It will be extremely inconvenient for everyone to deal with the construction situation, and tolls can also cause delays in travel time (as people who don't have transponders have to stop and pay). I hope that there would be additional lanes or some other improvements to make traffic move better that will make up for this.
- I think it's absurd that tolls are being put in place for roads that should have been maintained by taxes for YEARS. It's double dipping and ultimately the people that have the highest income will pay for those that use the roads more and in turn provide little to no value services and tax basis for Connecticut. It's water under the bridge so to speak but what I think we should do is reduce pensions and salaries for government workers and reduce infrastructure that is aging (courthouses are empty and running HUGE BILLS without use) and reallocate those funds to infrastructure that is in use - i.e. roads...
- New Taxes should be limited to very high income people.
- I strongly am opposed to the tolls.
- Past history in this state shows that funds relegated to road repair is absorbed into the general fund and used for all the entitlements that our politicians approve. I am tired of supporting this. We worked hard for our money and hate to see this waste. My husband and I are truly disgusted!!!
- I think the addition of tolls to I-84 is ridiculous! By adding to tolls to the highway, the congestion and travel time will be severely increased. This is not safe for all of the commuters traveling through this area, especially during rush hour. There can potentially be an increase in accident rates. This is a poorly thought out plan which will impact thousands of people each day. I SAY NO!
- do not want to see tolls on 84. it will lead to delays, cost money and may cause accidents.
- Dont Raise our taxes, out of state towns should pay not the people who already live in Hartford.
- no tolls
- Tolls were a horrible idea to start with and would lead to increased traffic delays in an already poorly designed inter-state system. Take the money out of the CT general fund and stop playing shell games with our taxes. Use the gas tax money as it was intended and not for Dan Malloys pet projects. Tolls were removed from I 95 years ago because of the number of deaths that were occuring at toll plazas. Tell Malloy to live up to his promise of no new taxes. Tolls are a new tax...
- Hope the taxes do not go up. Tax the people who drive through I-84 instead of raising property and real estate taxes.
- Governor Malloy is making a mistake by examining a mistake by examining the possibilities of tolls on the roads in CT It will create more problems than it will revenue. Tolls will be dangerous as well as a nuisance. He's raised taxes enough that we don't need these tolls. We can take revenue from all the new taxes he has initiated in the last three years as well as the ones that existed prior to him becoming Governor.
- We already are taken advantage of as residents in CT. With Car Tax, and so many other taxes, we are hurting. Now tolls. Come on.
- I do not agree with the video tolling, this is ridiculous and absurd i have been a resident of CT all my life and it is not fair to us taxes are quite enough!!!!
- put in a hiway tax instead of tolls
- consider raising sales tax. everyone benefits from highways
- I think tolls would make a lot of people mad. I would drive around them most likely.

- Don't do it. Please don't or my dog will have to have her ovaries cut off...you know...
- Taxes in Connecticut are ridiculously high. Adding additional monies for tolls within the state would seem to take more from tax paying working citizens. It would make sense to put tolls on the "ends" of the state (84 and 95) to charge those vehicles who are passing through our state rather than CT citizens. Most CT residents who work in NY take the train.
- I would NEVER pay a toll to use I-84....
- Connecticut already has the HIGHEST GASOLINE TAX IN THE NATION. Property taxes are high and rising. The CT sales tax has increased and expanded. Simple groceries at the market are staggering. Families are struggling. The average worker is lucky to have a job in these precarious times, where foreclosures still abound. Businesses are closing, even in more affluent towns. Commuters can keep the extra 10-20 minutes in their commute MORE THAN they can afford another financial increase, probably $20 per week! Most families/singles cannot add this burden to their already tight, sparse budget. What are you doing with the high gas tax? Wasn't that allocated for roads? How about the increased Sales tax? How has Connecticut benefited from this income?
- Every time taxes or tolls have been sold to improve roads, the money ends up in the general fund or money that was already earmarked for roads gets diverted when the new taxes or tolls are used for roads and bridge repair.
- Gas taxes should be used for improving travel. Commuter line from Hartford to New Haven that costs $1,000/foot is crazy and that money could also have been used. There is misuse of State funds and it's awful to expect people to pay tolls to compensate for this incompetence.
- i am a full time mom with three children full of activities, including traveling from West Hartford to Hartford to Manchester, Glastonbury and Rocky hill and further more a college student in Down Town Hartford traveling 4-5 a week. This will add to much into my budget. it does not work with my financial. Why can we we get the help that was promise from the revenue promise from the Casinos..and what a bout improving our city bus transportation more accessible and more frequent, i will be the first one to take advantage of it.. i don't use right now because after pm hour the local transportation is very limited and i can not afford to wait hours to get home to attend my children, since my spouse works when i go to school at night..(so far my children 14,12,10 stay home for a bout 2-3 hour alone). feel free to contact me at any time.. i have more to say, Respectfully, Katty
- I don't understand why the state feels they need a toll system. The roads should be paid for the same way they have been paid for in the past. Also maybe if the workers were more productive the projects wouldn't be so expensive. A big problem whenever you drive by any construction is five guys are there and only two(at most) are working, this is ridiculous. I wouldn't mind if you told me the workers are going to be more productive, with direct supervision. I think this is a way to cut costs, not a toll system.
- No tolls
- We have been paying fees/taxes to build and maintain the nation's road and mass transit for years. The money collected has been used for a myriad of other purposes. We have learned nothing about maintaining the infrastructure since the Mianus River bridge collapse. Millions were misspent on the reconstruction of I-84 in the Waterbury area. New roads are constructed while existing roads are neglected. Our leaders need to lead rather than pander to get re-elected.
- we pay plenty of taxes
- we pay enough in taxes as it is,,,cut spending!!!!
- Cost socialization needs to be made clear the the taxpayers and the highway users. The cost can not be put entirely on the commuters, but the benefactors of the highway improvements too. The city and the businesses in it should pay too.

- As if we dont allready have enouph to payfor in this rich state a toll booth wil add congestion and more burdens on the tax payer this is a very bad idea
- Taxes are way too high in this damn state!
- CT is ridiculous with the high cost to live here - now Malloy is increasing gas taxes and now you want to add tolls.....WTF???? Not to downtown Hartford (which is slowing dying because of the cost of parking and small businesses leaving). Put the tolls near the CASINOS - seriously that makes the most sense - not once again taxing people that are trying to make a living in Hartford - no one goes into the city now at night - they will NEVER go in if there are tolls there. Maybe the Govenor should look at the state workers and cut back there instead of always going at the middle class working (now poor) I tell my children to leave this state as soon as they can - it is over taxed and poorly run by people that have no concept of the reality of a working class.
- Please dont add tolling system, we pay to much in taxes already in this state.
- taxes are to high will be moving out of connecticut
- I work for the State of CT- our wages have been frozen for years- requiring tolls in addition seems like added cruelty for the privilege of being a public servant.
- I am opposed to paying tolls. The business I work for has many plates and would not find it reasonable to use transponders. I think that the gas tax money we, as residents, pay should be used to fix the infrastructure instead of going into the general fund. I remember when the Miamis Bridge collapsed and we were told that the tax increase would go to maintain the infrastructure. So much for that!
- our taxes are too high already...use that money
- Highway robbery no matter how you look at this. Pay this with a bond from the government. They paid for the airport in a similar way so we can do it this way too. This is nothing more than a money grab!! Extremely odious on fixed income people and lower income people who are still and do not financially stress the existing social infrastructure.
- i don't like tolls
- I don't see the need to put a toll in hartford why not from springfield ma or new haven ct to hartford
- how about using the high gas tax we pay to pay for the new construction, where is all that money going???? How about tolls on all major highways for traffic entering or leaving the state. High tech tolls with low overhead, example: New Hampshire toll on 95
- If you're going to institute tolls in CT, the state MUST dramatically reduce the gas tax, among the highest in the country. The state, one of the worst in the US in job creation, cannot have both tolls and high gas taxes unless we want to be another CA, NJ, etc. To begin charging tolls simply to fund make-work public works projects for union cronies of the Dems in the state would be a colossal waste of money and would do nothing to solve the congestion problems. The issue with I-84 is that it's inadequate statewide, not merely across Hartford, to handle the volume of traffic moving from NY across New England especially in the summer. And if 84 is going to be fixed or moved, run it through the North End of Hartford, not through the business district, so there will be the possibility of developing dense, residential areas in and around that business district.
- renovate the current spending to pay for i84.
- CT taxes are extremely high and I don't believe that we should be taxed further. The proposed location is extremely dense with traffic and would certainly be a hazard for travelers. Many travelers would opt to use "back roads" to get to their destination...causing congestion on secondary roads.
- high CT fuel taxes put in place for road work an additional road tax is NOT required Furthermore, 91/84 highway intersection already crowded at any time of day.

- CT has some of the highest gas tax in the country, which were put in place for road improvements. The state should first reveal to the public via and independent budget audit of where the gas taxes are spent. I strongly oppose starting tolls in CT. The government should learn to live within its means like the rest of us, and must first prove to be responsible stewarts of public funds before squeezing the public furthur.
- tolls on 84 are a bad idea and I am opposed to this proposal
- Did anyone remember the big car accident in the 80s when all those people lost their lives down in the lower region of connecticut..what about the congestion in nyc on 95s(tolls don't make things better). You would be endangering peoples lives for profit..and there is no guarantee that the money would go to the roads(prime example:lottery money and casino money). Whoever is thinking about this needs a lesson in budgeting and saving money. We are already getting taxed and spending so much in gas already!!!!Why would you do this to connecticut!!!!Dont you think we have enough problems trying to keep our families feed!!!! And trying to pay bills!!!!!That is why you had the income tax!!!Where is that money!!!
- PLEASE LOWER TAXES AND THINK OF OTHER WAYS TO SAVE TAXPAYERS DOLLARS
- Use existing tax revenue more effectively. No new taxes or tolls !
- As I live and work in downtown Hartford and use my personal vehicle to travel nearly daily for work, I am strongly opposed to tolls on I-84 in downtown. I feel I travel more than most on I-84 specifically in the downtown area (anywhere from 0-4 times a day). In addition, it seems many people use I-84 almost as a local route in downtown Hartford, as local streets downtown are inconvenient and maximize travel times. Most of these one-way streets push people to use I-84 and I-91, rather than local routes. For example, one cannot turn west off of Market St. between Talcott and State. I would consider paying a toll if traffic patterns in downtown Hartford were also reevaluated to accommodate local traffic.
- I think building a better infrastructure is good for safety, but I would not believe that they will use the revenue from the tolls for that. Look at the casinos. Their revenue is not used for that like they said when they were being built. This will be the same thing all over! This is just a way to get more money from us!!!
- I pay a lot of money in taxes and i live in Hartford. Our roads are AWFUL!!! I am not convinced if tolls are to be taken it will not help our roads. I don't see where any of my tax money is going. I paid $1000 in this year alone. I am not willing to give the state anymore money! I DON'T HAVE IT TO GIVE!!! I CAN BARELY PAY MY TAXES!!!
- Both my husband and I travel on I-84 through Hartford during morning and afternoon rush hour. A toll of $2.50/trip would be $10/day, $50/week, $200/month for us! We cannot take public transit because we have two small children, and we need to be able to pick them up quickly from daycare if they are sick. Neither of us has the ability to have a flexible schedule. Please do not squeeze the middle class like this!!!
- Living in CT has become so expensive that even with a full time job and a decent income, I and many of my friends have considered moving out.....no raises, higher taxes has made living here feel like I am living in poverty.....although I have a post graduate degree and a decent salary! Please don't add more expenses to our already ridiculously high living standards in CT
- Paying tolls is the answer if the State of CT uses the money to mantain the Roads in this state. I don't believe for a minute that they will do that. They will piss it away like they do with all the tax money.
- The majority of travelers through this area are people who work in Hartford or they are students commuting to and from school; getting hit multiple times a day, five days a week (if not more) will start adding up
- As a full time college student at Central Connecticut State Univ. and being employed at Westfarms Mall part-time, it would be very difficult for me to afford a toll every day of the week and I work every weekend as well.
- Use the money from the gas tax to pay for highways. do not use new toll income. State needs to cut spending not raise revenue. If there are any tolls should be rt 95.

- If you set up a toll system for Hartford, maybe I need to move this business outside of Hartford to the suburbs. If there is a 30% vacancy rate for office buildings in Hartford and you make it more expensive to get here, there will be even greater incentive to leave. Even if I can afford to pay tolls, many of my staff may not be able to pay them regularly.
- The state legislature and the governor MUST find other ways to pay for these highway repairs. The money used to fund CTfastrak could have been used to repair this stretch of I-84. More money has gone to other things such as college Presidents(Nunez of Eastern),UCONN and political appointees and the taxpayers see absolutely no benefit from the money we keep giving. The State has had the money from the gas tax and other taxes to pay for these repairs. Why weren't they made them before it got to this point? Why did the road have to get so bad that it is so costly to repair? The State obviously did not care about the safety of the drivers on this "dangerous" and "deteriorating" stretch of highway. The tolls are NOT about highway repairs. It's just another scam to get money out of the pockets of State residents. Will the tolls go away once the repairs are made? Of course not! I'd rather leave an hour earlier than continue to poor good money after bad into stimulating Hartford economic development while other cities such as Waterbury, New London and New Haven suffer with little or no State support.
- You people just don't get it. It's NOT about the time it takes to get to work, it's about how much money the state keeps taking out of my pocket. I live with my parents because I can't afford an apartment and have very little disposable cash. I'm a college graduate paying back student loans. I'm leaving CT as soon as I can so I will be able to have a better quality of life and afford to do more than go to work at one job and head back to another just to make ends meet. There is already a gas tax that should be able to pay for these repairs that the state has know about for years now. Why should I have to pay more money just because my job is located in Hartford. I think it's discrimination. If it's the state capital then let ALL of the residents of CT pay for it or just the Hartford residents since its for their benefit of economic development and quality of life. I live in Waterbury and I would like a better quality of life too, but Hartford residents won't be asked to pay for it. Why should I pay for them????
- When creating more taxes you must remember the poor, students and unemployed people. Will be the most affected by any decisions that are made.
- Connecticut residents already pay a high tax on gasoline. Mismanagement of these funds - appropriating them to backfill budget deficits - is contributing to having to raise funds to replace this section of I-84. Either way, residents will have to pay. But why single out Hartford? And the gasoline tax just increased again.
- People will use what is subsidized. Currently money is poured into highways. If a fraction of that money were put into public transportation it would be more heavily used.
- Take the money to pay for road improvements from the state of CT workers. Where is all the gas tax, cigarette tax and liquor tax, sales tax, income tax and lottery money going?
- We pay enough in taxes in this state! Cut some of the government programs to pay for road improvements.
- Tolls would forse more people to the hartford streets which would be a burden for home owners there. It would also be a degative driver to the region and encourage the people that live in surburban areas to live, work, shop and stay in the surburban areas. It would be awful for Hartford which I really want to succeed as a thriving city with too many odds against it already!!! Tolls are an awful idea!
- I live in connecticut, fees and taxes are part of everyday life. They go up constantly. Myabe we should charge the people form out of state more money for taking jobs from local residents.
- Take the enormous taxes out of the politicians pockets and out of the welfare coffers and put it back into the infrastructures to benefit the WORKING CLASS people in this state so we don't all leave at retirement and take our money with us.

- My biggest fear with the state getting tolls of ANY type established, is that they will eventually take the revenue generated and instead of being dedicated to road repairs/improvements, it will be dumped into the General Fund to feed the ever growing government spending in the State of CT (like the gas tax!). The Legislature has a horrible record on this issue and I don't believe that they could be trusted with another source of revenue and leave it soley for the intended purpose.
- NO MORE TAXES (in this case ...TOLLS).
- I believe that many of the financial difficulties this state faces is because no one will stand up to the unions and take back our agreement to pay state employees a large portion of their salary to retire after 20 years of service. No business in the private sector offers this - why does the state? Who was the person who agreed to such an arrangement? Most of those employees go on to work other full time jobs - some even working at their current employment for full pay while collecting their rtirement funds as well. I'm sure since the DOT is state employees this comment will not make it thru but I hope someone remembers what is said here as our state goes into financial ruination due to the money that is being spent to continue this practice. Most of us have to work until we are 65 and above in order to finally rest - why are state employees different?
- I believe CT roads are some of the worst in the nation. Many should have been expanded 25 years ago. You need to find the money for these repairs and upgrades within 2012 level tax (including the hidden taxes- like the ridiculous gas tax) revenues. I'm tired of paying for other peoples lack of accountibility, lack of planning, or political games. Do the right thing: make state workers pay their fair share of benefit costs, seek and prosecute welfare fraud, replace labor intensive systems with high-tech alternatives, eliminate all business killing legislation. Who knows, you might create a few new jobs in the process and increase the tax base.
- The only way I would see adding tolls is if the state did away with the motor vehicle tax. I pay a high motor vehicle tax which was sold to the public to remove toll roads and now the state wants to add tolls again. It's one or the other, not both.
- Instead of considering additional taxes or tolls, eliminate the States 1 billion gifts to UCONN at taxpayer expense
- The state government must first prove that it spend out money responsibly before they take more revenue from us.
- I can barely afford gas, putting tolls up only puts most people in a bigger financial bond.
- The State of CT has uselessly spent the taxpayers money on rediculous projects and should be utilizing what is being made with gas taxes, casino revenue etc to continue to fund this type of project. It is necessary, but as a hard-working citizen brought up in this state, the amount of money I spend on my daily commute is already expensive. I cannot afford to have tolls and increase the amount that I already spend.
- CT gas taxes are among the highest in the US.....where does the money go?
- No Tolls! We pay enough taxes and get little from them!
- This study starts from the premise that tolls are the only way to pay for this project. We just had an increase to the gross receipts tax on gasoline. Why is this money being used to pad the general fund instead of going to pay for transportation, as the fuel taxes were supposed to be used?
- The State of Ct does not use the funds that we have now, for road improvements. Why would we think that monies collected from tolls would be used for road improvement!!!!!
- I feel that tolls would be a mistake on the highways. We are already paying high taxes for infrastructure and believe that there should be enough dollars to pay for the roads. Use the HOV lane for all cars during rush hours, don't build the bus way and use those dollars for highway infrastructure repair.

- I feel tolls should be placed on 95, 91 and 84 where the state borders other states like New York and Massachusetts to increase revenue for Connecticut for highway repair etc. If we use the EZ Pass tolls, congestion would not be a big issue.
- I think that asking folks to pay a toll to fix a road that you knew would need fixing is stupid. The repairs should have already been budgeted. And since it is not, find the money from all the other taxes we pay!!! Do you guys think we are so stupid that once the "temporary toll" is in place "just to fix this road" and, when the road is fixed, the toll will go away? I don't think so. In fact, it will be a revenue stream that you will want to increase at will. So, no tolls!!
- If tolls are going to be implemented then the income generated should ONLY BE USED FOR ROAD IMPROVEMENT and not siphoned into the "general fund" never to be seen again!!!!!
- I think it is crazy to add tolls with everything this state is charging. Gas taxes has just went up and every time you turn around, there is something new to pay for. The state is so eager to make us pay out but they are not eager to give us more. There is no increase in our paychecks because our jobs are finding ways to cut back. It is hard to live in this state because it is so expensive.
- Every thing keep going up $$$$$$$$$$$$ except our pay, taxes, taxes,taxes, but the govenor keep giving our $$$$$$$$$$ away to company's, the bus way to no where etc. when will government listen to the PEOPLE.
- It is tough to watch the politics in the state and now continually see our taxes rise to pay for spending and projects that appear to be the view to make sure our state government stays employed. Decrease spending and make all of the states employees responsible for their own cars and gas. Even they may not be happy at that point.
- Connecticut pays the highest taxes. Where is all the money from the lottery? Cut down on state employees. Have state employees pay for health insurance when the retire. Get rid of large salaries and exorberant benifits paid to local and state employees. I work hard for my money which is not alot and more and more is taken away. I don't want to lose my house which I work hard to keep. Give middle income a break. Middle income carries the weight on our shoulders. Give less in state aid for people who can work but aren't willing. Creat more jobs.
- Please give serious thought to alternatives to raising taxes, collecting money for highway improvements etc. Connecticut is one of if not the most expensive state to live in and the Gov neeeds to be acountable for the number of state employees, their benefits and implement a plan to reduce state workers. This will reduce the burden put on the tax payers as well as other options implenmented to reduce state spending. The high taxes are and will continue to drive residents out of the state. The residents of CT have had enough overtaxing and at least 80% of my work, personal and professional acquaintences plan to leave CT to live a better quality of life. I have spoken with several indivuals as the subject comes up alomost daily and several will leave to states that do not tax income. I am a college educated professional and hope you realize the fatal impact the taxing of your residnets is having on the future of this state. Please feel free to contact me at 860-836-7578. Kathy
- I am extremely opposed to Tolls on I-84; people are struggling in this economy without having the state swindle them out of their hard earn money when the majority of people traveling into downtown hartford are just trying to get to work. If a toll is put in place it will just increase traffic for all the people avoiding the tolls trying to save on the dollar.
- I oppose additional or any new taxes on tranportation because the existing tax revenues collected for this cause are misused. Also, when redesigning I 84, I suggest eliminate all left lane (passing lane) exits and entrances to eliminate congestion and reduce accidents. Secondly, it's logical that number of Exits/entrances on highways be available on both sides/directions of highways. Lastly, consider avoiding obstruction of natural resources when relocating I84 (ie I91 infringes upon options for various access to CT River front). Thank you. Mary Y.

- Stop with the programs! Start using the budget as it was intended to maintain the state, not put up a beacon for every unemployed illegals and their families of 14 relatives to come to CT and suck the coffers dry in handouts! Connecticut used to be a proud state to live in!
- From this survey you will see I'm strongly against tolls on the road. Connecticut citizens pay a larger gasoline tax that was to maintain & build our roads and transportation systems. However this tax has been used for other things not related to our roads and transportation needs. Let's fix this first and CTDOT will then have the funds needed to do their job.
- To avoid traffic to build up on I-84 the HOV lane should be open to all vehicles between 5AM-10AM. No tolls please!!!!!!! I pay enough taxes to pay for highway repair.
- Existing taxes are sufficient of cover the cost of highway improvements if properly managed. Tax payers have already endured a state income tax and recent increase in sales tax. This is another burden on the middle class who are traveling into/through Hartford to work.
- We already pay a very high gasoline tax to pay for roads. The legislature should STOP RAIDING these funds to use for other purposes. If they did we'd have enough money to build and maintain the roads and we wouldn't need to have tolls.
- I just feel we pay enough in taxes as it is, and we didn't get a merit increase this year. Gas prices and vehicle maintenance costs keep increasing. The cost of living keeps going up. I don't want to have any extra expenses when everything else keeps going up.
- We have known for 45 years that this day was coming. The cost to repair or replace should have been, and should be, in every annual budget. We, the workers, should not be penalized on a nickel and dime basis for the State's failure to plan for the inevitable.
- find another way for the people of east hartford to get across the river and end traffic problems for 84 east. I would pay to use the HOV lane
- after taxes, how can we pay tolls?
- I highly oppose tolls on our state highways. We have the highest gas taxes in the nation and all that money should be used to maintain the roads not fund other pet projects.
- no tolls!!! I will seek other employment if I have to pay tolls.
- Connecticut needs to assess where our tax dollars are being spent that are suppose to be for road repair. Increasing taxes should not an option. The gasoline tax continues to be increased but not used for road repairs as it was designed for
- Considering the recent tax increase on gas, I do not agree with raising taxes and/or using tolls to pay for road improvements.
- We pay enough in taxes in CT already. They should have forseen this and put funds away in anticipation of this project. The state should run like we run our homes and anticipate these projects.
- Ready to relocate to afford lifestyle. More expense in CT will force us to move
- No more taxes please. Many states use tolls as revenue, so should CT.
- This state already takes too much in taxes for gas, income taxes, food and our cost of living. We are not receiving any increase in our salaries but the state continues to take more from us. Why does the state not learn to live within its means as I have to do so?
- we seem to have a new tax every week if you want the economy to improve in ct maybe you should think about tolls for people coming into our state.cant someone come up with a idea that the tax payer dont have to foot the bill ie trucking concerns that use our state as a cut through to boston,business . quite frankly enough is enough
- I strongly feel that it is unnecessary for CT to get tolls due to the high living already

- This state takes enough money from us.
- I feel I have already paid for these improvements. Tolls have never been used for what they were supposed to in the past. So I'm opposed to them.
- No tolls in Hartford, put them on the borders of the state if need be.
- While I support this option for congestion control on the highways, I think tax revenues already designated for transportation improvements should be used for this purpose. What guarantee is there that these funds would not be taken for the general fund also?
- Tolls are not the solution to this problem. It will cause many people to attempt to find alternate routes through or around Hartford causing congestion on our local streets. While this might be good for small business it will most likely cause the streets of Hartford to fall further into disrepair. Tolls would force more people to use the CTFASTTRACK but that only helps people trying to get into the city not people who are trying to get out of the city. High speed rail/ commuter rails to southern CT might help solve that problem if it ever gets built. Increasing taxes will cause outrage and discourage business as CT TAXES are already out of control. It would be nice if this could be paid for with tax money that already exists through Government budget control, though i know that is unlikely. Is there any Federal Money that can be granted to the state for transportation needs? CT needs to move behind the automobile I think we are a small enough state to utilize mass transit. CTfasttrack is a good start. High speed rail will be the next step and hopefully some future light rail to west hartford, east hartford, glastonbury, and the air port will change our city! Why did this city ever get rid of the trolley cars.....
- This survey seems to be primarily about tolls. Our current tax dollars, state and federal, are supposed to pay for highway maintenance, including these types of major projects. However I would support tolls IF they were partially used to lower the current income tax or overall tax burden in Connecticut, which is extreme. This could be done by tying toll payments via transponders to tax ID's and tax credits for Conn. residents for tolls paid. I would never support the state gov't saying "hey pay for this project for tolls that will NEVER GO AWAY and by the way we're going to continue to increase your existing taxes". I get the need for taxes but the spending in this state is out of control. Figure out a way to pay for this without raising our taxes. IT CAN BE DONE.
- Tolls start and they never stop, the price just increases up and up and it slows traffic even more. Just raise my taxes.
- My biggest concern is that people will be reluctant to pay the toll and the surface streets in the area will become even more congested than they are already at rush hours.
- The Cost for doing Highway improvements and maintaining highways was supposed to come from this State's ridiculous fuel Taxes..Tolls will do nothing but more damage to our State's dismal business future. Are their any people with any sort of business experience running a program like this? Sadly It seems there are not.
- I understand that implementing tolls is a method of funding an infrastructure project by charging those who use the highway, but, I84 is an interstate highway and should be funded by federal funds.
- Tolls are not the way. Use the gas tax like it was ment to be used for.
- I think that someone should look at how our tax dollars are being wasted on things we do not need and spend them on fixing our roads and bridges, not building more roads that we do not need.
- I find it ridiculous that with all the money coming into state coffers via taxes and the casinos that ct dot has the balls to bring up tolls... My taxes and the extra money I spend on gasoline and alcohol and other enforced hidden taxes can't be used wisely and fiscally smart to fix the problem. Perhaps we need to waste less money on this ridiculous fast track project and improve existing road conditions... In Willington, you are digging up a road at exit 69 that was perfectly fine and done last year or so... A total waste of money... And that wasted building on the Berlin turnpike, 3/4 of which isn't even used... Why not

rent out the space and use the funds to fix roads... I have a feeling that there is a lot of fiscal ineptitude in DOT management...

- Cut government. 35% state sequestration. FIRE state employees to get to this reduced government.
- Taxes in Connecticut are high enough. We should not have to pay tolls for improvements that should have been budgeted in all along. Gas prices are among the highest in the nation. Use some of the gas tax money to fund road improvements or if you are going to institute tolls lower the gas taxes.
- Taxes in connecticut are so high now, i am not happy being charged even more money to get to work, what we need is better mass transit, which for myself would mean earlier departure times, and convienient pickup times to and from work.i would be happy paying for this but not tolls.
- I strongly believe that our tax money should be used for the projects they were intended for and to stop making us pay for additional tolls/taxes and use the money that is established for these projects.
- It is discriminatory to place a toll in the middle of Hartford. The majority of Hartford residents are poor and minority and this disadvantages them disproportionnately. No other highway repairs in CT have been funded in this way. So why would you pick to fund Hartford repairs in this way? Many of the people who live in the suburbs get off before Sisson and so would not have to pay the tolls. People in West Hartford can take the streets to downtown Hartford. So this plan hurts the people in the state who have the least. Highway repairs should be funded by general revenue. If you must place a toll somewhere, you should place it at the NY and MA borders.
- I am not in favor of having tolls in Hartford which is a very poor city. If there need to be tolls to raise funds they should be collected somewhere else on I-84.
- I am completely opposed to a toll system in downtown Hartford area. Please utilize other toll methods to pay for this, such as tolls at state lines on major highways, etc.
- The reason we need to collect tolls as you see it is because the elected officials don't know how to reign in the spending. The bus is biggest waste of money in recent years. It's going to cost more to build and maintain than the idea is actually going to bring in in revenue. Any business would know this is a losing proposition. AND, we're funding it w/ borrowed money we don't even have and we'll pay interest on it because we don't have the cash. I don't care how many jobs it makes for a lousy 6 months. Start thinking like a business person & stop running us into debt we can't pay for! You elected officials are a bunch of idiots & you're not even listening to your own constituents!
- Tolls on the downtown I-84 corridor would unduly harm people who live and work locally
- Ct REMOVED all TOLLS years ago in an effort to reduce traffic congestion and accidents. Raised gasoline taxes to cover the cost of road repair. NOW you are asking me to pay the among the HIGHEST gas tax in the nation and TOLLS TOO!A toll of $1.50 which is about the average of the TOLLS proposed in this survey would ADD $300+ to my costs to get to work!!!!
- I think the toll proposal unfairly targets the lowest income earners in the state of CT considering it involves downtown Hartford.
- Why should Hartford drivers pay for Hartford improvements, our taxes paid for bridge work in New Haven etc. Tolls would also create increased traffic on local streets as people find ways around the tolls. Video licence plate collection would not work =missing front plate, traveling close behind 18 wheeler during traffic jams, extra cost- viewing video,sending bill,paper use postage, cashing checks, my time ,postage,inforcement of illegal plates and nonpayment. NO TOLLS
- Please do not institute tolls. Bad idea. Thank you.
- I beleive that the existing tax structure designed to support highway improvements (gas tax, etc) should be utilized properly before any additional tolls are considered.
- i will not pay to drive to work daily.

- I already work 2 jobs I dont want to have to get a third just so I can afford to drive to work. We are one of the highest tax states in the country...gas prices are ridiculous!! It is getting harder and harder to make ends meet in this state. I am so discusted with the way this state is run. The working middle class just keeps getting squeezed pretty soon there will not be a working middle class you are either going to be working poor or wealthy.
- I would be very much in favor of the project if not for the proposed methods of toll collecting as I think those who use the roads should pay for them. However, both radio transmitters and toll by photography create the possibility of abuse (particularly by law enforcement agencies) with regards to privacy - I would actively oppose implementation of either.
- Do not waste state money. Make a system by which current and future governments save for future construction projects so this situation doesn't arise again (need for a project with no planned funding)
- Toll are a bad answer. Tolls are a regressive tax on the poor. Why toll/tax Hartford when other roads are covered in the general budget? This will hurt Hartford residents and Hartford businesses. Wrong, wrong, wrong!
- I understand the need for the improvements, however, I strongly feel that the significant taxes CT residents pay this additional toll will be a burden. I also believe that our high taxes and the income from the casinos should factor into this as well.
- I would strongly consider all alternate options or even consider leaving 84 the way it is currently. CT residents are continuously bombarded with additional taxes and other expenses that further my desire to move to another state with a lower cost of living. I don't think people generally use public transportation except in extremely large metropolitain areas and Hartford does not fit that bill.
- Toll is not the solution to the problem.
- We need to stop raiding funds that were supposed to pay for roads.
- You collect enough in taxes at the gas pumps to pay for the roads. Other states can afford to maintain their roads without the increased gas taxes and tolls.
- I moved over from Minnesota three months back and the taxation in Connecticut is RIDICULOUS. Compare it to Minnesota where the social indicators are much much better, taxation is reasonable, businesses thrive, crime is next to nill, roads are in decent conditions and tolls are manageable - all this in a seemingly socially conservative but politically democratic state. I am a liberal and in general I like to pay my fair share of taxes towards all round growth. With this background too, I find Connecticut's taxation is on the verge of being dangerous. With this proposed toll on I-84 I am not sure if I have to rethink my stay in Hartford area, nay Connecticut.
- Keep raising taxes, wasting the tax revenue, and then wonder why people are leaving this state in droves.
- I do not feel it is right to penalize (monetary tolls) ONLY those who use that route to go to work. It is a state highway and I feel the entire state should be responsible for picking up the charge, not just a small group of commuters who who need to pass through the area each day for work.
- Connecticut needs to find a better way of paying for major infrastructure improvements. We are in a recession, charging for it is a major slap in the face to taxpayers, many who are out of work. Each state needs a flat tax rate to solve this issues as it's apparent our income tax that was implemented by Gov. Wiecker isn't working either.
- It is unbelievable to me that the state is going to further penalize the few remaining businesses and residents that come into Hartford by charging tolls. Based on your survey questions its apparent that my commute will take the same amount of time and cost me more - probably after 2 years of construction which will impact my commute time further. Please be sure to notify the local towns that their traffic will significantly increase as drivers avoid state highways all together further increasing their road

maintenane burdon. It will be no surprise when my company follows so many others and leaves the state. I will be happy to follow them OUT.

- CT gov continues to squander money at an alarming rate, there is no need for tolls.
- Connecticut already has one of, if not the, highest gas prices and taxes in the nation. There is no reason additional revenue sources are needed to fund construction projects if the existing tax revenue is allocated appropriately and wasted expenses are limited.
- ENOUGH taxes in this state - I thought the lottery funds were to handle road improvements. Perhaps you can use some of the gas tax that just went into effect....
- use gas taxes as they were intended, to improve and upgrade the highways.
- Please don't raise any taxes or add tolls to us, we are working class people... This state has already raised gas taxes, income taxes, the property taxes are getting up there. And when will it stop? Enough already ... rich are getting richer and the middle class is going broke.
- Please don't add Tolls.
- As far as I know the taxes and cost of living in CT is very higher than compared to many other states.Especially the property taxes on consumer vehicles are higher when compared to other east coast states. So why not this project be funded by government insteade of putting more burden on the people.
- The state should use the money from the gas tax to fund these projects and not use the gas tax in the general fund. That was the original intent for the gas tax.
- I-84 in downtown Hartford, is easily one of the worst designs as far as congestion I have ever seen. Something should have been done years ago to fix this. The traffic is horendous, and it does nothing but waste valuable time for drivers as well as waste gas and emmisions.
- I can't afford to pay daily tolls to get to work. If a toll booth must be installed in Hartford, the toll should be 50 cents or less. Consideration should be given to placing tolls at the state borders to capture funds from people traveling through the state.
- I am all for fixing the highway issues in this state. However, the State of CT collects (overall) the greatest amount of taxes from its citizens than any other state. Where is this money going? It's clear that when I hear about budget deficits and shortfalls in government money, something is going on within our state government. When I moved to the State in 2000, all I heard was news stories about crooked politicians and since that time, I am convinced that there is a lot of corruption in our government in this state. I think this needs to be looked at before you start asking the taxpayers, who already pay a heavy tax burden, to shell out more money.
- Opposed to tolls. Working in downtown hartford already takes up money for parking. Having the additional expense to/go from work is not supported referring to tolls.
- I think that you should start a new lottery game called "rolling in CT" or "Wheels of Fortune" and use the monies to repair and/or replace roads/highways in the state of CT instead of burdening the taxpayers once again!!!
- Use gasoline taxes, vehicle registratino fees, driver licensing fees to maintain and repair roads. Stop putting that revenue into the general fund.
- We don't need tolls to pay for upgrades. We have a transportation fund to pay for that, but we keep raiding it to balance the general budget. Stop raiding the fund and get rid of money wasting projects like the busway and we won't need tolls.
- Taxes are high enough NO TOLLS

- Rather than tolls, the State should be using the already high fuel taxes that it collects to pay for road and transportation improvements, instead of hijacking those revenues to shore up deficits caused by overspending in other areas of the budget.
- The taxes in this state are already some of the highest in the country. The gevernment should figure out another way to pay for their projects than to charge taxpayers even more to live in this state.
- tolls if implemented should not solely rest with CT drivers, but to all that use 84
- I think adding tolls on I-84 in downtown Hartford would be a big mistake. I think it will drive even more businesses out of the city; several large insureres have already left Hartford. We already need to pay a substantial amount to park in Hartford, now we will be asked to pay a toll to accomodate updates needed to I-84 when I HIGHLY doubt it will make any commute shorter or reduce congestion in Hartford. The state wants to make Hartford a better city, self proclaiming it to be "New Engald's rising star" but if you put tolls on the road, less people will visit, which will make the city worse off and back at square one. I think tolls are not the answer nor do I agree with increasing taxes. Find the money another way!!!!
- I strongly oppose penalizing Connecticut residents who are employed within the state by imposing a toll on their commute. The General Assembly approved diversion of casino income from the original purpose of highway maintanence to the General Fund. These monies should be re-directed to the purpose intended when gambling was allowed within the state and be used to redesign and repair fix unsafe highways. The only mass transit option from my home requires that I drive more than halfway to the office and then expent 4 times as long to actually arrive there. that just IS NOT a viable option.
- I think it is ridiculous the state is planning on imposing a toll to fix the state's highways and bridges. The gov't should have used the money they received from the gas taxes for these projects only instead of mismanaging our tax dollars. Now we will have to pay even more taxes? When will it end?
- Gas taxes were just increased, we already pay more for gas than most states, to pay for roads. Why would we have to pay tolls to repair roads?
- Generally, I oppose tolls on CT Highways. If the state was capable of appropriate management of tax revenues and if, politicians and state beuracrates could be trusted to honestly manaage the tax revenues they currently get, I do not believe tolls would be needed. Also, toll plazas are a dangerous addition to our highways even with electronic collection mechanism.
- As noted in my specific replies, I do not trust the CT general assembly to direct toll collections into highway improvements. Time and again we've seen sources of revenue redirected to the general fund where they can be spent on all sorts of silly money wasting initiatives. Effort would be better spent placing tolls on the entry/exit points into or from Connecticut, such as I-95 in Stonington, I-84 near Sturbridge, I-84 near Danbury, rather than on intrastate tolls near the Hartford area. Tolls on trucks using CT as a shortcut to NYC or down 84/95 makes the most sense.
- Tolls should be at the state lines and not in Hartford. We are already payings taxes for both our state and city roads. I feel the roads are terrible as it is today, especially in Hartford. This does not give me any assurance that charging tolls change the conditions of the roads. I dont mind driving 20-30 minutes to my house, I rather seeing the roads plowed properly and contruction done at reasonable times.
- Tolls on I-84 are NOT an option that I support. You can find other ways to pay for the road project, especially as you've seen the need for the road improvement for a long time now.
- We are already taxed to death - enough already
- The gas tax just went up in addition a busway costing millions of dollars is also bing partially funded by the state. If you put tolls up on 84 you will cost jobs. Maybe work with the money you have because individuals don't have any more $$ to give to this State.
- If a toll is going to be necessary to help pay for the necessary improvements, I think a lot of people are going to want to know why the already perceived high taxes in the state do not cover it. Some kind of

educational campaign will be necessary as there are already anecdotal cases of people unhappy about the potential tolls.

- I understand the need to improve I-84 but feel the taxes we are paying are high enough especially at the gas pump. I have serveral co-workers who have moved to lower tax states to work as some of us have the option to work at home.
- At this time, I cannot support adding tolls to interstate 84 to pay for bridge work. My commute is costly enough with gas prices being close to $ 4.00 a gallon. I relocated here in 2006, and since then, my dollars have been stretched to the limit forcing me to consider leaving the state of CT to relocate to a more affordable state in the nation.
- We pay a significant amount in taxes already. Adding incremental taxes for (needed) initiatives like this makes me wonder where the taxes I'm already paying are being directed. Evaluating where money is being misspent (e.g. high speed bus way) seems like a better way to finance this project.
- Connecticut collects enough money via taxes and the casinos to afford these types of improvements without tools. Money needs to be better managed as this is a small state roadwise (e.g. not Texas).
- I have no objection to tolls per se. However - in this case, we the taxpayers of CT, already pay HUGE taxes, and the gas tax should be used to pay for highway improvements. But it has been diverted to the general fund and is used for junk projects. Stop stealing this money - use it for infrastructure projects, and DO NOT EVEN THINK of putting yet another tax on us. It will be the straw that breaks the camel's back.
- I would prefer tolls on other roads like 95 generally traveled by tourists or those traveling 'through' the state - or tolls not paid by CT residents already paying local and car taxes.
- state legislators need to figure out how to pay for repairs to our infastructure within the given budget!!!
- As I stated before, new taxes in the form of tolls or anything else is upsetting. Our elected officials should be able to find the money in our existing budget. We are so heavily taxed as it is, adding another tax is an insult, and we all know that once the project is done (if ever) this tax will never go away.
- I would only agree to tolls if the taxes were significantly decreased for gas
- Our tax dollars should stop being spent foolishly by politicians and should be used on these types of road construction projects. It is highly aggravating to think I'll have to pay tolls AND pay for parking just to get to my job. If anything, you will push people AWAY from Hartford if you may them pay to get here. My suggestion is to put toll booths at all of the state border lines and make ONLY out of state drivers pay tolls to use our roads. When I am driving on I-84, I see as many (if not more) out of state cars than I do CT cars. They are causing as much wear and tear, yet not paying anything to our state for it.
- Gas tax in CT is astronomical. Now you want to add a toll. It's getting too expenseive to live here and the job market is terrible.
- I sometimes travel by car and have gone through every state from Maine to Florida and I'm ashamed of the road conditions in the state of CT. They are some of the worse I've traveled on. We pay high taxes in this state to cover the cost of road work yet our politicians take that money and move it to the general fund. What guaruntee do we have that if they install toll booths the money will actually go to the cost of repairing I-84 or any of our other highways? 91 and 95 both need work as well. This survey should have been thought of before starting work on the bus line that not enough people will ride to offset the cost. Unbelievable!
- I already pay to park to work in Hartford, If i have to add the burden of more expense, this will not help my financial situation! Please consider taxing residents for improvements. Tolls are a BAD IDEA Thank you!
- Stop taxing the crap out of CT residence. enough is enough

- The State of Connecticut has been irresponsible in terms of utilizing every increasing gasoline taxes for use to offset our general fund issues. Instead of dealing with those issues responsibly, we are not in a position where we don't have funding to do the work needed to maintain or replace our highway system.
- I used to live in NY and everyday I had to go over the Tappan Zee Bridge 2X. The traffic at the tolls was a mess even with the ezpass 35mph lanes. No Thank you to Tolls.
- There's ridiculous traffic in the downtown area, but if you want me to pay $6 a day on top of gas to go into and out of work, you're out of your mind. I-91 isn't a reasonable option for half the state, and the traffic's ridiculous on that as well. $6 ($3 each way) is an hour of work a day for a lot of people who have to commute into Hartford. Changes are necessary, but you're choking the main artery into and out of the city by putting a toll on that road.
- The state needs to cut spending in order to fund basic needs like maintaining the infrastructure. This approach will cause more companies to leave the state as well as individuals to seek employment elsewhere.
- With the high taxes already imposed in CT residents, the gas tax and gas prices rising, tolls I believe arenot a good idea at this time or in the future. It gets harder and harder each year to budget with a small family household. When are we going to get a break.
- My taxes paid for the current infrastructure. They should continue to pay for the infrastructure.
- I am a working monther of school aged chilren. I need to get into work quickly and out quickly so I can go home to my family and take on my role as mom. I can not tolerate being stuck in traffic, and my ability to be flexible to my time is not there due to sitters, and costs of sitters before and after school care. Adding tolls, adds additional burdens to families that have to pay for sitters, and parking in the city- be careful of the additional costs for us already struggling!
- Town and State taxes are very high now. People are leaving Connecticut simply due to the very high cost of living. Companies in this state are sourcing jobs overseas at an alarming rate. The state should work on programs that bring jobs to Connecticut. The increased employment will take people off state assistance and turn those people into tax paying individuals. That is how you should raise money to pay for highway improvement. Taxes those Americans that are lucky enough to have a job will simply drive more people out of the state. Wake up!
- My comment is our state should cut spending and shrink size of goverment to balance our budget and pay for core services and improvements only.
- I am a single mother who works full time and travels to Hartford every day. I agree that the highway infrastucture in and out of Hartford is a joke and a nightmare. Also, as a single professional working mother who owns a home I am the typcial middle class person who makes a good living and is barely making ends meet and really cannot see how I can afford to pay anything more than I am right now, gas and taxes on gas in CT is outrageously expensive. It costs me over $200 a month just for gas, not to add the $80 a month in parking fees. I cannot take the bus because I am since with children and need to leave work if I have to cart them around, or there is an emergency, or have to take them to an appointment and come back into the office. AND I work a lot of overtime, etc and when I finally get out of work I just WANT TO GET HOME. I agree with tolls in general, but not for state residents. We are taxed enough. If you ever travel I95 you can see all of the out of state cars, (NY and NJ) on their way to the casinos. How about charging tolls somewhere on that route to pay to widen I95 and correct in CT?
- You really do collect enough in taxes to cover the reasonable business expenses of running thestate. IT is time you stopped the out of control welfare, and vote-generating give aways.
- We pay WAY too much in taxes in the state and those funds I feel are not spent wisely at all. Out current administration is chocking our state to death. I can varely afford to live here anymore. I can not take ONE more tax or toll.

- Road/Highway/Bridge construction has been continous in the New Haven area for years. Funds were found to support that work without putting tolls in the 91/95 area. I would support tolls on the state broaders but not in the city. Between the gas tax and parking a large amount of money already goes to my commute to work.
- Another reason why people are leaving this state. either we are continually taxed or find other ways to get money out of the people who are already giving much. How about the govenor taking a pay cut along with his staff and making some smart decisions versus the New Briatin Busway decision and spending too much money.
- The State needs to work on it's own budget and start spending smart. Connecticut is getting to high to afford to live here. You have people that can barley afford to survive. You increase the Gas tax, increase the use tax, and then add tax for items that were not taxed before and now you are going to ask them to pay a toll to use 1-84 to go to and from work. Where is all that money going.
- From this looks like it going to Cost me money to live in CT - think its time to start thinking about moving out of state. you should consider this type of a question in your survey.
- I would not like to see tolls on CT highways. We pay high enough in taxes in this State.
- Pay enough state taxes that I do not need to be charged for fixing the highway no to pay tolls. Bad enough I have to pay for parking.
- CT residents continue to have taxes raised, other charges applied, and benefits cut. Where and when will it end??? The HOV project, in my opinion, was an epic failure with a handful of cars using the I-84 lane that I see during my commute. If those miles are transitioned to "HOT" lanes, why would people use them at a daily cost when they do not use them now for free? I guess I would implement a reasonable toll, but I will not use the roads with any toll. I alone support my two children and elderly mother. Living on an extremely tight budget does not allow me to take on additional expenses. With more and more people working at home as opposed to commuting into Hartford, is there a decline in commuters? Also, the CT Transit hours to/from Coventry do not make it an option for me which is a real shame. I do not have the answer, but know we cannot afford another failure like the HOV lanes that were supposed to solve all of our commuter problems. Maybe we need gas to cost $20 per gallon to force people to commute.
- Taxes are too high in Ct now. I cannot afford to live here any longer. Although I work a full time job...thank God...I can never get ahead...between property taxes going up every year...gas taxes escalating all the time...income taxes going up...taxing everything we buy....how many more taxes can the few of us who are still working pay....you are forcing business out of CT due to our high taxes...we are taxed to death...please stop....NO MORE TAXES! Where are all the gas taxes going? Use them to fix the roads...spend more wisely! Use non union businesses/workers to fix our roads...they are cheaper!
- Given the amount of tax dollars I pay in this state, the idea of tolls of more than $0.25 one way is an insult.Our state has enough trouble attracting business and keeping good employees - this would add yet another deterent (along with the cost of parking in Hartford - another insult - for lots that are a giant mess).
- I wouldn't mind paying a toll to maintain roads and bridges, but I cannot trust my government not to misappropriate the money to other perceived needs. A perfect case in point are the gasoline taxes that are now being used to bail out the General Fund rather than being used for their original intent. No matter what laws or constituational amendments the Legislature promises its people, the Legislature and Governor eventually break those promises and use the money to pay off their pet special interest groups. Fool me once ...
- I understand that the state needs funds to pay for highways. Labor and maintenance are not free which is fine. However, paying tolls especially for commuters is not practical because it would add up over time significantly. For example, a toll round trip, even at 25 cents would mean 50 cents, per day, 4-5 times per week, every week. Assuming 5 days of work, every week results in a $2.50 charge per week. After 26

weeks (because my job does not have summers off) and EXCLUDING any recreational drives at all, this results in about $130 in tolls. This also excludes any additional fees for an electronic collection service, also not counting any fees associated with the device breaking. I would rather have a small, one time tax added to CT state taxes. This would also alleviate the dollar amount needed per person as non-commuters would also be forced to assist. Tolls create traffic and cause accidents for individuals not paying attention or whom are distracted by the need to choose a different route.

- I don't believe that forcing the CT. taxpayers to fund this project will revitalize downtown Hartford. Hartford has far too many other problems with violence, crime, and poverty to be 'saved' by taxing the out-of-town residents to pay for an extremely expensive project which will only boost employment temporarily. Besides, West Hartford has already established the type of atmosphere/environment the Hartford politicians are trying to create (and thus steals potential business, since the only way Hartford will win over people staying in town after work is to clean up the crime and overall 'depressed' landscape), except the difference is W. Hartford doesn't have the poverty and crime that Hartford does. Since I'm sure you will be moving forward w/ this anyway and taxing the mostly out-of-town workforce to pay for a project that benefits so few, I hope that there is money left in the budget to pay for expanded police presence downtown, as I, my wife, and our friends have been approached by Hartford locals on several occasions looking for money, a ride, tobacco products, etc., and no newly paved transportation infrastructure will take away the grief of not going to downtown restaurants, bars, theaters, etc. Until these improvements are made, my wife and I will be going to West Hartford for a night out if we stay in the greater Hartford area.
- While I understand the need to maintain I-84 into Hartford, as an employee of a big Hartford Company, I pay gas and parking fees already, and I pay local taxes to maintain my town roads and car taxes. I think the large corporate companies should all pay to have I-84 fixed.
- Implementing tolls is just another way that the State drives folks to move out of state and due business elsewhere. Conn. already has one of the highest gas prices in the country. Residents already pay enought taxes in Conn. Why would you want to penalize a worker for driving to work during peak hours if that is what there work hours are? How many corporations are willing or able to provide employees with flexible hours where they can have the option of driving off-peak? I am from NY and always took the train to work. It would be a dream to have train service that ran parallel along I84. I do on occasion take the bus from Cheshire which is very convenient. However, you are only limited for three rides in morning and at night. If there was a bus that left Cheshire at 5:30 am in the morning and left Hartford as late as 6:00 pm in the evening (express not a 90 minute local ride) I would be hopping the bus in a heartbeat.
- Do not want any tolls in the Hartford area, period!
- Say NO to TOLLS NB busway es El Stupido!
- cut social spending and fix my roads thanks Ct Taxpayer
- Charging Connecticut residents to use roads when they already pay Connecticut taxes is a very illogical and rash decision. Do you honestly think this will solve traffic problems in Hartford? This will only cause the city traffic of Hartford to become worse than it already is. My suggestion would be to rethink your plans completely, or if you want to go with tolls use the electronic system to charge out-of-state drivers. I have no problems moving out of this state since I am already taxed to death. And the state wonders why no businesses are setting up in Connecticut and why all the major businesses are leaving except for the insurance sector.
- There are unforeseen occurances on each day's drive, that a toll can't cure. Weather, accidents & the occassional driver going 50 in the left lane. Thinking that a toll will fix my drive time is delusional. The roads & their design need to be fixed & the gas tax money was supposed to go towards that instead of going to the general fund. The tolls may start going to the roads & will eventually go the route of the lottery money going for education.

- I could go on all day and I say this being fairly a-political up to a few years ago. You can't increase taxes, take bail out money for "shovel ready" jobs, give money to corporations but forget the small ones, shrink our rights, increase gas taxes (make no effort to stop them "I wasn't governor in 1995". How about a executive order for that?) and all other taxes that were supposed to go to road and syphon them to the general fund? Casino $, cigarette $ etc. and so on. I look at this busway and talk to those building it and I have not heard anyone but politicans and those collecting a check form it that want it. Fix 84 with funds you already have. Put the money where it belongs, on the ground. Again, I could go on for hours but you know how we feel. The attitude that you know better than us is insulting and demeaning. Thank you for your time, no reverse your thought process and begin ignoring your special interest noise makers and start working for the working. Not just union working but the rest of us that pay for your ideas. Or there will be little left for you to pilfer.
- Asking residents to pay for travel on I84 is not something i can support. there seems to be an excessive amount of dollars that are overspent on any highway improvement project in addition to the increases in gas taxes. There neds to be a way to reduce the cost rather than tax.
- Money wasted on the busway should have been used for this project instead.
- Gas tax and vehicle property tax are high enough to pay for the changes required for the I-84 section in Hartford. Irresponsible financial management by the State is not a reason to push further expenses on to tax payers that can barely keep up with CT taxes. Even large companies can no longer afford to hire in CT due to taxes. It's time the State take responsibility for their financial mismanagement.
- I am not opposed to having tolls in the state, but I feel that the center of downtown Hartford is not the place for them. There are thousands of people that work in downtown Hartford and already pay for parking at their job. To add on a daily toll to that would be completely unreasonable, and honestly a lot of people probably couldn't afford it. I understand that this is the state's way of thinking they will "get the most bang for thier buck" so to speak, but the ramifications it will have on the people who's daily commute involves driving directly into Hartford should not have to suffer everyday for the states lack of budget planning for roadway improvement.
- We already have high taxes and a higher cost of living in this state. I might support tolls at our state borders as other states collect tolls this way. Travelers must come through our state points north and south. I strongly oppose tolls within the city. We already pay to park at work and also pay high gas prices. I think a toll fare on top of that to come to work would be extremely unfair to residents of this state who already pay their fair share.
- We already pay too much in taxes in the state of CT. Thus the reason for so many people, families, and businesses no longer wanting to stay in Ct or moving/relocationg out of state. There are many other states to live in which do not pay the sort of taxes we pay or have tolls. Please do not continue to increase our taxes or bring in tolls. YOu already impose high taaxes on our gasolene as well as cigarettes. Are taxes higher on alcohol?
- Come up with another way to pay for it. Making working people pay to drive on the highway they use to get to work everyday is absolutely ridiculous.
- Gas tax was just increased - believe the state needs to tighten their belts. State is becoming more and more difficult to retire in.
- The State of CT is already a state with the highest income and state taxes. Putting in "toll" options to improve roads is insulting to CT Resident intelligence. You are to look to the present income that we all pay to determine where road improvement funds should come from. Also, there are too many State Employees who receive incredible benefits, salary and time off. There are also too many State Employees. The State needs to look at their own "company" and make appropriate cuts to impact the bottom line and use funds for road improvements.
- The "personal" details required to complete this survey for the demographics should be optional. Gender and age specific questions are offensive, especially since they are REQUIRED to complete the survey. For

me, this change offers limited viable options: pay a toll or pay a bus fare. I really don't think any form of toll will help a struggling economy where commuting from the South Western corner of the state is necessary. You are taxing/tolling the part of the CT population that cannot afford the increase. With this proposed change for the I-84 corridor, the highest taxed state in the nation just got more usage taxes. Adding an additional expense of $40-80/month in "Value Priced" tolls will force me to vote with my feet leaving CT behind. Increased gasoline costs, increased income taxes, increased property taxes, and now increased road usage taxes. There are several line items in the state budget already applying taxes collected to maintenance.

- Please no tolls - I understand the project needs to be funded, but there are other ways to pay for it by manipulating the budget than to charge people for going to work. I have the ability to work from home and I would do so if it meant saving money on tolls - I assume others would do the same, and the project funding would not be guarenteed. Increase the cigarette or alcohol tax.
- I fear the tolls will become like highway funds collected via tax: Something to be plundered for non-highway-related political junk. There will the come the "one time" were we just HAVE to take the toll money and pay for something stupid. See: Every major government funding source in the history of the United States. If the above prevented and tolls were reasonable, I would be on board.
- Optional toll roads are ineffective and end up empty as people take alternate routes to avoid the tolls, thereby adversely affecting traffic flow. I prefer paying for construction via gas taxes.
- I am just floored that you would consider charging me a toll to come to work. Now the Magic Bus is making sense...you will force people to use it or charge a premium. Just how is a hard working family supposed to sustain themselves, and put their kids through college, when the Fed and the State are constantly reaching into my pockets? My company has reduced benefits over the years, drastically reduced salary increases, and eliminated pensions and retirement medical benefits. Therefore, I live modestly and yet am expected to save through inflation so that I am not penniless during my old age. I try hard to adjust and continually find myself going backwards. While I appreciate that a toll charge would hit all travelers, not just tax payers but I strongly request that you rethink this. Otherwise, this state will continue to lose families and businesses!
- I already pay too much to park in Hartford I don't want to also pay tolls.
- I do not believe that tolls will have any positive impact on travel times or traffic conditions.
- Your survey should at least indicate something about past (and future) collected gas taxes being actually applied to the roads. I don't mind paying fair taxes at all-- what I do care about is the bait & switch of the use of taxes like the gas tax or the lottery (education).
- I will quit driving into Hartford if a toll is implemented.
- Let's use the gas tax we have no to pay for the roads as it was meant to, instead of using it to balance the budget.
- If tolls are needed, they should be placed at the state lines. Not in downtown Hartford on I84. This would not be such an issue, if the state used the gas tax increase to pay for highway maintenance and construction, instead of stealing it for the general fund. As usual the middle class is always asked to pay more. That's one reason why it keeps shrinking. CT already has the highest cost of living in the continental US. How much worse do you need to make it. As soon as my last kid graduates high school, I am moving out of state.
- I refuse to pay tolls; especially after having to cut my personal spending in response to the biggest tax increases in state history that were recently imposed on us. My family has high medical expenses and we are already being taxed to death. I cannot afford to keep living in a state that keeps imagining new ways to spend money and then imagining new ways to tax me to cover the new expenses. There is too much waste in CT for the state government to keep doing this. Find waste in the state government and eliminate it. Take those savings and finance the needed infrastructure projects. Enough is enough, leave

me and what little income I have left, ALONE!!! Otherwise, I can't afford to keep living here. I'll have to relocate to a more tax-friendly state.

- I think allocating the already higher taxes we all pay to support the reconstruction would be appropriate. Having gone to college and now working in Hartford, I am pretty definite in saying rebuilding the city is a waste. Its already gone. Maybe try and build up surrounding towns so that it may give people an option to live/work in Hartford and make it better.
- In CT there is already a Gas tax..why is that money not being used to fix the roads...
- I have a "million" ways to get from Newington to Hartford. If the price of a toll was high, compared to driving in my-self or taking the bus, I would aviod the tolls like the plauge.
- Tolls are a waste of taxpayer's time and money. I lived in Massachusetts the past two years and they have not done any good for them. If there will be tolls, I expect a decrease in property/state taxes to compensate.
- I strenuously object to any toll scheme as the $ collected will not be used to pay for infrastructure repairs/replacements/improvements, but will instead be used to fund totally unrelated public expenses.
- Please, TAX of any kind is NOT the answer. If the state could manage the Taxes already collected we would always be creating and improving our roads..... State just went up on Gas tax....what are you doing with that MONEY?? I will not be retiring in this state and I'm encouraging my kids to leave as soon as they leave my house, graduate College. I guess the Taxes for the remaining residents will need to increase even more after we're gone!!! Too bad, I always thought Connecticut was a great place to live, and retire.... but you've priced yourself out of the market....2 more years and see ya.
- You need to find another way or getting the money to fix the roads - not taxing and collecting tolls. What about people who live out of state just traveling through? How will you collect money from them? The cost just to manage this program outweighs the benefits. Find another way!
- I do not agree that tolls should pay for the construction, as there is enough tax money already collected if unnecessary state support programs/government funded activities/waste were eliminated. I believe a train built from N to S, E to W through the city would encourage economic growth (jobs), more interest in coming to and spending money inthe city as well as the use of cleaner public transportation.
- Let's fix Connecticut's broken entitlement system and there should be plenty of money left over to fund highway projects.
- I believe we need to explore a metro system in the Greater Hartford area linking to other metro systems. I support tolls for out of state registrations but feel that CT taxes were increased to cover roadways and we should not have any additional tax.
- CT taxes compared to other states are already high. If you decide to move forward with a toll structure you have to get rid of the yearly car tax. The more I read and took the survey the more upset I became. I am only on I84 for a short period of time off of I91 to go to work and church. I am going to be extremely upset if I have to pay a toll to go to work and church!
- I agree I84 needs a lot of work, and would be very costly. However, I do not agree with putting the burden on workers in the state by either implementing tolls or addtional taxes. The tax burden is too much in this state already. Perhaps too much money is allocated to other projects that should be cut back. For example, how much more money are we going to pour into UConn? Do they really need to change the look of the mascot? How much is that costing? What is the return on that investment? More donations because the dog is meaner looking? The students have a better quality of life then most average workers in the state with the fancy dorms and coffee shops.
- The state of CT needs to stop trying to squeeze more taxes out of its taxpayers for transit infrastructure upgrades that the politicians should have dealt with years ago and start using the highest gasoline taxes

in the country to fund these improvements, instead of to fund other programs. Where have the gas taxes been going for all these years? "you people" are idiots!!!

- If you're going to consider implementing tolls to pay for interstate maintenance, why not consider tolls at the state borders instead of in Hartford. Similar to what Mass. does on Interstate 90. This state taxes its residents to death as it is. The state needs money, so up goes the taxes on cigarettes, gas, general sales tax, etc. I had to rent a car the other day, I couldn't believe all the fees CT snuck in there. Enough is enough. If out-of-staters are going to use our roads, let them help pay for it like we do if we need to travel to Mass.
- There is no way I would suppport a toll to use the highway to go to work. First off, the state needs to fix the potholes around the Hartford area before it considers major work on I-84. The route 2 connector to I-84 is deplorable and has been for years. The basic conditions of the roads in our our state is poor. This is not so in our neighboring states. There is way too much waste in state spending to be looking to us working tax payers to ask us to pay tolls or raise our taxes even more. If they continue to do this I will seriously consider leaving the state.
- We pay plenty in taxes at both the state & federal level. Those funds should be used wisely to pay for road repairs, replacement, etc. Our state government should NOT be budgeting for "nice to haves" and should be budgeting instead for "have to haves." If improvements / replacements for I84 are have to haves, then I suggest that our state government do their job and budget accordingly -- and get their hands out of my pockets.
- Given gas prices, and what I pay to park at work, I don't want to also pay tolls
- If tolls are to be put in place a person attempting to get to work should not have to pay toll prices. There can be a list to register on or those just "passing through" can pay them with the license plate photo option that was mentioned earlier. I am and always have been opposed to paying money to make money. I live on the other side of the river and have no choice but to take the highway at one point or another to get to my place of employment. Once one toll is put in place soon all CT highways will have them and no one in this state has the money to waste so they can get their paycheck.
- This is one of the stupidest surveys I have taken. I want the 20 miniutes back of my life that you stole! Pay as you go should not be considered. I pay Taxes and should not have to pay more to use a road that I already paid for. CUT OUR GOVERNMENT SIZE!
- My biggest complaint is Connecticut's gas tax. It's the highest in the nation, and was intended to be dedicated to support our highway infrastructure. Instead, it is diverted into the general fund. As far as I'm concerned, I already paid for good highways, but our legislature stole the the money I paid and used it for something else. Adding tolls makes me pay for the same thing twice, and I have no confidence they won't steal my money again.
- We need to eliminate waste or have other budget cuts to pay for the roads, not increase taxes. The State needs to stop wasting money and just fix the roads! I support tolls, especially on I-95.
- I can't believe that our "wonderful" governor want to add another tax to us working class. Enough already. You do really want to drive us all out don't you. Why don't you start listening to the working class.
- I am very opposed to new taxes or tolls to pay for road improvements as long as we pay one of the highest gas taxes in the country. The gas tax is intended to pay for road improvements. If the incremental gas tax is reduced then I would consider a toll to pay for the Hartford I-84 road improvement. CT is the 3rd most expensive state to live and this would be one more reason for people to move out of the state in the Hartford area or avoid coming into the Hartford downtown area. The state needs to work on improving public transportation.

- I don't see why we should pay any tolls! CT already has the highest taxes, unnecessary taxes (automobile), why should we pay anymore???? Terrible, most folks leave this state due to these reasons. Not to mention it is so expensive to live in this state overall!!!
- Only comment is about the fact that in a state that taxes income, taxes purchases, taxes fuel, and taxed property all at some of the highest rates in the country, there should be enough income sources to cover the cost of highway repairs that are only this expensive as they have been put off for far too long.
- 1)One of the highest gas taxes in the nation and yet our roads don't reflect it. 2) Too many state employees per our population size. 3) Why isn't DOT a standalone part of the state budget instead of being lumped in as part of the "general" budget. This way we can see if the inflated gas tax and registration/licensing fees could adequately cover the cost of highway updates. Maybe there is enough revenue already being collected? If you lump it in with other revenue how do I know that the gas tax currently collected isn;t being spent on other projects, such as the inflated UCONN budget?
- Look at the survey out today on CNBC about best states for business....CT is falling further and further down. Putting tolls into Hartford would be a crushing blow to a City that can barely attract businesses or people into the city. Our taxes are high enough, find the money there. Or toll the people coming into CT from NY and MA, we certainly pay them enough in toll money the minute we leave our state borders.
- Paying tolls to utilize this path for a trip that takes me 15 minutes one way without much traffic is outrageous. I am outraged that I would have to pay a toll to go through Hartford multiple times a day given my college location, work location, and house location. I barley make enough money to cover my college and general living expenses... are you crazy?!?!?
- CT is already one of the most highly taxed states from gasoline to income taxes. Let's do this right by setting up a process where those using the services are the ones paying for the improvements, I won't like it but it is the right thing to do as I will be one of those impacted. By making it easy and fair for everyone, it will be more tolerable. If this is done right, it should pay for itself in no time based on the traffic I see on my commute. Hartford is seen as a pass through city and if this is done right, it could take it from a dark city that it is today and open it up to a more open and friendly place to visit. Hartford has all the pieces needed to become a welcoming place to go but it needs more; how many cities would love to be on the river and only a couple hours from NY and Boston.
- I strongly disagree with this entire proposal and would likely avoid hartford all together to avoid funding this project. Any tax increase will result in me leaving this state and boycotting any businesses within the state. We are already grossly over taxed. This is the most expensive state in the continental US to live in. Aside from friends and family who live here this state has absolutely nothing to offer. The mismanagment in this state has been running rampant for far too long. Learn how to manage a budget, cut some damn wasteful spending and you will find there is ample funds to cover every rebuilding project you can conceive of.
- Federal and state spending is out of control; hard working taxpayers do not need to be violated to the point of insult. One of the main reasons taxes were ever invented was to maintain and repair streets. Instead we use taxes to support lazy, greedy and incompetent cultures.
- get rid of ctfasttrack, that project is a massive waste. if the state is worried about funding changes to 84, they should consider how "innovative" they are being, aka not at all. taxpayer dollars continue to be wasted for antiquated ideas with little to no benefit and certainly no payback period for the investment. what a mess
- I'd like to see the gas taxes, which should be used to pay for road upkeep, actually used for upkeep. I travel in on Rte 2 to 84 West, and the ramp from rte 2 to 84 is a mess, with potholes and patches galore. PLEASE GET THIS FIXED. Additionally, getting off the Asylum Street exit, right where the light is, the pavement condition is similar to that of a 3rd world country. It is in desparate need of repaving. I feel that between these two trouble spots, I drive about 1 mile, but get 100 miles of wear and tear on my car. Broad street was in tough shape too, but the stretch I drive on has now been repaved, which is awesome.

Send the paving crew over to Asylum at the bottom of the exit and have them do that too. You'd make a lot of people happy if you could do that.

- There are PLENTY of funds already being collected from the taxpayer that can be more wisely used for these types of projects....especially if you go to the Federal level of govt. Why does CT tax payers have to pay for repairs on a national highway? I will curtail my travel to towns where I must pay a toll to get to. CT taxpayers pay enough taxes, we don't need to tax drivers for driving. Plus - my wallet is getting empty - time to push back. On the other hand, this whole issue is probably already been decided and this survey is just another ploy to make the residents believe they have a say when it's really already a done deal.
- My first question is, "Where is the Federal money that is giving to the state of Ct....? Ct. pays the Highest Gas Taxes in the nation, so where is that money...? If you privatized the highway work to Non Union companies, you will create competition and Save Money and get more work done in a shorter time. Government waste and fraud is rampant in this state and every state. Start by cutting out waste and abuse and we will all see a Huge improvement in our governement services. Cut out the unions, or make them compete with non union work and this will foster competition, which in turn will save the state money and will more than likely get better services for the money spent. More money is Not the Answer!!! Being efficient with the money already allocated will be best for everyone. Look at the U.S. Post Office... They loose 25 million dollars each and every day, mostly because the Union workers have No Incentive to produce anymore than they need to, which is bare minimum at best. The joke is that with running Huge deficits each and every year, they all still retire with Very nice pensions. In the Real World, most people would be fired and or forced to produce in order to keep their jobs. Fair is fair, but cronyism is cronyism and the unions are Way too Greedy for bare minimum productivity. Too bad the politicians cave in when it comes to the lobbyist, no matter what group they represent. :-(
- Concerns over paying tolls is that I don't believe they'll always go to highway improvements....They'll find their way to the General Fund somehow, as so many past "directed funding" has gone. Also, still need to do more in the way of coordinated mass transit.
- Limiting a toll placement to one area in Hartford will encourage businesses to leave the Htfd area, and driers who are only passing through to take laternate routes. If CT wants tolls, place them on 95, 84, and 91 to allow out-of-state vehicles to help pay for our road maintenance just as every other state does. Why limit this to just those CT residents that are already over taxed to be forced to pay even more to work and live here.
- It's disturbing that tolls are being considered for a small portion of I-84. Taxes are already high in this state. Here's another example to drive business & it's employees out of the city. It's cheaper to drive on the Mass pike than what is being proposed for a small commuter stretch. City streets will become clogged because commuters will find alternate routes. If politicians did their job correctly, there would be money available to rebuild the infrastructure without penalizing a small group of people. Employers are cutting back on benefits and charging absurd pricing for parking as it is. This state is becoming increasingly more difficult to survive financially. The whole idea of tolls at the price that is being proposed is ridiculous. Is there anyone with any common sense looking at this holistically?!!! And as far as FastTrak from New Britain to Hartford - get real . . . how many people do you really think you are going to accommodate into the city? A far better solution would have been to invest in trains (like the Boston T) that accommodated all areas of the state. Investing so much money in 9 stops in which the overall commute time is minimal makes no sense when you can drive quicker door to door. I drive I-84 in a.m. with min. traffic, 15 mins. I avoid it at night and can be home in 1/2 hr. Why would I want to drive to a lot, have to leave earlier to make the bus (whether from home or work). I commuted on bus for years from Meriden. It was far enough away that it made sense to do so. The design of I-84 thru Hartford and I-91 (where East Hartfd connector runs into I-91) are the worst designed roadways. Putting up tolls isn't going to fix the infrastructure problem or congestion!
- For those of us working and have to get into Hartford daily, the additional costs coupled with additional taxes and Obamacare and existing traffic would make it an extreme hardship on those who are employed.

- You gas tax to fix road problems
- I stronly agree that our highway system in CT needs MUCH improvement. Our highways across the entire state are old and out-dated. Our family travels regularly to other states and CT has some of the worst highways in the country. However, implementing tolls on I-84 only impacts (and punishes) the people that work in the Hartford area (use I-84 for their work commute). My regular work commute from Bristol to Hartford on a daily basis is extremely aggrevating and long due to the traffic conjestion on I-84. Some days I will sit at a "stand still" for 10 to 15 minutes!! I would be willing to pay a MINIMAL toll (under $1.00 daily) if it would improve my commute. However I feel highway improvements need to be made state-wide --- not just on I-84. Therefore, ALL people in CT should pay for the improvements via a state-wide tax that applies to everyone --- not just the working people that use I-84 on a daily basis. I-95 is also a nightmare! Two lanes for a highway???? Unreal!! Trust me, NO ONE wants to pay additional taxes --- we are already being hit with so many other taxes. Suggestion: Rather than INCREASING TAXES to improve the highways, how about cutting back in other "state run" areas such as the salaries for the coaches and professors at UCONN and other State schools. Paying coaches $1 million / year is a little much .... don't you think??? Employees at Aetna and other insurance companies have had to have salary freezes and numerous layoffs in past years in order to "keep their jobs" (per management). Why not freeze the salaries of the state workers for a few years and use the money to help improve the highways. Another suggestion: What about putting in tolls at the state borders? Each time my family and I travel to a different state, we have to pay for tolls. If you want to raise money to improve the highway system, then have people that travel through our state pay tolls. All the money that the wasted on a bus system from New Britain to Hartford could have been put towards highway improvements!!! I doubt very much that the state will make money off of the bus system! What a waste of tax payers money!!!
- Will NOT drive 84 if TOLLS are added.
- Because of the significiantly higher than average gas/diesel tax in CT people from other States use our highways and never stop for fuel, so never contribute to the the upkeep of our highways. The solution is to put tolls near the borders of the State I-95, RT 5/15 NY; I-95 RI; I-84 NY, MA; I-395 MA. Almost every other State in the NE Corridor employs this strategy to ensure people from out of State pay their fair share of highway construction and maintenance. CT residents should pay less at these tolls becasue they are already paying a significiant gas tax. Putting tolls on I-84 in Hartford makes no sense and will only cause additional congestion - electronic or not!
- The CT legislature likes to spend money on whatever its "flavor of the day" is, and they are quite willing to rob any bucket of money to do that. Once the legislature learns a little self-control concerning the use of dedicated funds (eg, Transportation Fund) then I would consider tolls or taxes to pay for needed infrastructure repairs.
- We pay enough and there should be NO ADDITIONAL charges on the highways!
- No Tolls, taxes are high enough in this state..stop spending and you will find the funds for this project....its been on the table for years.
- we are taxed enough in Connecticut and with the slow economy, high gas taxes and no annual raises - think about how you are overburdening the middle class again! people are leaving this state because it is just too expensive to live here. The state needs to find a way to get the money from the current budget and learn to live within their means. If we have to do it in our own households then the state needs to as well. Why not use the taxes on cigarettes etc. and revenues from the casinos to cover these road projects? Be creative like individual households are.
- Please keep I-84 hartford downtown area away from tolls, rather implement innovatove ways of fund collection.
- Really, where are the dollars that have already been collected for the roads in CT via gas taxes and casino % dollars. Why a brand new tax to fix something that has been an issue for years.

- Any change in I-84 must keep the # of lanes consistance through all of Hartford enough for traffic to flow freely during rush hour (not 5 lanes resuduced to 2-3 at Hartford center) and allow for lane expansion. More use of the HOV lane should be done now!
- Keep toll roads out of CT!!!!!!!!!!!!
- We pay enough local, state and federal taxes. Those accountable should do a much better job of managing the taxes/fees they already collect.
- You are full of it if you think that you are going to save money with tolls. I wont believe those lies. I have seen the opposite. If you knew this road had a short life span then you should have been saving for and thinking of alternatives. We already have high car taxes, this is ridiculous. Hartford is NOT a destination point like NYC, you are only punishing the locals that have supported the economy here by having tolls.
- You are already taxing people and business to death. You are driving people OUT of CT. You are misappropiating funds already- the general fund is NOT the way to budget funds It is time to have tax funds managed correctly and for this state to actually learn how to balance a budget. If you dont have the money- you dont purchase or do the project- period. NO more arbitrary tax increases, or borrowing money to "balance" the budget or pay for projects we cannot afford. Start managing the state like business manage their budgets and people manage their personal budgets. ENOUGH IS ENOUGH.
- The taxation and fees to live in CT are becoming prohibitive, and as they increase, so does my desire to move. The state with the worst job growth and business climate just keeps giving out welfare instead of spending that tax on infrastructure.
- I believe tolls on 84 - could result in reduced tourism for the State and City -
- We need to look at how current tax dollars are being spent, including excessive salaries, perks, and pork barrel spending. I should not be asked to subsidize an administration that cannot reasonably balance their budget. If I spend too much and cannot pay my bills, I don't have the option of asking my employer for more money.
- What makes this proposal so frustrating is that I have zero confidence that any money collected would be used for it's intended purposes. We have some of the highest gas taxes yet some of the worst roads.
- It's not CT Residents faults CT has wasted their Gas Tax money all these years. We have the Highest Gas Tax in the USA. Nothing has been done to improve our highways all these years, yet now you want to charge us a Toll to use I-84 after CT abused all that Gas Tax money by doing nothing?? Get real. Also hire PRODUCTIVE Contruction Companies to do our road work so it doesn't end up like another Bridgeport mess. Wasted Tax Payer Money & it's still not completed. I-84 over the CT River in East Hartford into Hartford is an EMBARRASSMENT! Really, who has TWO lanes highways to enter a State Capital City. I mean really? Poor Planning! The Route 2 interchange is deplorable. I LOATHE sitting in traffic to merge onto I-84 West at roughly 7 am! There should be at least 2 lanes merging onto I-84 West from Route 2. I-84 should have at least 4 lanes going in each direction over the CT River. UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...UnAcceptable...
- Tell the Capital to stop taking the gas tax away from road and transportation infrastructure projects!!! You tax the hell out of our gas and now you want tolls too? Reduce the gas tax, implement the tolls and let the tolls maintain the highways.
- I can't afford any more taxes and definately not tolls! Everything keeps going up but my pay.
- I work in healtcare in one of the largest hospitals in the state and haven't had a raise in THREE YEARS! There MUST BE money available from CT's share from the casinos. Get it there! And, fix the whole highway, not just the flyover! I84 is a wreck!

- I have the option of working from home each day and would consider that should tolls be installed on I-84. Connecticut is already the most expensive state to live in and we continue to be asked to pay more and more for things. The government should really look at how they spend tax payers money. Instead of wasting funds on a bus line from New Britain that few people will use, they should use those funds for road improvements. Too many people need to have transportation to take care of kids and aging parents. Add the tolls and more folks will work from home and not come to the city. Way to costly - already pay for parking at work in a garage that the company owns - it's ridiculous!
- I cannot afford to pay any additional tolls, taxes or fees in order to commute.
- We now have to pay for parking where I work now your asking about paying for tolls to get to work, this is ridiculous! Can't wait to retire and move out of Connecticut.
- The state can pay for these improvements by reducing goverment. We are currently over taxed and should not be put in a position to be taxed more!
- Our govenor and legislature needs to spend our tax dollars more wisely.
- If you charge tolls, I hope you have another way for East of the River commuters to get into Hartford other than crossing a bridge where a toll must be paid. Otherwise, I will swim or ice skate.
- Current taxes, specifically the Gross Receipts Tax on gas were designed for payment of road work. Since this money is already used for "other" expenses I have little confidence that toll money will be used for its intended purpose.
- The State of Connecticut taxes are high enough. There should have been better planning for this project. PLEASE manage this state in a more efficent manner. By taking this survey just confirms another reason why I need to move out of Connecticut.
- I can only believe that this proposal will drive people away from Hartford and will have a negative impact on Hartford area businesses in general. Hartford will become a ghost town again.
- While I agree with the premise of tolls and taxes for road improvement, I would like that money to actually be dedicated to highway improvement. I'm tired of taxes and tolls being used to pay for a project, and then when the proejct is completed the money is still collected and re-purposed for something completely unrelated. For tolls, I would prefer a model like the NY State Bridge Authority, where the money is collected by them and used only for the maintainence of those bridges. They charge only what they need, and the long term results have been good. Additionally, if tolls are to be collected and transponders are to be used, the transponders should be free and there should be no monthly or yearly fee associated with the device or account. The tolls themselves, as well as any interest or invenstment gains on the stored balances of the accounts, should suffice. Lastly, I would prefer tolls be placed on roads people primarily use for pleasure and not employment. Many people travel to Hartford for employment, but travel to the casinos for pleasure. I would prefer that tolls be collected on roads where people are driving on them more optionally then mandataroily.
- I think it is outrageous that our gas taxes have increased and both per gallon and via gross receipts and yet the money is being dirverted to the general fund and not used for infrastructure ~ roads, bridges etc. And now in addition you want to add tolls that will only put a burden on anyone coming into the Hartford. Do you want the city to die completely? You have already increased congestion by putting in the busway from New Britain and closing access to various roads around my workplace. And yet the money for the busway (which will have very little ridership) could have been used to improve infrastructure. This is short sighted public policy all the way around. I know that infrastructure must be paid for so use the money already allocated for that purpose and don't divert it. That is just wrong.
- Please do not discriminate against the capital city. We are already struggling to attract more visitors and to keep city residents. Hartford does not need another reason discouraging people from the surrounding suburbs from traveling into the city. Please use our taxes (fair and income based, across the whole state) to fix and repair our infrastructure. To single out Hartford as the only place in CT where tolls will be used

is unethical and discriminatory, especially along such a locally used stretch. If tolls are added to that stretch of I-84, then it would be only fair for them to be added to all major thoroughfares throughout the state, including on the Merritt Parkway.

- While the roadway needing improvement is in the hartford region, it serves as a major artery for not just Hartford but the surrounding state. It would be unfair to penalize those of use calling Hartford city home with this added toll. The revitalization of the city is fragile enough that discouraging suburban dwellers from visiting the city would only further exacerbate the problems. It is not fair to discriminate against those who call Hartford home.
- The last thing we need is more tolls or increased taxes. We already have enough taxes, everything is taxed so you should be able to get this improvement money from somewhere. No new tolls no new taxes!
- The state of CT gets enough taxes out of us. To think the installation of tolls to pay for such an undertaken is again the responsibility of the everyday communter is crazy. Also, with the installation of tolls on I84 it will not lighten or cut down on the commuter time, it will make it worse....
- I'm curious to see how video tolling will work. I feel it will be very difficult to collect these tolls from people who use the roadway but are on foodstamps/state assistance and generally don't pay their own bills. How would you ensure they paid? I don't feel as though all of the burden should be placed on the responsible travelers.
- The current viaduct should be the ONLY option considered for I-84 through Hartford. The proposal to bring I-84 down to ground level will create more traffic disruption to the city of Hartford. Local communities will be physically cut in half. It is cheaper to fix what we have now. Traffic would be impacted for years during construction.
- CT taxes are high enough already. I refuse to pay taxes for daily travel within the state of CT when out-of-state commuters traveling through the state to north/south destinations do so free of charge. I travel through MA, NJ, NY, and DE regularly and have to pay numerous tolls during the the trip. Why not ask the "out of towners" to pay for the construction too? Why have we as a state voted down tolls at our borders like our neighbors, but rather tax ourselves for traveling within the state of CT? I am ready to move.

1.5 Comments about the Survey

- Thanks for a great survey!
- I would have preferred not to enter my household income...should have a "rather not say" choice!!
- cool survey
- Survey had too many questions regarding pricing of tolls. If taxpayer doesn't want to pay for tolls, it does not matter whether the fee is slightly reduced
- love the library [the survey site]
- Very good! I'm happy to been found to participate in this survey. I think it is so vital that Hartford citizens begin to get involved in this discussion. All residents will have to be involved in this coming change, so better to join the discussion and get open minded to the possibilities.
- Survey too long and options for paying changes too expensive.
- why do you always ask if people are hispanic or latino?
- the alternate route should also provide a trip in a reasonable time for example, I often use the Merritt parkway to drive south in CT to avoid I-91 There does not seem to be a reasonable alternative to drive through Hartford east/west besides 84; the local roads are not an alternative!
- why do you always ask if your hispanic or latino why does that even matter?

- Is there any way to liven up this survey? It's somewhat daunting, feels very repetitive, and very difficult to maintain complete attention.
- way tto long survey
- There were no safety questions. I oppose the safety of tolls in addition to their inconvenience.
- Happy to know feedback is being sought and considered to address this issue.
- thank you for your consideration
- Why does my ethnicity have any play in this freking poll? Will I get a better deal if I am Latino or Black? This race card crap is ridiculous....
- I could not select my actual departure site of 47 Burnham St, Enfield, CT. The system selected my address as being in England. I chose a point near to my home in Enfield that the system was able to find on the map.
- thanks for the opportunity to offer my perspective
- More space is needed for comments and suggestions during the survey. Also it would benefit from a wider range of options, otherwise the purpose of the survey is circumvented by the very limited scope of the discussion.
- Why is there no option not to tell how much my household makes, it makes no difference to this survey. Second there should not be a seperate question to ask if I am Hispanic, I am opposed to all questions that ask about race in this country. We are all created equally and should be treated equally! And what does race have to do with road repairs?
- Thank you for asking; I wished this kind of survey went out with the New Britain Busway project.
- Thanks
- I based a lot of my answers on the toll cost to the highway toll charges in New Jersey (where I've previously lived and grew accustomed to highway toll charges). The common toll charge for highways in New Jersey is between $1.00 - $2.00 - with most of them being around $1.00. I would consider a toll of $1.75 or higher to be unreasonable.
- One question you should have asked is would you be willing to Work at Home to aleviate travel costs. I think most folks would be willing to begin to WAH at least 1 day per week if travel cost increase in the form of tolls.
- It is inappropriate to ask income and race in this survey and I strongly object to this information being requested without an option (for the income) to say prefer not to disclose or to the other personal information. Regardless if it's aggregated data or not, it's very personal and let's face it, I did this for FREE.
- This was one of the most un-user friendly survey's ever. It was horrible and way too time consuming. You need to find a way to simply this... use better technology to pin point the street/location info that you want. Above all-- don't tax us and don't use tolls. You can't think that folks believe that tolls will make a commute shorter. With flaws in technology-- it'll probably end up charging me for trips I didn't take. DON'T DO it...
- It would be helpful if you provided definitions of terms used in questions. I did not know what one term meant.
- Interesting study. Would love to see the results & findings. Great job!
- I find it odd that any survey like this for 84 improvements doesn't include the already in-progress Busway as they run pretty much side-bny-side. If the survey's use of 'public transportation' or 'bus' meant the Busway, it wasn't clear to me.

1.6 Comments about Non-Auto Modes

- I notice that the proposed bus routes only go from New Britain to Hartford - as a commuter from New Haven who works the off-shift at the hospital, I currently can't use the public transit options with any reliability for both reasons (too far to use one bus and working at night is complicated with regards to public transit.)
- We need better bicycle routes into and out of hartford
- Rail service west to east and east to west in center of state. Study of light rail sevice on the I-84 corridor.
- Most interesting thing to do to put hartford on the map in a good way would be to make it a completely car-free city. Even, say, 12 hrs per day.
- The CTfasttrack bus lane is a waste of money. Even in your poll questions, the time savings were minimal. The state and federal governments don't need to spend this money at all.
- I object to the current Busway project. It is a waste of taxpayer money. I doubt it will be used. It is currently inconveniencing me with detours, and the closure of Flower street is a long-term obstacle to my travels. I cannot imagine why I would ever use it, and I live in Newington. I prefer regional commuter rail travel as a long term solution/alternative to tolls and busways.
- i was grateful the tolls were abolished shortly after i moved to ct in 1981. i certainly do not support the creation of new tolls. were the public transit system more reliable and able to attract a cross-section of the population, more people might take it. having been in harlem last weekend, i felt more comfortable taking public transport there than i do in hartford, where the system attracts the homeless, the addicted, the mentally unstable and otherwise disenfranchised.
- I would love to see an investment in regional mass transit. Above ground rail like parts of NYC. Not for within Hartford but for the regional areas to the south, north, east and west to have fast, reliable transit into the city.
- I use I-84 all the time, do not want tolls, willing to pay more in taxes. Our infrastructure needs to be maintained and improved. Public transit, bus and rail needs to be expanded.
- The State should have NOT bonded for the busway. A complete waste of money both Fed & State. Also as stated the state government needs to keep their "damn" hands off of the transportation fund which is funded by our gas taxes. It should be used solely for transportation projects and not to help "balance" the annual budget in the General Fund. This State has its priorities completely screwed up.
- Only for buses to come through or cars from New Britain to Hartford?
- Public transportation is hard for me because I'd have to walk about 2 miles to get a bus. If you had a parking lot at Bishops Corner for free I'd consider it. Also light rail would be nice!
- Use some of the funds that are currently used on other projects such as the bus-way which will have questionable use and big ongoing costs.
- I believe that highways are a big failure. You can keep improving them, widening them and we will still end up with bumper to bumper traffic. Some other rail or subway transportation is needed.
- History in CT is even if they start tolls it will not go to highways and transit, but general fund. Enough already. If it went for roads and bridges that would be great, except given the state time, it will be used for other purposes.
- We'd really like to see a train instead. It's a great way to relive congestion and we could relax on board and it would free up parking.
- I do support having tolls, but realistically, I am personally in favor of using public transit, cycling, and walking. I'd like to see infrastructure and scheduling improvements to those areas as well.

- We should promote bicyle riding, make it safe, fix city and town streets so they are safe, and improve education for auto drivers so they are safer with bicycles, especially the three foot rule.
- I strongly support CTfastrack
- we do not need ct transit highway lanes that's a WASTE OF MONEY and focus on improvements on I-84 regular highways people are not going to use the busing as much as you think they want to use their own cars.
- The bus way is a waste of time and money. Should improve the bridges and some access ramps on a highway in CT.
- I strongly support mass transit that is convenient, easy to use, offers many destinations, handicapped accessible, and affordable. I also believe that previous infrastructure projects in this state have been built without tolls and future projects should be paid for in this toll-less way as well. Our federal and state governments need to continue to upgrade these projects but not pay for them on the backs of the average citizen. They need to do a better job of collecting taxes from those who can afford to pay more and don't pay their fair share in the first place. A toll system will hurt those who can least afford the expense.
- Please consider re-opening the train from Waterbury to Hartford. I currently reside in Derby and have no access to any direct public transportation to my work in New Britain. The commute is long and I would gladly give up driving by myself to use public transportation such as rail. Thank you.
- I would love to take public transit to work BUT there is no way to get to the south end of Hartford without changing buses 2 or 3 times! What at time waster that is! It is a total nuisance, so I have to drive. IF the STAR SHUTTLE provided service from downtown to the end of Main Street at the beginning of the South End (Maple Street/Jefferson Street) then I bet you would see more and more people taking the bus from the suburbs - especially people who work at Hartford Hospital and IOL. It would only be one transfer to get to work. I have suggested this many times to the City's development office, but have been told the Star Shuttle is on a federal grant for a specific geographic area of the city only. Too bad since it seems to be empty the times I see it operating! THINK OUTSIDE THE BOX for commuters! It would be so easy that way.
- To reduce congestion, consider dedicated bike and bus lanes into Hartford.
- A commuter train or trolly (like in Boston) going straight down I84 from Tolland would be my preference. I would drive to a commuter lot that is at the Train Station and take the train into hartford. This would require trains to run frequently during the rush hours.
- The New Britain busway is a HUGE expenditure of money for very questionable return. MANY people like myself cannot use it because it doesn't stop anywhere near my work in Hartford; I would have to catch yet another bus to get to work. Not at all efficient or reasonable, and the reality of usage should have been ascertained before the project was started. That money would have been MUCH better spent on this I-84 repair project. Shame on the planners for not assessing adequately!
- I would be more than happy to use public transportation. My previous employer subsidized monthly bus passes and it was very convenient and economical for me to take the bus, especially as the commuter bus dropped off & picked up at my employer. However, my current employer does not subsidize monthly bus passes and the commuter bus does not drop off near here. Therefore I would have to transfer from downtown to my final destination. I am willing to try this option again, but I do have personal safety concerns once winter arrives and I have to wait in the dark to catch a bus downtown.
- I think a Subway or T-rail system like what they have in Boston would be benificial rather than a bus system. I think CT can think of a better way to deal with the traffic problem other than what this survey was about. To ask the question regarding more tax on the maintance of the roadways is totally ridiculous due to the fact that we are the highest taxed state in the country.
- Would be willing to ride a bicycle to work if there were bike paths or a way to get over the highway.

- Using public transportation would be an option for me only if the distance to then travel from the bus exit point to my place of business was close and safe. I do not see myself walking in the dark in the winter to a bus stop through unsafe neighborhoods in Hartford.
- In addition to the Fast Track project currently underway, a train commuter rail system from the cities/towns surrounding Hartford would be beneficial as well and a revenue gain for Hartford. Similar to the New Britain headquarters for Fast Track, downtown Hartford would serve as the headquarters for rail system. If downtown Hartford had more attractions, eateries & entertainment activities, more people would be probably take advantage of a commuter rail system to come into the city during the week/weekends.
- Public Transportation is good for commuting to and from work or school it is not indicative of shopping and returning home with large parcels and bundles of packages or shopping bags of food.
- Almost EVERY mass transit option took longest AND cost more. And I won't even get into how construction will slow things down while it is being done. Where's the benefit? How about traffic signs which alert you to traffic conditions BEFORE I'm stuck in it. 1 sign says 4 miles delay. Travel 2 miles and now it says 5. Huh? Make no sense many times. And how about signs that say how long the trip is in time from point A to point B. What do I care about how many miles. I've gone thru 7 mile traffic jams in 10 minutes....and sat in 1 mile jam for 20. Most major cities talk time, not miles.
- If there was a faster way to get from the state house square to SFHMC, I would utilize public transportation. The city departing bus times do not line with the arriving express bus times. If the city express bus line was expanded down asylum, to woodland, then back to farmington, I think more people would utilize it.
- Would be willing to try public transit if I can be assured of it running on late or off hours. Would especially be interested in inclimate weather.
- If you want people to use public transit to commute, the buses must be more human friendly. Over the years I have been stuck on 84 anywhere from 2 to 15 hours in my car, commuter van or on the bus. When I started using the commuter buses, they had footrests, comfortable seats, wifi and a bathroom. So, the extra time and expense was worth it. When the new CTTransit buses arrived I stopped recommending them and I use my car more. This morning's commute was easy because its summer vacation time and I used my car. If I took the bus my travel time would have been 1 hour and 15 minutes. I would rather take a train if one is ever developed.Trains run on the weekends.
- ive often thought of traveling to work on public transportation but would have to go to union station to transfer and it takes too much time to get to work....if bus dropped off at major employers without transfer it would be helpful
- I don't use public transportation for work because I frequently need my car to go off site for meetings, etc. However, I recently used the Bradley Express to go to the airport and was very pleased and will use it again.
- I would strongly prefer to use public transit but our transit infrastructure in Hartford is slow and massively inconvenient. I hope the busway will improve matters. I would strongly prefer to see the state put it's money into public transit rather than I-84 improvements.
- I would be happy to use transit full time if direct service were available from west Hartford to Pratt and Whitney.
- CT needs to improve its public transportation so that it lends itself to the suburban commuter. Lines need to reach further, have fewer stops in Hartford, and run later allowing people to take advantage of Hartford Life. Cheers
- Adding a bike path that is part of the I-84 viaduct is appropriate. It could be part of the East Coast Greenway - a 3,000 mile route from Canada to the Florida Keys. With a safe bike route I would ride my bike from West Hartford.

- The Department of Transportation in Connecticut should consider alternate options such as a monorail system (light, raised rail transit trains) to quickly transport Hartford area commuters in and out to all of Hartford's suburbs (West Hartford, Avon-Canton, Glastonbury, Wethersfield, Manchester, Newington, Bloomfield, etc). At a reasonable cost per trip and highly available schedules, this would relieve highway congestion, reduce pollution, save energy, and economically help the entire area. It's time Connecticut government tried new ideas and stopped balking at the "price-tag" of these options and deliver real services to its citizens that would be of great value and convenience to all.
- The Express bus between Hartford and New Britain is a positive move. The stop at Stop and Shop provides access for city residents to a supermarket. BUT with a lower income level for most city residents, there should be a reduced price for city residents who ride the bus. Mass transit in the Hartford area is difficult to negotiate and requires a lengthy commute. Improving the infrastructure for autos should also include improving mass transit.
- Alternative transit options and ease of access to such options should be considered for the project. CT Fast Track is a good start but more could be done to make ease of getting from one point to another in less time throughout the region.
- By and large, public transportation is not a commuting option for me as it's currently constituted, given my home and workplace locations.
- Dear Mr. Dan Malloy, Why build a busway that no one wants or will travel on; then solicit ideas and feedback after the fact... How much have you been paid for this travisty? No you want to send out survey that imply that you will add tolls to the Hartford area or EZ Pass type transmitters. Well how about this the money you spent on the busway is the money you should have spent on updating I 84 in the Hartford area. Signed someone who voted for you, but will NEVER vote for you again!!!!
- If the fees to use the transit buses are too high, people will not use them. Should have went with a trolley transit system to make it more attractive to people like Boston has. Buses are old school and not alot of people are interested. Hopefully, if the fees are low, people might try it out.
- Seeing the waste that this state has on taxes, how about getting smarter instead of constantly wanting more? The Busway to nowhere was and is STUPID!. A light rail system would have been 100% better. Connecticut lives in the past and the management of the state shows it. LIGHT RAIL SYSTEM!!! Anyone listening?
- Is the busline in New Britain not working out the way it was supposed to? Gee, what a shocker. Won't be long before there is a mass exodus in CT.
- I think the Bus route that is being added from New Britan to Hartford is money that could have been spent on the I-84 improvements. Not enough people will benifit from this.
- Would be very supportive of spending on light rail.
- I am very much looking forward to the busway from New Britain to Hartford
- Adding a lane might aviod congession during rush overs. Adding frequent services to Bus/Train will also avoid congession.
- My only comment is is that the state is investing millions of dollars for the busway - which should reduce the number of cars on 84 coming towards Hartford from the West - but what about those of us coming from east of the river? There are just as many commuters who would use this option if it was offered - rather then receive a survey asking if we would pay a toll. Build a busway or transit option for those coming from east of the river and offer it at all hours to accomodate those of us who arrive into work before 6am - I would definitley take advantage if it was offered.
- i think biggest incentive for people to take the fast track would be the time saved, even if reasonable cost, taking into account gas savings/wear and tear, but not too high a cost, most folks would just look at the higher cost and probably would not factor in wear and tear / gas as much as they should. They just see it

hurts the pocketbook now. Flexibility of return trip times must be thought of as well. If i have to wait too long for the bus , i lose my time savings over driving.

- I think one of the keys to getting people like myself to use CT Fastrak will be the cost. Monthly passes can't be more expensive than the cost of driving/parking. As convenient/timely as it seems the buses will be, getting to and from the bus stops, especially in the bad weather, will make it hard to compete with driving the 8 miles on back streets from home in Newington to the Aetna parking garage in Hartford.
- So far every "improvement" the state has put into place has only served the needs of people living west of Hartford or immediately south or north of Hartford. Mass transit it non-existant east of the river. its 23 miles in to Hartford - but if I wanted to take mass transit I would have to drive 17 miles and then pay as much for the bus as I would have paid for the original 23 miles worth of gas, and I would have to pay 17 miles worth of gas on top of that.
- I would consider bus travel if they were more frequent & travel time was quicker than they currently are
- If you put in a low cost commuter railroad line from Springfield to New Haven and it is fast emough you will decrease traffic by 40%. The current busway is a waste of money and will not be used by many. TOO MANY issues with parking and how long it will take to commute associated with it. If you are going to make I 84 a toll people will just use 91 creting more traffic issues or local raods creating traffic.
- Monitor the busway being built now from New Britain to Hartford, see if that is/was worth the money.
- I would rather see my tax money spent on developing mass transit.
- I think the current bus system that is being put in will not be beneficial. The city should add a train system that has frequent trips and does not carry the stigma of the bus. If a train system is installed where the current bus route is planned and then out to the Manchester/Vernon area, many more people will ride that as opposed to a bus. It will begin a revitalization of the city.
- I do not think the bus route from NB to Hartford is a viable solution. 84 needs to be completed in Waterbury (complete project that was started years ago)that shuold have been the priority.
- In addition to fixing all I-84's problems, I think a mass transit system (rail system ideally) from East of the River towns to downtown Hartford, and the Asylum Hill area is long overdue - something similar to what is progress from New Britain to Hartford. I oppose the idea of adding tolls anywhere in the state, especially on I-84, due to the added cost burden (on top of already high parking fees, and the high cost of living in CT already). I would take mass transit if it were an option. Today, I do not take the bus because there are no good routes from my town to Aetna, and there are no buses I am aware of that would get me directly from my area to my workplace (without having to transfer to city buses downtown.) Poor options right now for those that live East of the River.
- Why did Connecticut decide on CTFastrak which would require building those new roads for the buses....instead of a commuter rail type of system like the MBTA up in Boston?
- I would gladly use Mass transit if the surburban town I live in had a bus service I can take from my neighborhood to the bus stop to go to Hartford.
- As an outsider, non political and a tax payer i think overall US has a huge scope of improvement in the Public Transportation. First of all we need to have a robust public transporation system (fast local trains, BRTS etc) and the public should be encouraged to use it. It should actually be so good that people should think twice before using the personal vehicles. For Personal vehicles, i think silver/diamond lanes concept is good. It encourages people to carpool but again, how many people use carpool? Other way (not the best one) is to charge more/extra toll to people driving alone in the car. It would encourage the carpooling.
- I am still mad about the New Britain/Hartford Busway - EVERYONE knows this is a boondoggle, and a huge waste as it will never get used nearly enough to make it a worthwhile investment. I will be opposed to ANY decisions like that since they are made by the folks at the state now considering TOLLS

- The State if CT should use the federal and state tax dollars it collects properly and should not be allowed to funnel funds to the "project of the day". The busway is one of the biggest waste of public funds I have ever seen. Simply appropriate our tax dollars and stick to the appropriation. I just can't believe how irresponsibly our elected public servants manage the citizens' funds. Casino approval was based on those funds going to the school system - not any longer. Lottery funds were supposed to go where? A good solution to our traffic problem in Hartford is in the construction of a well designed beltway and using tax dollars properly to maintain it.
- I am a twentysomething young professional who is VERY MUCH open to alternative transporation, better public transit options, etc. I am environmentally concious and understand the impact of solo commuting on infrastructure. But I really struggle with the notion that we "need" tolls to pay for I-84 improvements. Our gas prices are generally higher than other states, and we comply because many other states have tolls to pay for transportation and infrastructure. Between gross receipts and direct gasoline taxes, we pay some of the highest prices at the pump. So where is this money going? Are we spending it effectively? Are we appropriately prioritizing road and construction projects? It's impossible to do a project like this without asking the right questions regarding the rest of our accounting practices. Some might disregard these as political criticisms, but politics dictate where this money comes from and how it's spent. I would argue that we should have a balance of both taxes and tolls. My concern is that once we give the State an inch, they take a mile. If we implement tolls in Hartford, tolls will almost certainly be introduced elsewhere. And I doubt, given our history, that the legislature will lower taxes on gasoline to compensate for the increased revenue from tolls. We need a comprehensive approach guided by a leader at the DOT that can speak sensibly on the issue with the public. A survey like this is great for gathering information, but it leaves people out. Time for a marketing campaign that will connect with people, admit that we have a problem to solve, and seek valuable data - qualitative and quantitative - that will help us tackle this challenge.
- I would use public transportation now for my commute, but the bus back to Unionville does not leave early enough. I can come to work early and get my day done, but you don't have any bus service, early enough, to make that possible (a 3 p.m. departure time from Hartford). Expanding bus service or alternate transportation methods would be better than tolls.
- I would rather see light rail added instead of a highway.
- the New Britain-Hartford 'busway' currently under construction appears to be a waste of resources, but a good way to generate construction jobs; I can only hope it receives sufficient use to be self-funding in maintenance costs.
- Would like to see a solution that is a combination of improved city transit, and low highway tolls...like .25 per vehicle. Any higher and folks coming in 5 times a day would be paying more than $10/mo. and $120/yr...on top of higher gas tax and fuel...on top of the $600/yr already being paid for parking even if not used when sick or on vacation. Also strongly oppose having an electronic tracking device in my own personal vehicle, and do not trust that the camera will work accurately or it can be easily circumvented by people obscuring or switching plates.
- I Take the bus home, I would take the bus to work, but there is not bus service that I can take to get me at work earler then 6:50am. Tolls on the highway are fine, but would like to also see busses with beter routs.
- I drive Since it there are no convienent public traksportation options for me By the time I get to a commuter lot I am halfway to work and I have to switch buses downtown
- As a Wallingford resident, I am especially anxious for the New Haven - Hartford - Springfield high speed rail line to complete. I would certainly be a regular rider. The 91-North traffic I experience essentially every day beginning at exit 24 (northbound) is ridiculous.
- An indirect result of this study is that you will find where a lot of the traffic is actually coming from that uses the I-84 corridor. On the west side, I believe few appreciate how many hyper milers there are

traveling from Waterbury and beyond on a daily basis. I hope the new busway fixes the need for West Hartford and Newington residents to drive to work and clog the last few miles of the commute, but to meaningfully lower the overall volume on I-84 solutions need to be made for the hypermilers and residents in the Farmington Valley - more routes/times. Today, I would gladly ride an express bus (bus 9), however, my local route only offers good flexibility on inbound morning times. Outbound buses in the afternoon only run twice - once at 4:10 PM and another at 5:10PM. In order to make these, I first have to get downtown on the commuter shuttle. I would need to leave work at 4PM or 4:30 to use these options, most people can't actually do this day after day. A third run for this route is needed at 6:10PM or up to 30 min earlier. I work at Aetna and between us and The Hartford we probably cover 50% of the commuters on I-84, we should have a direct stop for express buses and not have to go downtown.

- We should invest in train infrastructure.
- I believe bus way was a waste of money and should not have been done. I don't have the money to pay for all these increases in taxes and parking and gas. I need flexibility to get my children from their magnet school to their events so I cannot take the bus for another 5 years. My car just got totaled traveling these congested highways and now I need to replace that also. I am definitely not in favor of tolls.
- I think more trains with cheaper pricing would be more efficient
- More investment in mass transit and incentives for people to use it.
- I would rather see economic growth and tax increases in this area of the state on a rail system. I have lived in other cities where it works fantastically. I agree that updating 84 is needed, however, it appears that to be a major overhaul, and for my money, i'd rather see it spent on something that is innovative...rather than inserting tolls, which won't guarantee any remote to stable driving times. With the gas prices the way they are, a a monorail system would should be cheaper over the long run, and afford residents extra money to help the economy in other areas.
- I would take transit more often if my employer offered more flexibility on parking payment options. I have to pay for parking to allow me to be flexible with my schedule. There is less incentive to take the bus when I am paying $1,000 plus per year to park. There is no partial option available at Aetna.
- I find it very disturbing that you are building this massive bus way, when I have yet to find anyone that supports it and now you want to charge us to drive on an existing road. You continue to take more money from people that are trying be productive citizens, why not try cutting some programs that aren't working or use the Gas tax to fund road work.
- I would prefer to see spending on a REAL mass transit system such as metro trains instead of a poorly thought out short term solution such as a dedicated bus way. I would generally prefer to avoid driving if I could arrive in to work in 30 minutes or less with reasonably scheduled departures.
- I dont understand why we never think of a light rail system. I'm sure there are many of us that would use it and it will allow for folks to come into the city easily and get home easily especialy for those of us that work long hours and bus are not a option...rail really is the way to go if you want to keep young people around and make it easy for folks to get into the city.
- The most variable part of my journey is getting to the highway, not the time on the highway. Local traffic congestion on rt 10 is unpredictable. (2) I mostly work from home, and probably travel 84 more often for non-work reasons. I avoid driving 84 during traditional commute hours. (3) The path of 84 along the old Park River is a poor design. If there is going to be a major overhaul of the whole elevated highway, why not consider routing this differently or at least straightening out the road? (4) Rather than the NB bus, I would greatly prefer a true Metro rail system connecting the main transportation corridors (like Washington DC or Stockholm Sweden) running along Rt 84 from Waterbury to Vernon (maybe even out toward Storrs), from New Haven to Bradley Airport along 91 (maybe even to Springfield), from Hartford to Norwhich / New London along rt 2 / 11. Give us something that connects the state and gets cars off the road altogether. Pair stops with both commuter lots and suburban/urban spots along the way. The

rail line along the shore works fairly well today, but I'd like to see good connections in New London and New Haven with a true Metro system that connects more of the state.

- I bicycle to work about half of the year, public bus during the other half.
- We need to further develop alternative commuting methods. I live and work only a few miles from rail stations, but don't have an option to take a train, for both schedule and cost reasons. Has the bus line eliminated the possibility of a commuter rail line along I-91 and I-84?
- A paper billing process for drivers without transponders will likely generate high overhead costs and collect little revenue. Definitely go with a reduced toll amount for transponders to incent drivers towards electronic administration--best to align with same transponder systems & driver accounts used by neighboring states to more efficiently collect from out-of-state drivers. I am unlikely to use a bus because of lack of timeliness, reliability and potential need for early/late/or emergency departures--However, I would be more likely to use a train if Hartford implemented a local (high frequency)commuter rail system like Metro North, Boston's T or WDC's Metro (too much for a small city I imagine)
- Your time estimate for my 1-way trip seems unrealistic. It is approx. 22 miles door-to-door, with 20 miles on I84. In your modeling, how can you estimate anything less than a 15-minute ride without greatly exceeding the speed limit? Are there any options under consideration other than the toll?
- I do not plan on taking mass transit to and from work from Plainville to Hartford. I need to be at work at 6 a.m. and for me to drive to take a bus would take longer than for me to drive directly to work. If tolls were added, I would take back roads.

- Please get the commuter rail service between New Haven and Hartford completed as soon as possible. Then I can avoid I-84
- I would take public transportation if there was express service from my home to my place of employment and if there were more frequent afternoon options (hourly trips from noon-3:00) for getting back to my home town.
- I did use CT Transit to get too and from work for a period of three months. Getting to work was fine. Getting the bus home was very unreliable as you never knew how early or how late the bus was coming out of Hartford and I could be waiting an hour or more for the bus home and would often give up on getting the bus that comes closest to my house and take the bus to West Hartford Center and walk from there which depending on weather and things that I'm carrying isn't always easy. In addition, it was not reliable if I needed to get somewhere at a certain time after work.
- I find it fascinating that tolls are being considered on working people at same time the state and federal govt. are WASTING hundreds of millions of dollars on the the fantasyland "New Britain to Hartford Busway" which will be a complete financial disaster.
- I support improvements for fly over ramps or additional ways to get between the highways - like 91 and 84. right now, if you leave hartford from the capital area and have to go with everyone else leaving hartford and going either 84 east, route 2 or 91 south or 91 north. this is too congested. Tolls must be reasonable. Pay for use is a better option that adding additional taxes. Public transporation is never used for the majority of the people. The new bus route between New Britian and Hartford is a waste of our money. Trains from Hartford to Boston or New York are a better investment for our state.
- I realize that cost is the greatest factor and that it's difficult to change prexisting infrastructure. But travel on the East Coast needs a major redesign. I'd support high speed rail, or any rail for that matter if they had more direct routes, or even some closer to my location. However, the truth is that The oft-repeated idea of building mass-transit systems in major metro areas makes no sense. For openers, urban gridlock areas like Hartford have widely dispersed business and commercial districts. During rush hours, commuters speed off in all points of the compass, meaning there is no logical midtown destination. To create an efficient mass-transit network in Hartford would not be cost effiecient. Even in cities boasting

modern mass-transit systems, such as San Francisco's Bay Area Rapid Transit, the traffic load increases by the year due to the diverse destinations within the metro area. More light rail and subways are almost out of the question because of the budget-busting cost of land acquisition and rail construction and the inability to serve a fragmented and unpredictable commuting public. It seems that the available funding is only enough to maintain the current network with little or no new construction. Other ideas such as user fees, more toll roads, alternate business hours, computer-managed traffic flow, and high-speed passenger express lanes have been tried with limited success, but the harsh reality of 125 million more motor vehicles flooding the nation's highways over the past few decades offers a gridlock crisis for which there is no financially logical infrastructure solution, to build more highways (which might immediately fill up with more vehicles)is just too costly. I feel that only if legislators, traffic engineers, safety experts, etc. come to their senses and agree that with proper training, proper laws, and proper road design, efficient, high-speed utilization of the interstate network can be optimized for millions of motorists currently chained to laws and traditions that reduce the efficiency of this grand complex of highways by perhaps half. Just by revisiting the licensing and driver training systems you'd resolve half of the existing trafic conditions. I think a great, tried and true prototype for reformation is the 7000-mile German autobahn system that is light-years ahead of our own superhighway network -- not only in design, but also in a driving philosophy constructed around the laws of lane discipline upon which all safe driving is built. The autobahns, with their superb signage, flawlessly smooth road surfaces, state-of-the-art guard rails, and vast stretches without speed limits, is backed by sound research and unavoidable statistical evidence that German-style high-speed driving is essentially as safe as our throttled-down, haphazard, undisciplined interstate environment. The numbers he cites, dating to 1997, reveal a death rate of 0.74 per 100 million miles of autobahn driving (no limit, but a recommended speed of 130 kph, or 81 mph), while our interstate fatality rate was slightly higher, at 0.88. Both rates, by the way, continue a downward trend. I believe a five-point "Fast and Safe" agenda, which calls for mandatory seatbelt use, drunk-driving enforcement based on a progressive blood alcohol concentration beginning at 0.05, a "drive right" law that is rigidly enforced to reduce passing lane blockage, a reasonable tax on the gallon for better highway designs, and all speed limits set at the 85th percentile, that is, the speed at which 85 percent of all road users travel. Could eliminate a great portion of the problem with small changes to infrastructure. Sadly, to alter this ugly situation would require improved driver behavior and better road designs, which are difficult policies to pass.

- I usually take the bus to work but need my car 2 or 3 times a week.
- How about instead of building busway's that nobody will use, we use that money for road improvements. Our Governer is a moron
- I do not agree with the busway project! I don't feel it will be used and the traffic and construction headaches it's causing are terrible! Constant road closures, lane closures and one officer trying to direct traffic on Broad Street is not safe! You can't close lanes before 9am! It took 19 minutes to get 2 blocks the other day! This project can't end soon enough!
- I am incorporating the use of Dattco Express Service from Southington to Hartford in my daily commutes whenever possible. Due to changing work demands, it will not be possible to use bus service on a day to day basis. However, use of the bus has been a VERY positive experience and I plan on continuing and hopefully expanding my use of the commuter bus. I am hoping that the FastTrac system does not detract from long distance Express Bus Service provided by Dattco and other bus services. It would seem that the Express Bus Service should be allowed full use of the FastTrac system.
- I would love to see commuter train options from the north part of teh state to Hartford. I would use the train for many more options than just driving to work but would love it if it was available for work.
- I could be more flexible if my son could catch a bus to and from his job in north-west Windsor instead of needing a lift. I would rather take a subway if we had something like BART or the D.C. system.
- I use mass transit for commuting to work. I expect tolls on 84 on the west side of Hartford would create a significant amount additional local traffic to avoid tolls in. Also tolls should be for travelers going through

the state (similar to Mass Pike)not local traveling/commuting. I have no issue with paying the Mass Pike I90 toll or NJ I95 toll since my only purpose is to travel through the state for destination trips. Commuting tax is unfair for lower income residence (not my situation). Discouraged by CT direction for more taxes.

- Take the money that you have wasted on the New Britain busway and use it to repair I84. Also, we pay more gas taxes than anywhere else. Use that money for the purpose that it was originally designed for.
- if you want to encourage mass transportation into and out of hartford then you need to make it more flexible and faster. the mass transit from my local pickup takes nearly 2 hours each way and only leaves between the hours of 6AM and 8AM. I can commute from my house to NYC in nearly the same timeframe. Even though hartford traffic is horrible it is better to sit in it in my own vehicle than to sit on a bus with multiple stops for nearly twice as long. Come-on, get it together, do you think that people who work in hartford want to to turn their workday into a 12 hour adventure just to save a little gas money?

1.7 Miscellaneous Comments

- Enforce speed limit by camera useage
- Toll booths can lead to traffic congestion and accidents. I have an EZ Pass to avoid having to stop on bridges and toll gates in NY and MA. I am concerned about being rear-ended as I wait to pay a toll. My EZ pass helps me avoid the major tie-ups at toll plazas in NJ.
- I drive professionally 3000-4000 miles per week I-84 ranks right up there as one of the worst hiways in the US. The Penn section is the worst condition but Hartford is the most congested and dangerous!!
- 84 needs a bypass for those not going into any of the Hartford exits
- This study assumes that tolls will reduce traffic. There has to be compelling evidence not just to suggest that tolls will compensate for construction costs, BUT that they will ALSO significantly reduce traffic. Not sure this is proven.
- It's time that CT. instituted tolls at the entrance to our state from MA and from NY. Lanes for transponders only would help keep the traffic moving and the monies could be used for the roads. We are a free ride through state with high gas prices
- 84 was unsafe the day it opened .It was poorly designed from the the very start.I traveled on 84 from west Hartford to hartford for over 35 years.I was on 84 from the the very beginning .Now that I am retired ,I try to stay off it as much as possible.Other states from Me to Fla. have superior highways ESP So Carolins,well designed to handle all the traffic. 84 has been a mess for many years and can not handle the increase in traffic with all the twists and turns. Ct is spending tax $$ on the stupid bus line from N B to Htfd .I wonder if they are using the same companies that designed 84.
- tolls should be on the inbound lanes (coming into hartford) in am.Outbound in pm. biggest delay is capital ave exits after tunnel and the poor lane design and cross over traffic . future ideas is a belt way traffic issues are trafficentering from captl.and traffic merging to go 91 north.
- The premise that only an E-Z Pass transponder would be used to collect tolls on a highway is ridiculous. There are too many vehicles on the road that do not have such a device, which would require the installation of toll booths on the highway. Toll booths only cause significant delays, irritation, and excessive car exhaust pollution. The whole concept of "value pricing" on I-84 using E-Z Pass transponders is absurd.
- Please think on this , People who use I 95 most of them used as a commute from NY to Boston , for cargo transaportation, bussines and others why do not install tolls in I 95 THERE insted I 84 it seems a good idea since people using I 95 are most of them not from CT .

  Just as an anecdotal observation, the I-84 section through Hartford has been meticulously maintained throughout its lifetime. I remember it being repaired for a long time. I also remember how extremely

frustrating that was for my mother and the other thousands of people that use that section of I-84 on a daily basis. To engage in another time-consuming construction project when, from all outward appearances, there is nothing seriously wrong with the highway itself would be foolish. I have no problem with the construction if it is truly needed. However, I do know that everything costs money and, at this time of budget pinching, I'm not sure that the state should spend the money on this project right now. Even with the tolls to help offset the construction costs, most of the burden would fall on the state taxpayers. The people that use the road for travel/commuting on a daily basis will essentially be taxed and will experience a decrease in their quality of life. As a side note, I rarely travel I-84 so I will not be affected. My comments are simply forward-thinking. Please take them seriously. Thank you.

- I travel to Boston periodically on the Mass Pike; the highway is still congested, the highway is in no better condition and I've seen and heard of accidents at the tolls. Tolls are not the only solution to reducing traffic volume and increasing mass transit use. Let's be more creative!
- Tolls should be reinstated on the borders of CT to pay for road improvements and repairs!!!
- Finish the ring road around Hartford (I-291)
- Should have used money for I 84 instead of the new road fromNew britian or Bristol to Hartford.
- I have lobbied my representatives for years to consider the concept of open road tolling. I live along i-95, and the fact that this state's roads are used so heavily and supported by none of the drivers is ridiculous. We should have tolls at the Rhode Island and New York borders to catch all the interstate traffic that puts the wear and tear on our interstates.
- Malloy MUST GO!
- Tolls that allegedly are designated to pay for improvements typically become permanent.
- I realize that improvement projects must be paid for, but I think bringing tolls to CT sets a dangerous, and frankly, quite annoying precedent. I do not support upping the cost of transit.
- I will not use a video toll or buy a pay pass!!
- Any funds collected are in a dedicated road fund
- fix I-95 Traffic!
- I-84 in Hartford is one of the scariest roads - it twists and turns too many times. Every driver has to change lanes in the downtown area simultaneously. Cars pass on every side, often at high speeds. Straighten the road.
- I like the idea of not having to stop for the tolls. I Like the option of having an ez pass. If we pre pay could we get it cheaper?
- I think tolls would be better placed at the borders of CT
- Charge non-residents for use of the highways with transponders. This way residents pay gas tax to use the highways already, and residents who register their vehicles out of state will now pay the toll rates for the use of the highways
- Their current system is out-of-date. There has to be improvements for a straighter and a safer road.
- Looking forward to Malloy being out, need to get someone qualified in. Also need a politically balanced Capitol to clean up the budget. Cut spending, balance budget, stop handouts.
- Maybe if you put more police officers on the road to ticket speeding and crazy drivers then you would get enough money from the tickets to fund the road improvement projects.
- Connecticut finances are in the red. This is the reason for this survey. Unfortunately, people have short memory tolls are unpopular in CT. Why don't they place a toll in either Danbury, CT or Union, CT instead

in downtown? If it works on the borders implement it downtown, not the other way around. Common sense (lacking always in CT).

- If you put tolls in CT, I think each CT registered vehicle should be given an ez pass with an allowance for a reasonable amount of free passes through the tolls each year. People who use the highways daily could purchase a monthly or annual pass for more money. Out of State registered vehicles would pay for each use. You should then use the $$$ generated by the tolls to lower the gas tax so more people buy gas in CT.
- it took us so long to get rid of our tolls why should we bring them back again. We all know that once they come in they will not go away. I do use my EZ pass when in other states and i like it a lot but if there were no tolls things would speed up automatically.
- In some what I agree, but honestly the cost of living has gone up tremendously. There is no work. I as a mother of 4 children lost my job due to my child's illness, can not afford most amenities. I feel there will be a lot of discomfort for many people, especially if they travel from surrounding towns to hartford for work on a daily basis x2. I hope they will take that into consideration. The state is overpaid and do not work (department of social services) I feel we suffer after we put hard earned money into it and they don't want to help afterwards. Good Luck.
- Make 84 a secondary road. Remove the left exit ramps. COMPLETE 491 AROUND THE CITY.
- How will tolling improve the highway at this time? It will take a lot of tolls to get the highway.
- i think fed funding reg prevent addition of tolls on 84
- I believe the democrats in charge should stop spending like o and use the money for the projects it was intended to be used for not wasting it on the people that take advantage of the system daily.
- First, explore state border tolls to maximize revenue from out of state users and minimize impact on state residents.
- Put tolls on the outside borders of Connecticut. Charge out of state vehicles for toll not Connecticut residents.
- Pay only 25 cents because the cost adds up fast if you travel frequently on that road.
- tolls should be located at ct's borders and paid by people traveling through our state. Ct's residents are already taxed to death and the toll is just another tax.
- As stated earlier before running out of room. I am wondering how out of state travelers will be charged. Is there an electronic database that is readily available to use in this format? Also, Why only one toll in Hartford? These toll booths should be placed on the outskirts of the state in order to have out of state motorists pay for CT roadway usage (do not fully burden the residents who already pay taxes to maintain CT roadways). Keep in mind I am not adverse to paying tolls, I simply want them in a fair and practical manor. I have many many more inquiries, however I am next in line at the DMV.
- construct an expressway that by passes downtown; that would expedite traffic and relieve congestion and improve the flow
- don't support tolls, but willing to pay
- Put tolls at places where you enter into the state but other than that I do not want tolls or believe in them.
- Tolls would likely be a dangerous addition at the toll collection areas (even the EZ Pass) that would greatly increase the number of people taking backroads to avoid tolls and create more hazards for school buses and other local traffic.
- I am a nurse at St Francis hospital and drive to work 4-5 days a week through that area of hartford and believe it is a dangerous section of highway as it is. Frequently at 2-230 pm the traffic is backed up and I am late for work. This tole would make it worse.
- We need to have tolls when you enter and exit the state.

- I'm not not sure how this was captured - but I intentionally levave work at 5:30 b/c the commute time is shorter - it still takes me 40 minutes to get home; however, I find that if I left at 5:00 the actual time is closer to an hour to get home. So I spend an extra 30 minutes at work to save 20 minutes in the car. Hope this helps.
- Traffic problems around Hartford go far beyond I-84. Left hand entrances and exits on major highways, narrow and unpaved local streets, unsynchronized traffic signals, too many entrances and exits onto major highway in a small area, and a host of other problems plague the local commuter. If local roads were wider, paved, had no parking during commuting hours, and had street lights that were synchronized so that you could go more than a block without stopping, West Hartford commuters would use those roads. But instead, it is still faster to sit in traffic than it is to try to get to WH through local streets. The highways are a mess because you have entrances and exits on both sides of the highway, meaning you have diminished predictability and crossing traffic, which, with a little bit of congestion, quickly causes back up.
- Tolls should be placed as you are entering the state not in the largest area of congestion for the working class.
- You should consider change the hours of state's offices 8:30 a.m. to 4:30 p.m., instead 9:00 a.m. to 5:00 p.m. Most of the business's hours in Hartford are 9:00 a.m. to 4:00 p.m.
- The State should take a bold step and pursue a "Big Dig" project to put 84 & 91 underground through Hartford. It would be a much less challenging project than Boston, learn from the mistakes made in Boston and view it as a long-term investment in our state and its capital. The state should also consider a small Subway system downtown w/ plans for furture expansion. It would make the City of Hartford a more open, walkable, livable city and would realize the vision and then some of the iQuilt initiative. It is time for Hartford and the State of CT to start thinking on a grander scale if we no longer want to viewed as the poor cousin of Boston and New York City.
- I am very familiar with toll roads and use EZ pass transponder. Even with that there is a slow down. I believe tolls of ANY kind would be a burden on travelers. We need express lane fly over overpasses to accommodate people who want to go East-West and vice versa without exiting in Hartford. No more left lane exits, please. Build a huge bypass from 91 North to 84 East past Silver Lane to eliminate the 3-mile backup on 91 and the most ridiculous merge onto 84 East. Offload the traffic through new arteries. Someone must be able to figure this out. Of course, any kind of RELIABLE commuter-based transport is desirable -- commuter hubs with shuttles. Sync up the buses departing in Windsor with the Amtrak arrivals, so you can get from New Haven to the airport without driving a car.
- The road system in CT is horrible. The new bus way a joke. We need better highways, eliminate the HOV lane and let everyone use it. Install tolls on all highways, why we do not have it becasue of the Fairfield County politics is disgusting. The DOT needs a total revamp and has anyone of them ever driven from Hartford to Stamford??? I have no faith any thing p[roductive will be done in CT to our highways.
- I realize it is outside the scope of the study, but the extremely poor traffic flow management that characterizes downtown Hartford is a major factor in my routine decision-making about when and whether to use I-84. Much depends on where exactly I need to go downtown when selecting the best approach to getting there. When possible, I also try to schedule appointments downtown at times when congestion is least likely to be a factor and parking will be available. In principle, I believe there are too many entrances and exits on I-84. Eliminating or redirecting some of them however should be undertaken in full coordination with reworking how traffic flows in the off-highway downtown area of the city itself.
- HOV lanes were supposed to be the magic bullet and they have solved nothing. Adding tolls to I-84 will not decrease traffic and if there's any true intention to accomplish that result, commuting issues in and around Hartford must be taken more seriously. There is very little incentive for the public to rely less upon automobiles and more other forms of transportation. There is not even ONE bridge that crosses the CT River in Hartford that doesn't require getting onto a highway. The New Britain-Htfd busway may be

some help but that services only one corridor. Bring trolleys back that run along Farmington Ave from W.Htfd Ctr, through downtown Htfd to E. Htfd. Another trolley route from north of downtown, south to Wethersfield Ave and out to Old Wethersfield. These things USED to be in place before the tire companies lobbied and won the fight of rail vs rubber. Other cities have traveled 'back to the future' with positive benefits for commuters and tourists alike. Get with it Hartford!

- The elevated portion of I-84 are not the only bottlenecks. That area is bad, but so is the 72 Slater Road area. And the left hand exit for UCONN is ridiculous. Coming out of Hartford West bound is a nightmare too. The left hand exits are terrible...all the way to Cheshire. People get into the left lane and travel at ramp speed. Finally, the traffic from Hartford to the RTE 9 exit, is just too heavy, too many cars for the roadway or exit ramp.
- I think the tolls should be put at entrances into/out of CT, such at the NY line, the MA line, just as NY get commuters going over the Tappan Zee bridge into Rockland county towards NJ, and they get money from commuters going over the George Washington going into manhattan and out of from NJ. Let the ppl who work out of state or live out of state or travel into CT pay for our new bridges...just a thought. I don't mind chipping in to help with the toll for the new bridge but if it is a $1.00 each way that is $10.00 a week, $40.00 a month which will add up for people who might already be stretched... $.50 each way not so bad that is $1.00 a day, $5.00 a week, per car you will get the money you need, anything $1.00 and up, people will head to Farmington for work. No one likes to pay to go to work.
- While I support tolls in general (I am from New Jersey and am used to traveling throughout the Northeast and have had an EZ Pass for years) I am against charging more during heavy commute times. Generally employed people do not have flexibility regarding the hours they work, especially those in education (including students who can ill afford any additional costs), health care, retail, and other customer support jobs. Maybe some employees in the insurance industry and government workers can stagger their start and stop times, but the majority of workers cannot, and should absolutely not be penalized. And what exactly are the revenues from Connecticut's unfair vehicle tax used for if not road infrastructure? Public transportation would have to be vastly improved before I would utilize it. Another issue not mentioned and that is a major deterrent to taking public transportation(besides the crime rate)is that pedestrians in Hartford literally take their lives into their hands when crossing streets. I lived in California for a while where the pedestrian ALWAYS has the right of way, and the laws are very strictly enforced. If you want to reduce traffic and promote the use of public transportation you will have to address this major safety issue as well.
- I am a strong proponent to having state tolls at the borders, such as what is seen in many of our surrounding states. Many people pass through CT that don't stop, just use our highways and go to their destination. They should be helping to pay for our infrastructure improvements as well.
- I would like to see the state implement toll booths at state borders. I think it is only fair to generate revenue from both in-state and out-of-state CT highway users. It is unfair to generate revenue for in-state users that commute to work/school on a daily basis. CT commuters have to pay tolls at NY/MA toll booths and so should commuters using CT highways! Traffic congestion and poor infrastructure is not only present at I-84 but throughout other highways in CT.
- The current commuting situation in Hartford is very dangerous and time consuming - The roads are terrible and overcrowded
- I don't want tolls installed on I-84. Just tax everyone to pay for the repairs, not just the people who have to drive to Hartford to work. The busway doesn't work for people with odd hours (hospital staff)
- I am opposed to local tolls within CT, however, would support tolls along the CT borders. Additional tolls are a burden to working people who make daily commutes.
- Morning Rush hour access to I 84W from Route 2 North is my greatest commute obstacle - I hope you are looking at that...

- Tolls are NOT the answer that the State is looking for. You shouldn't charge taxes AND tolls. Costs are High for Highway/Road repair, However, this is NOT news. With all of the analyzing that is done, the State should be able to anticipate reasonably well what the costs will be in both the near & distant futures. Every aspect of Highway/Road is costly and no one expects those costs to go down, but I, however, do expect the State to be able to anticipate these increases.
- I did not think it is fair that 2 poeple can only use the 2 passenges lane. Traffic on 84 west is get back up often and if i can use that lane in the morings that would be wonderful becasue it me right into downtown hartford avoiid traffic jams and car accidents that often happen on the highway. I think people that have jobs in downtown hartford use be able to ride that lane regardless if you are only one person. I will not be albe to use the busway. Not fair. My taxes go for that busway, too.
- I am not entirely opposed to paying tolls on CT roads. I think there should be tolls at the entrance to and exit out of CT roads at the State lines. Interstate traffic should pay tolls to help maintain our roads as they contribute to the wear and tear on our roads. I think that the State constituents should have a lower toll rate that traffic from other states. Other States should pay a higher rate. This can be done using transponders in vehicles. I am opposed to in State tolls because the legislature always finds a way to divert funds designated for road construction and maintenance to be used for other purposes.
- Please consider the impact additional fees to repair the roads will impact your Ct residents. Employers will not be raising salaries to accommodate this rise in the cost of living and families struggle now with basics like gas, taxes, childcare and food just to name a few. And please don't make this a racial issue. One of your last questions singled out specific races for a question with a follow up question of what my race is. Someone's race shouldn't matter in the determination of road structure and repair.
- I would prefer to see the tolled part of the highway leased to a private corporation(s) (a la California or Indiana). They have a better incentive to use the collected toll money responisibly and effectively. Leasing the highway will also not increase the need for government jobs, but will increase the creation of private-sector jobs.
- If I had answered the survey on a different week - I would have had a longer travel time. this is a light travel week due to being July & many commuters have vacations. It usually takes me at least 45 minutes with traffice, coming from East Windsor.
- Connecticut is a pass through State for many out of State drivers. Just charge out of State driver's tolls. Don't impose tolls (a tax by another name) on our CT citizens. State Employees (especailly those in management, the Governor is a state employee too) need to remember we are here to serve the public and need to spend our friends, family members, the elder and all the residents of CT's money wisely.
- I do not use my email at home but would consider other surveys if sent to me at work.
- I would be more likely to support toll highways if they were a choice. (eg Ontario Canada's 407) There really aren't any other viable options for me than 84.
- I have had periods of employment when I van pooled. The SUN is an obstacle for those of us who travel east-west.
- Wanted to point out that I-84 in the West Hartford area is a NIGHTMARE many times because of the bad decision, years ago, on the part of DOT, to allow so many Exit Ramps, where traffic enters on or off from/to West Hartford onto/from I-84, causing everyone to constantly step on their breaks. Many times, like today, it was better for me to use the back roads. I feel I-84, from the Farmington area to the Capitol Avenue exit, needs an additional highway lane.
- The traffic lights coming off the Asylum Ave exit need to be adjusted. The least amount of time is allowed for the Aylum Ave. west traffic, which has the most cars. These leads to congestion and back-ups on a short exit ramp -- dangerous. Same issue with the Garden Street lights heading toward Collins Street.
- Alternative options should be available for the transponder - perhaps a prepaid transponder that does not link to the person being charged, like a prepaid Visa card. That way, if people do not want a

transponder linked to them personally but take the route often, the less expensive toll is still accessible to them.

- exiting off the asylum street exit on a weekday is always backed up onto I84. It is dangerous and wastes time, is there anything that can be done about this?
- I use I-91 south in the am...I feel your HOV lane is the biggest waste of money and it is not efficient...If you got rid of the HOV lane,you could make 5 lanes available...at least open it up around the exit 36 area!
- I have driven through many states and Connecticut is the only one where you have major highways intersecting and there are only one lane exits. Something has to be corrected but increasing taxes or tolls will directly hurt Connecticut Commerce. If Connecticut keeps raising taxes there will be another mass excises like in the early 80's. I have not heard I parent encourage the children to find a career in CT. but to finish their education and get out of this State as fast as they can. Sad!
- I wish I could take a bus from Exit 62 (Buckland) to St Francis Hospital without having to walk from Farmington Ave (I work from 7 AM to 7 PM)...
- Instituting a toll on I-84 has the potential to negatively impact some Hartford residents financially. This is especially disturbing in a city with many families who suffering in low income situations. To add even a "reasonably-priced" charge can further drain some of the residents' limited resources. A few options to consider: - Add tolls to the highways that are closer to the NY border for CT residents who work in NYC but live in CT because the cost of living is less. - Focus more energy on alternative means of travel within Hartford, including bus and bicycle. Investing time and resources to develop a solid bicycle infrastructure can help defer travel costs for Hartford residents who choose to ride instead of drive and can also reduce wear on the roads. Not to mention the obvious boost to the environment.
- This state is in the worst shape ever thanks to our gov.
- When making changes, it would be interesting to consider an alternate route for traffic that is going straight through -- like a highway "loop" that goes around Hartford, so that those drivers are not stuck in the rush-hour traffic of downtown offices. Like the beltway in DC, or other cities.
- I would have been interested if I still commuted to work but I am a work at home employee and only go in to the office on a rare occasion.
- The questions asked covered many different scenarios, however if the tolls were not "reasonable" (meaning, less than $1.00 per day) then my plan would be to work from home more often as my first choice to avoid traffic congestion/tolls. Given the recent gas tax increase, daily commute time, regular vehicle expenses, and now tolls, the savings recognized from working at home would outweigh driving to work for those that have the option.
- Put toll plazas at all highway points of entry into CT (84, 91, 95, 395) so that out of state drivers pay for the use of CT's roads. DO NOT increase taxes (tolls are a tax) on CT residents. We have the highest taxes as a percent of income in the United States.
- Install several signs on the Charter Oak Bridge on-ramp that say "Steep Incline....Maintain Speed". This would solve the back-up problem on 91 North at that exit. Increase the speed limit on 84 from Hartford to West Hartford to 55 MPH. Put in an HOV lane from Hartford to Bristol.
- There was a big accident during my most recent travel (4 right lanes closed) Normal travel time during the same hours could be anywhere from 20-40 minutes. Thanks! I am not in favor of the toll is it is too much, and we normally use cal pool lanes.
- Start enforcing HOV regulations. Added revenue would pay for increased police presence.
- Rather then adding tolls in the local Hartford area and impact local drivers on a day to day basis, why not add tolls on the state borders. 84, 91, 95 and 15 would generate the revenue needed. Instead of making improvements to I-84, why not look at running trains from the shoreline into Hartford and from Northern CT down into Hartford? How about trains going to and from the airport; down to New Haven

and up to Springfield? There is no reasonable public transportation for people of Connecticut. There is no need to update I-84 if people are given choices...there are no choices!!

- I feel that there is too much spending today on things that impact a small population. State and local funds are being misused for these programs and should be reallocated to projects such as improving our infrastructure in Hartford (the states capital). It is long overdue and should be focused on by managing the existing funds the state raises through tax collection vs imposing new taxes or tolls. Let's begin spending money on the areas within the state that need it most and will have the biggest impact. A project like this will make Hartford a friendlier place for folks to visit and more attractive to new companies for relocation.
- 1)I travel I84 for about 2 miles from Rt2 to Sigourney St exit. I'm sure many other local hartford residents take similarly short trips to get around Hartford. How can you justify charging a toll for that short trip? Its an assinine concept to have a toll in the middle of a city! 2) A bus goes right past my house, but the 6 mile trip takes an hour and requires a transfer in downtown Hartford, to get to Farmington Ave at one of the city's largest employers (Aetna)
- There is WAY too much unavoidable lane changing between the tunnel and Sisson Ave - it is a very dangerous strech of road
- Normally my trip to work takes place anywhere between 6:45 a.m and 8:00 a.m. Depending on the time I may or may not take the highway because the traffic is very heavy starting around 7:00 a.m. up to about 9:30 a.m. or so. I don't like to be in that heavy traffic so I use the city streets 98% of the time for my commute. It only takes me an average of 10 minutes to get to the parking lot from my home. It would be very unlikely that I would change that even after the improvements to I-84 have been made.
- Tolls should be installed at state borders. I support that idea
- My employer demands I come into the office, even though I have work at home capability. I already pay a fortune to park in the employer mandated lots. I oppose tolls because 1) you won't actually drop the traffic volume and ease congestion, just cost me more money and 2) the bus system is so poorly designed that it takes 90 minutes to use a bus to get to work. I can't afford 3 hours wasted on a bus every day. I would support an effective trolley or train system if I could get from Wethersfield to downtown in under a half hour. It is doable. What you are talking about with this proposal is rearranging the deck chairs on the Titanic, not making transit reasonable and useful.
- If you are considering putting in a toll for people traveling into Hartford to work, are you also considering putting in tolls at the borders of our state? There are some days when the majority of cars I see during my commute on I-84 and I-91 have out of state license plates.
- Trying to get into and out of Hartford in the winter is a disaster. Usually the roads aren't plowed, everyone ignores the traffic lights and it can take up to 30 minutes or longer just to get around the block. Taking the bus does not eleviate the probelm b/c they usually can't roll up a hill in the heavy snow or they get stuck in the snow. The best option on heavy snow days is to take a day off or work from home b/c it simply isn't worst the aggravation.
- I-84 is a joke compared to the cost of maintaining I-95. Put tolls there and charge the comercial traffic to pay for our road system. This entire approach is ridiculous. Traffic flies through CT between New York and Boston on I-95. Make them pay to use our roads with huge tolls. They are the ones that tear up our streets let them pay the cost.
- Many of these proposed ideas are unrealistic. There is no way for you to be sure there will be no traffic issues or longer commutes if there's a toll to pay for new roads. The idea is nice to actually go somewhere and not factor time in for traffic but it's not realistic. There's no way for you to control that.
- The traffic is not so terrible that I dread driving into Hartford. I am lucky to have a flexible work schedule, but I am in the office 5 times a week. There is a gym at my facility. If I want to avoid traffic, I simply come in earlier and go to the gym before work. I would be opposed to tolls even though I could afford them. I

have tried taking alternative routes to get onto/off of 84 to avoid some highway traffic. If there is congestion on the highway there is also congestion on the side roads. Adding tolls will alleviate the congestion on 84, but will leave the side roads to be really backed up. Sometimes the alternative routes take longer due to traffic, lights, distance, etc. I like the idea of the new trasit in New Britain. If prices are good in combination to parking fees at the facility is equal or less than driving, I can see a lot of people using it. Some people like myself would have to drive halfway to New Britain. If I am not saving anything, I would not participate. Another way to alleviate congestion is to encourage companies to have employees work from home on some days.

- I would like to suggest that reflective lines or reflective markers be used on all roadways. The lines on the roadways become very difficult to see when there is pouring rain.
- Would like to see HOV lanes thru Hartford. Better on and off exits.
- Route 2 is also in need of an overhaul. On-ramps are dangerous during rush hour times and the backlog of traffic getting onto 5D and also the there is only one ramp going to 84W which is a nightmare.. I would prefer not to work in Hartford..
- Driving into Hartford is already a nightmare, especially around the Aetna building.
- I gave information based on my morning commute because that's when I would use I84. However, for my evening commute, I purposely AVOID I84 due to congestion and use city streets to get to I91.
- Please do improve traffic in I-84 as Time taken to reach office on peak hours are getting increased up day by day. It is not that we cant eliminate it, so adjustments can be Made particularly in the travel route in Exits 50-48 which are the highly affected ones during peak hours.
- The unusual length of my communte this morning was due to an accident on I84 east of Downtown Hartford. Ordinarily, my commute is 30 minutes or less.
- Most of the major corporations in Hartford charge their employees to pay to park in their garages and/or surface lots. I, for one, did not CHOOSE to work in Hartford. My employer chose to move to Hartford. I already spend more money for gas, I pay $60 a month to park in the garage, and I pay for my own equipment to work at home a couple of days a week. I do not want to spend anymore money in order to get to work. Perhaps the corporations can fund the construction project(s) with the excess money they are making charging employees to park at their facilitis.
- I drove over the bridges when there were tolls in Connecticut. It shoud not cost more than gas to get to work. Also - it should not cost an employee to park at work.
- You should really test the assumption that putting tolls on 84 might push more downtown workers into telecommuting meaning less warm bodies and open wallets for downtown businesses. Maybe think twice before making yet another dumb decision to hurt small businesses in CT and drive them to other more affordable/business-friendly locations.
- Having people who work in Hartford pay a toll for coming into the city seems like a pretty drastic way to get the roads repaired. Instead of making this a place where we want people to come and perhaps spend time for more than just work and actually bring money into the city(e.g. dinner after work, attend a play or concert) we will charge people to come into the city? It would be interesting to see what the cost would be to set up this toll system, cost to have something added to someone's car (who pays for that)repairing the devices, etc. Almost seems like a scare tactic to get people to not come into the city. Not saying that road repairs aren't expensive but this is the capital for heaven's sake - shouldn't it be all of CT supporting it's city? We need to focus on getting people to come here (like using the Colt facility for outlets). I think the survey may have been premature - not providing what the viable alternates are and the overall cost for the toll system. I do appreciate being asked to participate in the survey but I have to admit I was very surprised by the toll idea - or maybe I wasn't.

- Most congestion occurs before even getting to the highway. The highway on-ramp is approximately 1 mile from my work place. It takes almost 30 min to get from my work to the on ramp. Several routes to the highway have been closed due to bus route construction. I hope people use this bus route.
- I completed this survey using my morning commute information (because the survey asked for my most recent travel of the route). My commute differs drastically between morning and afternoon. It takes me approximately 30 minutes to get door-to-parking lot in the morning. My afternoon commute takes over an hour to get home (due to I-84 traffic, I-91 south traffic, and route 9 traffic).
- Tolls should not be implemented on a particular highway as a "pay for". To put a toll on people communting in and around Hartford will keep people out of Hartford. The tolls should be on I95 which would hit many people traveling through CT. The state would use those funds for whatever projects existed. Employees will look to rural employers if in addition to paying expensive fees for parking, they now have to pay a toll. A toll would not relieve congestion in any way.
- It's more important to me that you fix the Park Road curve area of I-84, rather than downtown Hartford. I run into more traffic issues there.
- I think the proposition to place tolls on I-84 through Hartford is ridiculous and offensive. We are one of the most highly taxed states in the country as it is and to place tolls through Hartford, on a road primarily travelled by local, CT residents is shameful. You can place tolls on the entrances to state borders (where CT meets MA, NY, etc) just as bordering states do for us. To place tolls IN Hartford is unreasonable, fiscally irresponsible and obtrusive. It will not lead to people using greater public transportation as most commuters live outside the city and we do not have an efficient or highly effective bus system. We are are driving city - it is just a fact as our suburbs are not like that of Boston which are in such close vicinity to the hub. I am completely against tolls on I-84 within Hartford or its surrounding borders.
- When will you ask about Rt 91 congestion?!!
- Flower street was closed due to busway that wont truly be utuilized and now it takes me up to 40 minutes to go 3 blocks to get on 1-84. Genius.
- It's 13 miles from my house to the parking garage. The survey said that a 10 minute trip is considerably longer than normal for my daily commute. That makes no sense unless I am driving at a speed that would get me a ticket everytime I drove from home to work. You probably need to look at that piece of the survey and update it.
- I had an alternate route but then flower street was closed for the bus line and Broad street is a construction disaster so I have no way to get to I91 via Capital Ave without using I84. I did take an alternate route when flower street was open. So now I try to leave earlier and sit through the I84 congestion.
- We're a small state with a large number of drivers on the road. Whatever can be done to aid the flow of traffic during peak times, even if only at a slow pace (such as a steady 15 or 20 mph, not stop and go traffic) would be amazing.
- The trip I described was an exceptional one-way trip from my workplace in downtown Hartford to my husband's in Farmington. I typically do NOT make this trip, or use the highway in my daily commute -- I either take the Farmington Avenue bus, or drive on local roads (FArmington or Capital). This is because I live locally, about a mile drive away from downtown.
- I take 91 South a majority of the way into Connecticut. I only take 84 east to get to Aetna. My travel time alone is lengthened on the way in by 25 minutes from exit 38 I-91 S to my exit on 84.My travel time alone is lengthened on the way home by 25 minutes by the traffic on 84 West to 91 N and 91N until exit 38. There is no need for an HOV lane because people abuse it, it takes up two usable lanes, if I could carpool I would, and where it runs is the major source of traffic. 84, the portion in which I drive, needs to be expanded. Getting onto 84 than having to merge through traffic immediately to ensure the correct exit is dangerous and creates more traffic.

- Connecticut highways are designed very poorly which makes it dangerous when commuting throughout the state. I-84 thru Hartford is a nitemare.
- I understand a toll system and am in favor of it at the CT borders just like MA and NYC, but not to and from work on 84. I work hard and pay for gas and parking as it is. Paying tolls during rush hour is a slap in the face to those of us who work. Try putting tolls or taxing everyone who doesn't work because they just don't want to.
- Not sure the survey I just took accurately represents my commuting needs. I travel south on I91 into hartford. I use approx 1/4 mile of I84 for my work commute. I travel the same commute on Sundays to do to work. Enter and exit the same. I would expect to see City/State/Federal funding to pick cover this cost OR I am willing to pay the toll if I no longer have to pay the taxes on my vehicles.
- It just so happens there was a very bad accident on I84-west bound this morning. At the very least they should open the HOV lanes to ALL traffic in these situations to try and help with the flow of traffic!!! Again, what would normally take me 45 minutes to drive which is long enough took me 2 hours on 7/15/13.
- How can you guarantee a reliable travel time during rush hour? It varies on time of year, accidents, weather, etc.
- I avoid traveling on 84 between Hartford and West Hartford as much as possible. The many lane changes and exit lanes make for difficult and unsafe conditions -- especially around exits 46 through 52 - my least favorite area. Hope that DOT can consider improvements to this section in addition to the others - very much needed.
- I will not be using the highway if there is tolls on I 84 I would rather travel RT 6 to get to work and I am assuming others will feel the same way. I refuse to use the bus way as I sepend to much money on car taxes to not be able to drive my car where ever I want to.
- Why create a toll for people entering Hartford...why not do it in Stamford or one of the other large cities that attract more people from out of state vs. in-state people? We are being taxed to the point of poverty (gas, property tax, income tax, sales tax, etc). There has to be a better way.
- Don't think you'll ever get people to believe that tolls won't slow travel down, no matter how the fare is collected. Nothing worse than having to slow down or wait in line to get through a toll.
- I would recommend toll related charges at the borders of our state with in state rates for residents and out of state rates for our neighboring states. Living on the coast is a nightmare to travel the highways on the weekend with all of the out of staters using our roads to go to boston, the cape, and newport. Worst part they do it for free while we pay for there roads when we travel to those states. just did it this week 7 dollars to travel to and from Scotia New York. Its the fairest way for our residents, a great way to control volume, and an opportunity to generate revenue without adding additional tax burden to our hard working citizens.
- The traffic signals on Route 9 through Middletown are dangerous and cause countless traffic delays on a daily basis. Please, please do something to address this situation!!! I-84 is only one point along my route where delays occur. Route 9 through Middletown has become a very dangerous area and needs DOT attention. If light commuter rail service were implemented, I would definately take the train. Hartford needs a commuter train.
- Corbins corner and park road curve are awful in rush hour as well!
- If revenue is to be generated from tolls they should be installed at the CT borders to tax the out of state traffic vs. in state residents.
- Travel times illusrateted are absurd -- 12 miles on back roads takes 10 minutes?!? Given limited stretch of I-84 I travel and approach from the south, I'd be most likely to use city streets if no major constuction/conjestion --> Need to finish contruction work on Fairfield Ave.

- is it not smarter to put a toll on the state border? Toll for 84? Drive all the businesses out of Hartford you idiots! What about the "NEW" gas tax in July for repair to roads and bridges? Was that not what the new additional tax was for? Fire Malloy, and get our elected legislators to actually balance a budget!!!
- You should put tolls on I-95 and let the people coming into the state pay for tolls. We had them before - put them back. 84 is too congested to do it here. 95 would be a better road to do it on. You pay tolls in every other state around here to the point of being ridiculous. Let the New Yorkers pay for a change.
- Taxing users of I-84 will have economic impacts for the small businesses in the city of Hartford. To avoid tolls, more commuters will seek alternative routes if they decide to travel into the city. The wear and tear on the infrastructure will be shifted to surface streets. If tolls are to be instituted, all those traveling through the state of CT on major thoroughfares - I-84, I-91, I-95, Merritt Parkway, should share the burden. Establishing a metro train route that would service the city from the surrounding areas would be an ideal commuting solution but does not address the I-84 reconstruction costs.
- What ever happened to the Lottery money covering road construction?????
- I don't understand why you would put the burden on the commuting workers of Ct. Put the tollbooths at the borders for people passing thru the state. Can't the money for the roads come from someplace else? Look at the spending on UCONN.
- This might be a good idea, if tolls are reasonable, travel time is improved, there are no toll booths, etc. However, I would be extremely opposted to putting any tolls up in the center of the state BEFORE tolls are put on our borders. Massachusetts, New York, and I think just about every state but CT have tolls. CT drivers who go into MA and NY get hit with tolls on key roads almost immediatly. I'm not sure about RI, but last I knew, they charge to go over the bridge. We need to start making a.) drivers in other states that toll CT and b.) through drivers (especially truckers), start paying their fair share to use CT roads (especially 84 and 95), as we do to use their roads. Until we start doing this, we are throwing money away, and until we start doing this, I will oppose any tolls in the Hartford area. Once we toll the borders, I'll be open to tolls on I-84 in Hartford.
- I am aware that this study is only for Hartford I-84. However, I drive to and from Waterbury every day. I spend much more time (e.g., traffic delays) going through Waterbury than Hartford.
- I dont have the answers for this problem, but I think it is INSANE my 20 minute trip homes takes me up to 50 minutes because I cant get ON the highway when leaving aetna!
- would the tolls be both directions on the highway ?
- Please don't look at just 84 - RT2 is terrible for traffic times there is a hugh population that has moved to the suburs since RT 2 was build....I was a child when that went in adding 3 lanes doesn't help when the majority of people are going onto 84W or 91N
- I have no problem with tolls in the state of CT but they tolls should be (as they are in most states) at the borders of the state to get out of state travelers.
- The date I traveled on I-84 was also the friday after a thursday Holiday, so traffic was light. my commute from Vernon to Hartford can take any where from 15 or 20 minutes...up to 45 minutes to an hour if there's a back up. Which is ridiculous. Most of it due to the tunnel traffic and the numerous on and off ramps in that area.
- Will the NSA be snooping in to find out who's on the roads?
- I would prefer to see tolls put at the state CT state borders so those out of state travelers can pay for use and maintenance of our roads.
- Out of staters traveling through CT to go to NY or to RI or MA should pay tolls if you're going to need to charge tolls. CT residents should not have to pay tolls for general commuting purposes (work, shopping, etc.)

- My concern about tolls is that they are supposed to be used exclusively for road maintenance. I am confident that once implemented, they will go to the general fund and never go away.
- With the cost of gas and increase in parking and now a toll - I would work more from home and the revenue needed would not be collected. Connecticut has been very short sited with the economic development which includes transportation of the state. The building of I-84 through Hartford demonstrates a short sited and provincial attitude. This is an example of cheap yankees. I would be willing to pay more in taxes if there wasn't the corruption and cronism especially in road construction. An example of this is the I-84 highway section from Cheshire to Waterbury. I paid more in the midwest but saw my tax dollars being put to good use on infastructure and public projects. Yes, I will move back to the midwest when I can. I am originally from Connecticut.
- It would be great if someone could improve Hartford; follow the example of Baltimore, MD. Just spent a week there and it was great. Why can't Hartford be great?

2.0 COMMERCIAL VEHICLE SURVEY OPEN-ENDED COMMENTS

2.1 Positive or Neutral Comments about the Project

- This survey was very informative. It would be wonderful to see improvements made to that section of I-84.
- they need to fix it
- Fix the road so it isn't as bumpy! (Actually I hate going over 84, most times)
- if the money is actually used to fix the roads then that is okay, and the projects should be done at night
- thank you, you are doing great,
- do what needs to be done
- I am for tolling IF it's a fair toll and it is spread evenly between autos and trucks. I think they should try to find out where all the highway taxes have gone and use that instead of highway taxes. There's already a lot of money that is supposed to be allocated for this.
- im not apposed to tolls as long as their are reasonable
- As long as it improves the road and is reasonable I'll support it.
- It is worth it if the money goes to fixing the roads.
- I don't think its a bad idea!!!

2.2 Negative Comments about the Project

- strongly opposed. I believe it's a bad idea. A waste of money.
- should not put a toll on 84 because it would be a logistical nightmare
- tolls arnt a good idear for hartford, there is to much congestion now, at the begining or end would be better for I-84

2.3 General Comments about the Project

- traffic in that city during rush hour is rough but i will not pay a toll just to improve it my belief is we have been lied to about tolls long enough you say pay tolls just to pay for building but will end after construction is paid for but tolls never stop but continue to go up tolls for trucks way to high
- would consider toll if there was an HOV lane for 5 axle or more trucks. most trucks drive thru yet have to avoid cars/pu trk who do not practice safe merging. ALSO, MORE TRUCK OVERNIGHT TRUCK PARKING (w/facilities) REQUIRED TO COMPENSATE FOR HOURS OF SERVICE RULES. would pay min fee for parking, not to exceed $5.00 us. if you want to target trucks to pay for YOUR roads, there has to be some benefits to drivers. ALSO, long term road construction causes MAJOR BACK UPS, how will you minimize problems?? 413-949-9296 linda
- if you guys are really gonna improve roads it will be ok to have some charges on tolls as long the state it's not able to afford the cost of improvements !! but if this is all about bureaucracy to find the way to make money instead of
- build a road for truck traffic only
- would not pay tolls if the alternate route is not too out of the way
- Use it for what its meant for.... pay for roads.
- if it will truly improve the conditions i agree with the tolls as long as the money goes in for the roads and not in a goverment officials wallet like they have so many times in the past

2.4 Concerns about Value Pricing and Taxation

- tolls cause delays on all roads even will e-tolling
- I don't believe we should pay an increase in tolls because I think my taxes should pay for it.
- tolls are not necessary with road tax we pay
- tolls are highway robbery
- totally disagree with any new taxes or new tolls - stop padding people's padding
- There should be no tolls in America at all - that's why they call it a freeway! That's why we pay higher road taxes!
- I don't agree for paying for any state that I don't live in for repairs because I'm only passing through.
- we pay enough road taxes already/. Show me where the billions of $ you already got went.
- They shouldn't take money out of the bridge and road fund to balance the budget. They need to fix the roads.
- Things are bad enough here in connecticut, I had to move to texas so I could afford to live and work. I am a former resident of Manchester and stafford springs ct. NO DAMN TOLLS
- I don't want a toll road. Because later on the toll is going to continue growing, like New York.
- since we copy other countries and they dont have tolls we should get rid of tolls
- no tolls
- increasing tolls will make everything more expensive. If you put the money on truckers, the cost will be passed on to customers.

- I am opposed to paying tolls they are to expensive and its another bill there must be other ways to raise money for construction.
- We already pay road taxes! I know this stuff has to get taken care of somehow. I know the taxes are not quite enough anymore. But I don't think it's right to make the people who travel the road pay for it, especially because they don't have a choice in the matter.
- where do our fuel taxes, highway use taxes, and other road taxes go? tell me that first.
- As an Owner Operator tolls are one of the biggest factor in determining weather i am going to take a load or not.The average price paid in toll for the east coast region (that i pay) is over $100.00.Anymore tool will only hurt not help
- I think it sucks. We're already paying enough taxes in fuel. This is what the fuel tax is supposed to cover.
- dont need anymore tolls,already have them on 95
- all you will end up doing is putting about 1/2 the money in the pockets of the goverment and the roads still don't get fixed seen to many time.
- I think the government mismanages the money. Tolls are pointless considering the amount of taxes you pay. Where does the heavy road tax goes. Don't want to pay for buying bus stops and flowers like in Florida. IT's supposed to go to roads.
- i h8 tolls
- how about making the politicians take a pay cut to pay for the improvments instead of making the already struggling working class pay for it.
- I'm opposed to tolls. It's high time they put the money that is already taken to good use instead of somebody else's pocket. I'm getting tired of this crap. Taxation without representation. I don't trust that the money will be used well. At all.
- i as an owner operator pay 550 dollars a year for hvut and fuel tax for every gallon purchased at the pump.and i owe a state for every mile i drive in in that state. i try to avoid tolls as often as possible because i feel as though i already pay my fair share in taxes for road and highway use. i feel as though the states need to better manage their budget and fix the roads before taking money out for other non road projects. thank you from a 26 year veteran of the highways.
- fuel tax should be for the roads
- ct is the highest tax rate and highest fuel cost we cant aford any more cost add to the cost of a load
- Most states can manage to build, repair, and maintain it's roads without requiring tolls to be paid. We are taxed enough.
- If you people would stop wasting our money; you would have the money to do this. All our politicians seem to do is enrich themselves at our expense. You should all be fired.
- As an owner operator in the trucking industry my cost of doing business has sky rocketed including tolls, maintenance, registration fees, insurance and cost of equipment. To some its only 7.50 but I ask where does it stop. The fuel tax in CT. is one of the highest in the U.S. at .43 cents per gallon. at some point the truck drivers wont be able to afford the goods they're hauling let alone the general public.
- live in ct pay enough in fuel taxes and property car taxes with two cosinos in a small state alot of wastefull spending goverment thanks ardie kalivas
- There are already enough tolls in the North East and freight rates are NOT adjusted to the HIGH TOLLs already in use When will the East realize we can NOT keep hauling their freight with the already HIGH tolls an now you want to add more TOLLS When are you going to start RAISING the rates on your freight?????? East Coast

- I am opposed to ANY new toll roads. Company's and Owner operators already pay enough, heavy highway use tax fuel taxes etc, etc
- tolls suck cause they are more tore up than the rest of the highway and they charge you stupid high prices for a tore up road that they don't really fix.
- No tolls
- in my oppenion there is enough toll every tollwhere you go youhas to pay

2.5 Miscellaneous Comments

- Trip time is important for log reasons, less so for timely delivery.
- If you are going to build a toll road, might I suggest Bridgeport,CT where where there is more space and in need of road repair anyway.
- If tolls are project specific, I am more supportive, if they are just for general revenue and never ending then I am against them.
- I'm paying sales tax just by visiting your state and interstate highway use tax which is still left over from Reaganomics. And Canadians are taking the money right back home. The hell with their nafta trade!
- If the toll money actually went to road construction like it says it does it would be fine -- but it doesn't.
- It depends on if I was late or empty whether I would use the road. If I have the time generally you can bypass if it's not going to waste too much of your time. But this trip, I don't see much ways of getting around it.
- politics took them off in the first place. thankx to our goveror.
- Tolls are expensive to set up, maintain and are not cost effective. The unmanned collectors are not 100% reliable. I would prefer a higher fuel tax over tolls.
- interstates were made for transportation industry and military. us truckers have already paid time and again for yalls roads we travel on! called ifta for every state we travel in.
- I travel thru this corridor frequently when I am in the Northeast. I use it for convenience to regular delivery locations and because it is NOT a toll road. Needless to say I will avoid it if it becomes a toll road. As a straight truck driver I dont have to pay as high a toll as the tractors but certainly pay a toll that affects load value.
- everyone should know how to use a map
- I wish they would really really fix the roads with the money they will have. If they don't use the money for the project it's not worth it.
- Toll roads are good when you pay them. But how do you know where the money is used? Do not know where the money is going? Nobody knows.
- IF you add a toll it will remain long after the repairs are completed. Any funds generated after the repairs have been completed is either theft or government mismanagement, both of which are unacceptable.
- Road conditions wont improve for truckers while cars are allowed to weave in and out of traffic trying to get to their destinations and are not held responsible for disorderly travel behavior. Trucks should stay left and cars should stay right for easy exit to a cars' destination.
- You need to do this survey at a local Hartford restaurant, early in the morning before everyone tries to beat each other to work

Connecticut I-84 Corridor Congestion Relief Study

Appendix B – Simulation Model Development, Calibration, and Analysis Reports

CAMBRIDGE SYSTEMATICS

I-84 Value Pricing Pilot Program Study

Base Year Simulation Model Development

final

report

prepared for

Connecticut Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

CDM Smith

June 2016

www.camsys.com

final report

I-84 Value Pricing Pilot Program Study

Base Year Simulation Model Development

prepared for

Connecticut Department of Transportation

prepared by

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date

June 2016

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1.0 Introduction

In order to support the I-84 Value Pricing Pilot Program (VPPP) study, Cambridge Systematics was tasked with developing a microscopic simulation model in TransModeler for assessing traffic operations. The study is examining possible tolling strategies along the I-84 corridor in Hartford, and is coordinating with a separate study examining the reconstruction options for the I-84 Viaduct structure in downtown Hartford. The specific area of focus for the viaduct study is between Flatbush Ave (Exit 45) and I-91 interchange in downtown Hartford.

The microsimulation model will be used to assess the operations and impacts on both I-84 and the local streets due to potential changes in traffic patterns related to different tolling strategies along the I-84 Viaduct.

1.1 SIMULATED PROJECT AREA

The purpose of building a microsimulation model was to evaluate the traffic impacts of various pricing and operational improvement alternatives. The microsimulation model was built to include the transportation network which would be potentially impacted by the alternatives, included local detour routes on arterials through Hartford. Regional diversions would be examined by the demand model and forecasting tools developed by CDM Smith. The microsimulation model includes I-84 from Trout Brook Drive (Exit 42) in West Hartford to Middle Turnpike / U.S. 6 / U.S. 44 (Exit 61) in East Hartford. The model also includes portions of I-91 from Brainard Road (Exit 27) to Trumbull Street (Exit 32B). Also included are the connections to I-384, Route 15, and Route 2. The microsimulation model also includes a significant portion of the arterial system in downtown Hartford, an area bounded generally by Prospect Avenue in the west, I-91 in the east, Farmington Avenue in the north, and Park Street in the south. The figure below highlights the roadways in orange which are explicitly simulated in the model.

Figure 1.1 Simulation Model Geographic Limits

Source of Aerial Imagery: Google Maps

2.0 Subarea Model and Demand Development

The following chapter outlines the development of the base year subarea demand model and the development of the OD demands used in the simulation model.

2.1 SUBAREA NETWORK DEVELOPMENT

The network structure used in the development was extracted from the time-of-day Capital Region Council of Government (CRCOG) regional travel demand model, as adjusted and updated by CDM Smith. The updated CRCOG model considers a two hour AM peak period (7 a.m. to 9 a.m.) and a three hour PM peak period (3 p.m. to 6 p.m.).

A subarea highway network covering the microsimulation area of interest was extracted from the CRCOG model and was used as the basis of a subarea TransCAD model. Along with the subarea network extraction, an Origin-Destination matrix for the subarea was also extracted from the updated time-of-day CRCOG model.

Subarea Model Network Detailing

After the network and zone structure was extracted from the updated CRCOG model, a review of the network structure was completed to ensure that the roadway connectivity was properly represented. Where differences were seen against recent aerial photos, the subarea network geometry was adjusted to match the field observed roadway connectivity. Of note, this included the AM period reversible lanes in the downtown area of Hartford being properly coded into the subarea model for the AM peak period.

Within the subarea model, the centroid connectors were reviewed to ensure that zone access is logical when compared to real-world driveway access points or any minor streets that were not included in the CRCOG model. Additionally, some zones from the CRCOG model were disaggregated to allow better distribution of traffic loading onto minor streets. Disaggregation factors were developed based on a visual approximation of the degree of development within the regional zone and all time periods representing the full 24 hour weekday were disaggregated.

Link Parameter Adjustments

The initial estimates of link parameters for free flow link speeds and link capacity were taken from the regional travel demand model. However, as needed throughout the subarea model to better match logical route choice patterns, the observed count data, and the observed congestion levels in existing conditions, the free flow speeds and link capacities were adjusted for the AM and PM peak

periods. This allowed the resulting highway assignment and congested speeds to better match the peak period conditions as seen in the field.

Turn Penalties and Turn Bans

While not part of the original CRCOG model, the detailed nature of the subarea model required additional input regarding turn penalties. For a handful of turns in the subarea where turn prohibitions exist in reality, turn bans were added to a turn penalty file. For the remainder of the turns, global turn penalties were added to the assignment methodology to approximate additional delays for completing a turn at an intersection. All left turns received a 0.2 minute time penalty while all right turns received a 0.1 minute time penalty. These values were developed at as part of the calibration of the existing year subarea model. All U-turns in the subarea were prohibited and through movements were not penalized.

2.2 EXISTING YEAR SUBAREA DEMAND ESTIMATION

Following the creation of the subarea demand model, an iterative multi-class (LOVs, HOVs, & Trucks) ODME procedure was undertaken to refine the existing year AM and PM peak period demands as produced by the updated CRCOG time of day model to better match the AM and PM peak period counts. This procedure is generally known as Origin Destination Matrix Estimation (ODME), and is a mathematical process that is conducted in conjunction with an existing travel demand model. The iterative process makes slight adjustments to the OD tables, assigns flows using the travel demand model and compares them to observed traffic counts. The differences between model and count are then examined, further adjustments are made to the OD tables, and the assignment is repeated. The process continues until the error between the assigned flows and the traffic counts are minimized. The end result is a trip table that matches the overall OD travel patterns estimated in the travel demand model but better matches the observed traffic counts. The key inputs to the ODME process are the regional model (which is used for traffic assignment and for the initial seed trip tables) and the traffic counts.

Traffic Counts

All available turning movement counts (TMCs) and automated traffic recorder counts (ATRs) for the AM and the PM peak periods, 7-9 AM and 3-6 PM, respectively, and were added to the count database. Where the count data did not include a count by vehicle class as needed for the models, factors were developed using observed vehicle class counts from neighboring counts or modeled vehicle mixes from the CRCOG model to split the observed counts into an estimated vehicle class count. This is especially true for the split between Low Occupancy Vehicles (LOVs) and High Occupancy Vehicles (HOVs), as auto occupancy counts were not available.

All counts received were geocoded to the subarea model network, after which the total inflow and outflow volumes for each link attached to the TMC nodes were summed to create the TMC link count sets. These TMC link counts were then

added to a master link count database containing the balanced link counts (from ATRs and permanent count stations).

CS reviewed the flow balance of the counts on the network and ensured that major imbalances between neighboring counts did not exist that could not be explained by driveway or minor street activity, as represented by the zone centroid connectors. Such differences between nearby counts can often be seen when count data is collected over different days and time periods. Some of the counts were slightly adjusted to ensure better flow balancing between counts where mid-block activities could not explain the count difference and significant discrepancies between the counts existed.

Throughout the ODME procedures, minor adjustments were also made to the seed trip table obtained from the regional demand model to better reflect the ramp to ramp OD movements as derived from the Skycomp vehicle tracing observations.

Conduct ODME for AM and PM periods

The multi-class ODME process was conducted using TransCAD version 6.0 on the subarea network for both the AM and PM peak periods. The master set of balanced flow link counts (including in and out flows from TMC counts) were used as the primary input to the ODME process. The individual turning movement data from the TMC counts was also included in the ODME process, but were used to guide and inform the travel patterns in the ODME process. The final adjustment and validation of the ODME adjustments were done using only link counts.

During the ODME process, the seed subarea trip tables as extracted from the regional model were adjusted to correct for some zonal pairs with zero assigned flows. These adjustments helped the ODME process to better match the observed counts for some minor approaches into the count locations.

2.3 OD VALIDATION CRITERIA

Link Volumes

Following the AM and PM peak period subarea ODs adjustments, the resulting TransCAD subarea highway assignment link volumes were validated against the total peak period volume counts in the simulation subarea. 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 calculated using the following formulation:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

where: M = Modeled volume
C = Count volume

Tables 2.1 and 2.2 indicate the distribution of GEH statistics for the AM and PM peak periods. The criteria of at least 85% of counts with a GEH of 5.0 or less was met for both peak periods. GEH stats presented in the table below are for the matching the TransModeler model.

Table 2.1 OD Validation GEH Statistics for the AM Peak Period

Number of Counts	Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	Validation Criteria Threshold and Result
521	GEH <= 1	184	35.3%	N/A
521	GEH <= 3	371	71.2%	N/A
521	**GEH <= 5**	**459**	**88.1%**	**> 85% (met)**
521	GEH <= 7	485	93.1%	N/A

Table 2.2 OD Validation GEH Statistics for the PM Peak Period

Number of Counts	Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	Validation Criteria Threshold and Result
521	GEH <= 1	192	36.9%	N/A
521	GEH <= 3	387	74.3%	N/A
521	**GEH <= 5**	**464**	**89.1%**	**> 85% (met)**
521	GEH <= 7	483	92.7%	N/A

Trip Length Distribution Coincidence Ratios

In addition to the validation of the resulting highway flows against counts, an additional way of checking to make sure the ODME process does not significantly change the trip distribution patterns is to compare trip length frequencies before and after the ODME process and compute the coincidence ratio. This ratio measure essentially compares the frequency distributions, and is most easily understood as the area under two curves divided by the area under one of the curves. Figures 2.1 through 2.4 illustrate the trip length distributions for autos (combined LOVs and HOVs) and truck trips respectively for the AM and PM peak periods for the seed and ODME adjusted trip tables, along with the resulting coincidence ratio between the distributions. Although there are no established standards for this measure, the coincidence ratios in all cases are near 80 percent or above, indicating a high level of coincidence and a limited change in the overall trip making patterns through the ODME process.

Figure 2.1: AM Auto Trip Length Distribution

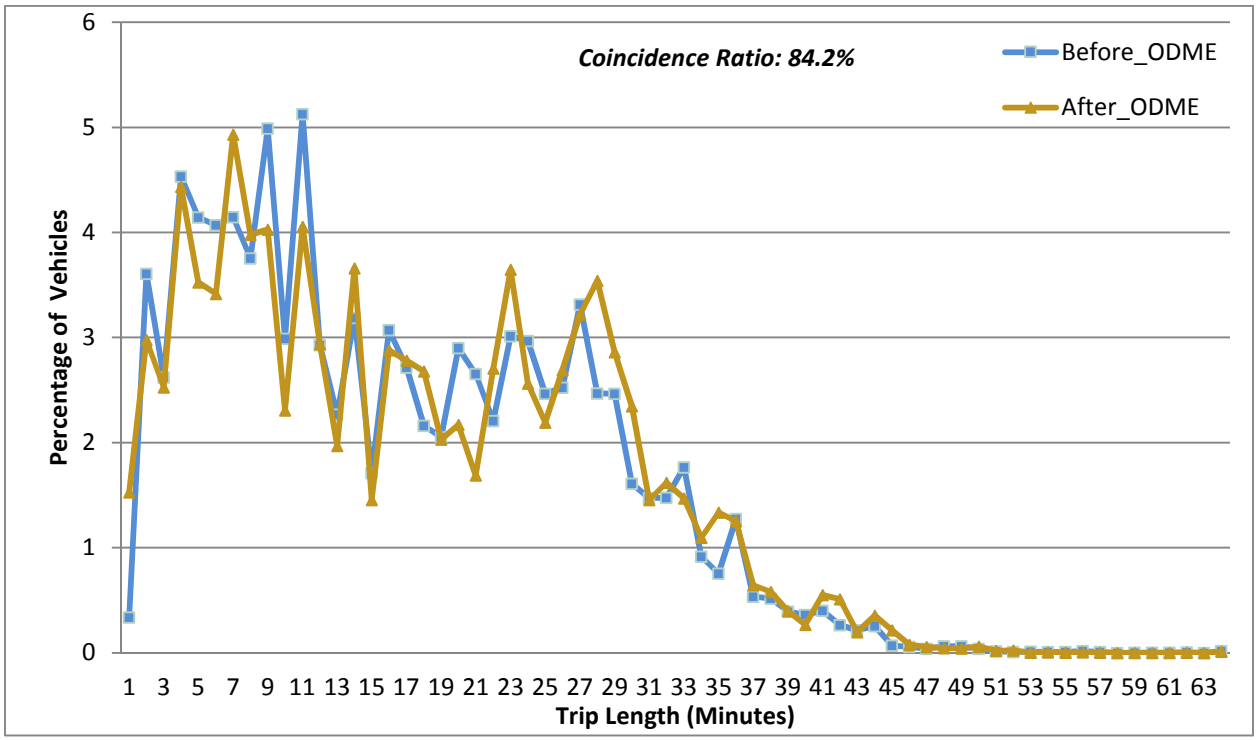


Figure 2.2: AM Truck Trip Length Distribution

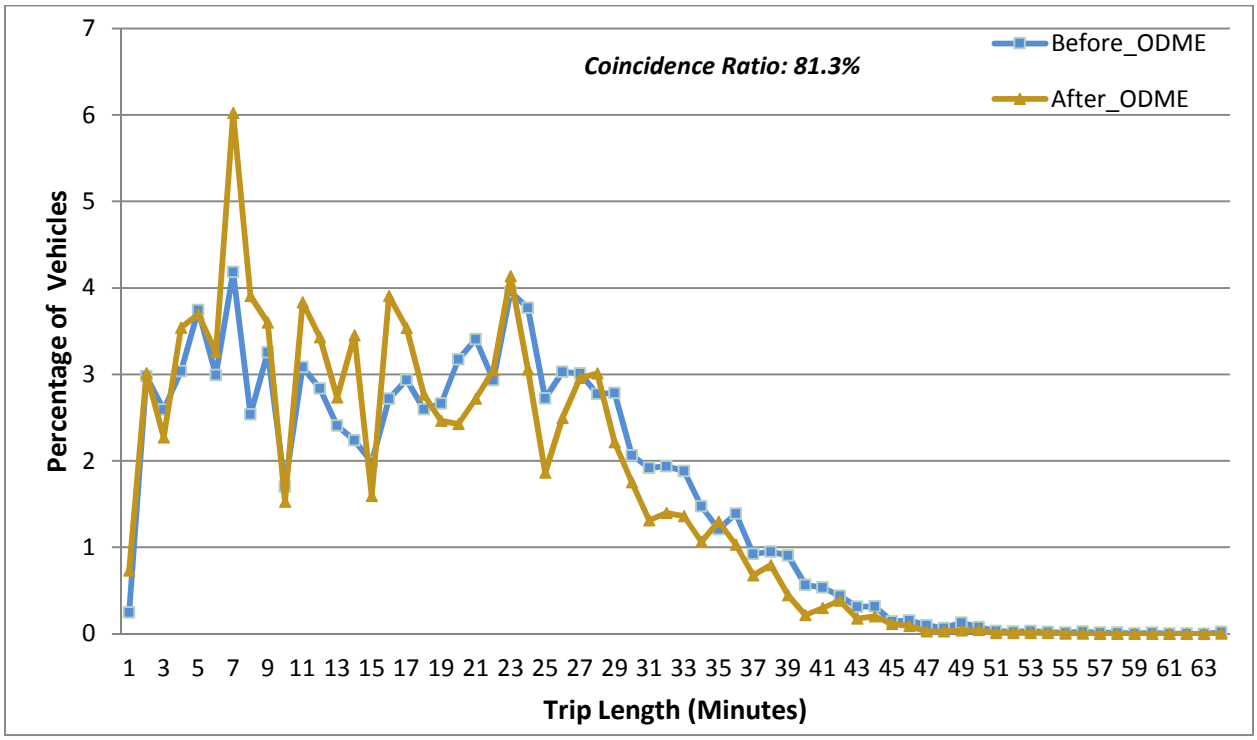


Figure 2.3: PM Auto Trip Length Distribution

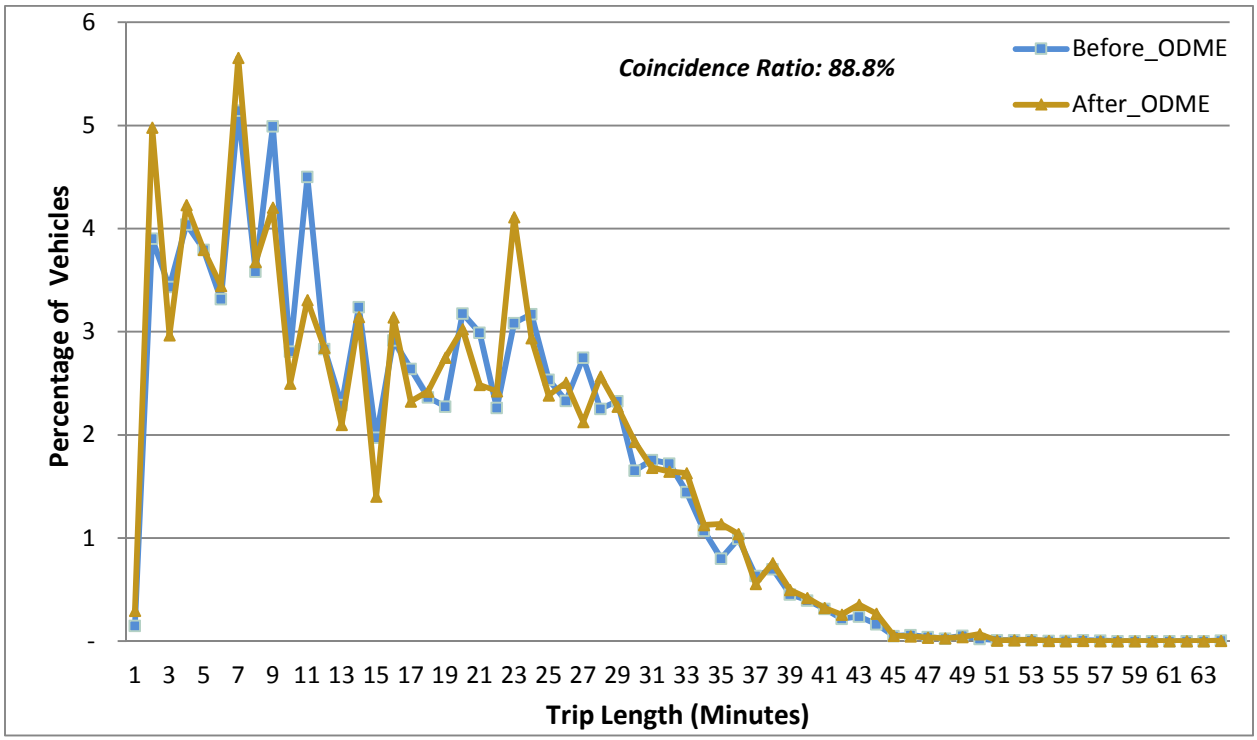
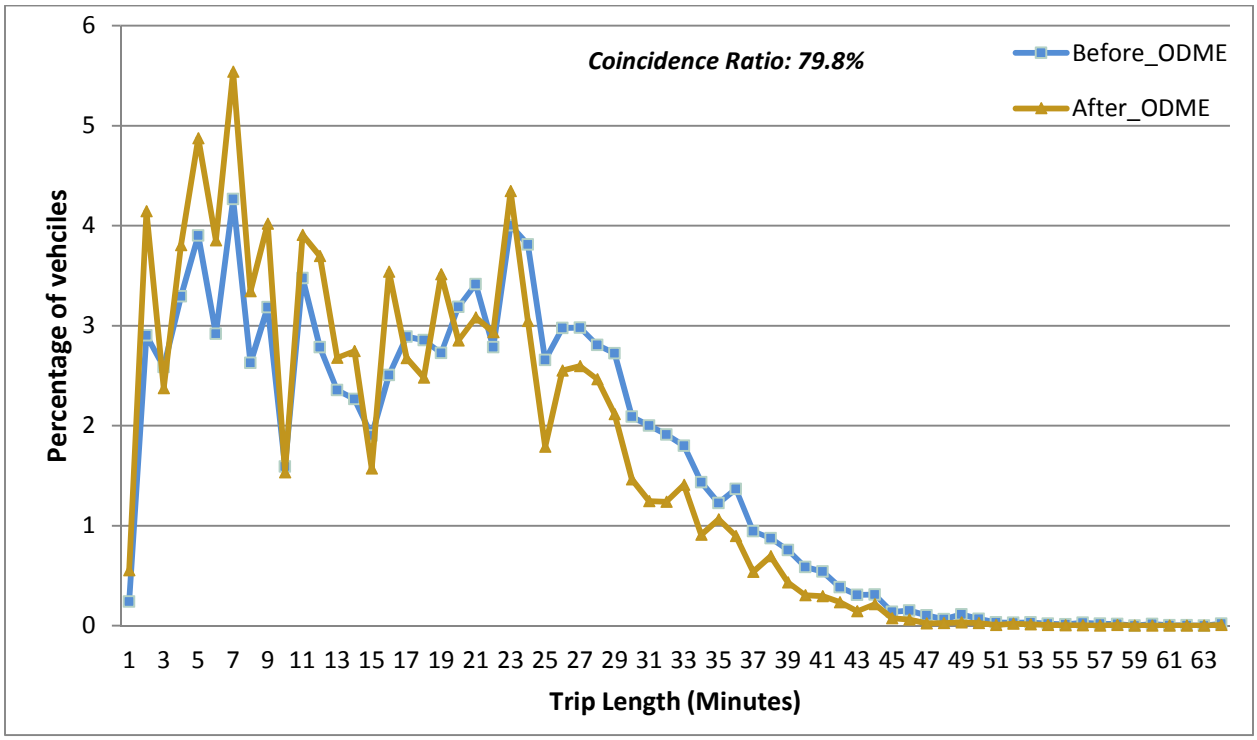


Figure 2.4: PM Truck Trip Length Distribution



2.4 FURTHER REFINEMENT OF OD FOR MICROSIMULATION

Following the adjustments of the ODs to better match the peak period observed counts, two additional steps were done to disaggregate the AM and PM demands to better serve microsimulation analysis.

Truck Classes

After the ODME process the trip tables the truck vehicle class was further split into heavy (e.g. 48 or 53 foot tractor trailers) and medium truck vehicle classes (single unit box trucks) for improved microsimulation of truck movements. The initial split of trucks into medium and heavy classes was based on the truck classification counts available. As truck classification counts were only available on interstates and are not predictive of the truck mix on local arterials, a separate factor was developed for through trucks and local trucks. Through trucks are defined within the subarea as trucks with either an interstate or state highway as both the origin and destination zones of the trip, while local trucks are defined as having a local zone or subarea cordon arterial roadway as either the origin or destination of the trip. While no specific truck classification data was available for local oriented trips, it was assumed that 5% of internal zone truck trips would be heavy trucks. Table 2.3 summarizes the disaggregation of truck trips into medium and heavy truck classes.

Table 2.3: Disaggregation of Trucks to Medium and Heavy Classes

Time Period	Trip Type	Medium Trucks	Heavy Trucks
AM	Through Trucks	54%	46%
AM	Local Trucks	95%	5%
PM	Through Trucks	47%	53%
PM	Local Trucks	95%	5%

Temporal Distribution within Peak Periods

The final adjusted AM and PM peak period trip tables were finally split into 15 minute trip tables using factors based on the temporal profiles of available counts in order to produce final trip tables to be used in the microsimulation model. The temporal distribution of demand across the peak period is necessary to ensure that the peaking nature of demand is simulated appropriately. In order to differentiate between the different observed temporal profiles for traffic on the interstates versus traffic on the arterials, different temporal profiles were depending on the type of trip. Specifically four temporal profiles patterns were developed and applied to external to external, internal to internal, external to internal, and internal to external trips. The developed patterns were originally developed from count data, but were manually refined to better match congestion and queuing seen during the peak periods.

3.0 Base Year Microsimulation Model Development

This chapter discusses the processes of the development and calibration of the TransModeler microsimulation model. The model was developed to assess a detailed operations assessment of the study area under varying future year geometric and tolling conditions.

3.1 NETWORK DEVELOPMENT

The initial step in developing a microsimulation model is to ensure that it accurately represents the infrastructure. This includes developing the simulation network to match existing conditions in terms of number of lanes and geometric details, signal infrastructure, parking regulations, and typical free flow travel speeds. The subarea network initially developed for development of demand was used as a base for the microsimulation base model. The TransCAD subarea network was imported into a TransModeler microsimulation network using internal procedures of TransModeler. TransModeler version 3.0 r2 Build 4200, 64-bit was used for this study.

Details regarding the exact lane configurations for freeway ramp and intersection turning lanes, peak period parking regulations, and posted speed limits were coded into in the simulation model based on a combined review of available aerial orthophotography, the Skycomp aerial surveillance imagery, available online ground level photos (e.g. Google StreetView), and field observations. This include detailed coding of the reversible lane details in Downtown Hartford.

Intersection Controls

As the subarea demand model does not contain any intersection controls, stop signs, yield signs, and traffic signals controls had to be added to the microsimulation network. Unsignalized control were added based on aerial photos, ground photos, and field observations. Signalized controls were added according to the actual controller data as collected from the operating agencies. Full signal controls, including any actuation and detectors details, coordination information, and pedestrian phases were included in the simulation model.

Many of the signals in the model are controlled in real-time from a computerized signal control system operated by the City of Hartford. Under the computer control system, timings and coordination can be varied in real time based on detected field conditions. The development team visited the city's Traffic Operations department to review the system and gather details on the input parameters to the system and the default operating conditions.

However, as this level of signal control was not able to be included in the simulation model, the signal controllers in the model were coded to represent these typical default conditions. However, during the model calibration, it became evident that the signal operating in the field sometimes deviated from these typical conditions, and timing splits for some phases were consistently either longer or shorter than the input parameters would provide. For these locations were discrepancies were observed, the simulated controller parameters were adjusted to represent the actual green times which were observed in the Skycomp aerial surveillance imagery and in field observations.

3.2 CALIBRATION AND VALIDATION PROCESS

Before the microscopic models can be used to evaluate the future traffic operations, the models needed to be adjusted to ensure that they represent observed traffic conditions in the study area. The process is collectively referred to as calibration and validation. The procedure entails the adjustment of network attributes and model parameters in order to replicate a certain set of observed conditions.

Calibration Process

During the calibration stage of the microsimulation model, adjustments of the local network attributes, coefficients, and parameters were made to replicate the observed conditions. The overall goal for the calibration is for simulation conditions to match observed network capacities and route choice patterns as evident from the observed volume and operating conditions. The calibration process is iterative in nature and often requires that parameters are adjusted and the steps repeated. Throughout the process, the initial subarea network and ODME-produced demand tables underwent alterations and refinements to better match observed real world conditions. The parameters which were considered for calibration include local parameters for mandatory lane change (critical distance) parameter and lane connectivity parameters.

DTA Methodology

One of the major objectives of the simulation analysis was to study the operations impact of various tolling and traffic mitigation strategies on the transportation network. Under I-84 tolling scenarios, it is expected that there will be changes in travel patterns as some of the traffic from I-84 would reroute to arterial streets or shift the freeway ingress/egress location to avoid locations where tolls would be paid. To assess the changes in travel patterns under future forecasted conditions, the microscopic model was developed to use the Dynamic Traffic Assignment (DTA) functionality in TransModeler. A DTA model takes into account both spatial and temporal effects of congestion in order to determine route choice. More specifically as applied in this simulation model, a time-dependent dynamic user equilibrium (DUE) approach was implemented in the simulation model.

Route Choice Calibration

It is important to simulate how travelers make their decisions to select their route across many alternative paths with varying levels of congestion, travel times and delays. The TransModeler routing algorithm seeks a minimum congested travel time for each simulated trip given the congested travel times at the time of the trip. Stochasticity is applied to help distribute drivers along multiple paths that are equal or nearly equal in travel time in the simulation model to reflect personal variations in route choice selection.

Route choice calibration was conducted in the microsimulation model by studying the simulated paths for certain OD pairs and comparing them with the local knowledge of travel patterns in the area and with observed turning volumes. Adjustments were made to free flow travel times on TransModeler network to help influence route choice behaviors as simulated in the model. Whenever necessary, adjustments were done to the subarea demand network attributes and zone connectivity and the resulting ODME process to influence route choice in the TransModeler simulation model.

As there are no direct observed measurements of route choice available to compare against simulated route choice, no direct validation of route choice can be performed. However, as the simulated route choice is a critical component in how vehicles flow through the network and experience congestion, it can be assessed by the overall fit of the model results to those metrics (speed, volume, queues) that were observed.

Throughout the calibration process, the overall simulated results were compared to the observed conditions and the overall model estimates of system performance (e.g., simulated volumes, congested speeds, and queues) were compared to the field observations. Depending on the results, adjustments were made to the simulation model parameters. Throughout the calibration, roadway speed limits were adjusted to not only reflect posted speed limits but the free flow speed limit and perceived attractiveness (a perceived higher speed equals a shorter travel time) of using the roadway for route choice. Finally, in selected locations where programmed signal timing plans were insufficiently providing capacity for the simulated demands, minor adjustments to the timing plans were made to better reflect observed intersection throughput and field observations of phase green times.

3.3 MICROSCOPIC CALIBRATION RESULTS

Observed data was collected and compared to for three performance measures – volumes, congested travel speeds, and queues. Each of these measures was used during calibration to various degrees. Volume was calibrated both in ODME and in the TransModeler microsimulation, with the same criteria being established for both procedures. GEH statistics were calculated for volumes for each hour for each individual link in the model where base year traffic counts are available, and the percentage of all links meeting the criteria is then calculated as measure of the overall "fitness" of the model. Screenline volumes were also compared where

available to help ensure the validation of the micromodel as compared to the regional travel demand model patterns. Congested travel speeds and queues were validated using qualitative assessments.

The general rule in simulation model applications is that as the model coverage increases, the model validation precision decreases. Furthermore, it is assumed that links with higher hourly volumes will have less day-to-day percent variability in traffic volume, and therefore, expected variation should be lower. Similarly, as the average link volumes decrease, it is assumed that there is higher variability in observed counts; therefore, the expected variation should be higher.

The calibration and validation process was an iterative cycle of simulating the model, testing simulated results for reasonableness and against validation criteria, revising the network, demand, route choice, and scenario parameters, and then rerunning the models. Sometimes unanticipated intermediate results required going back to previously tested model parameters when the selected changes did not have the desired impacts. The validation process was completed when consensus was reached that the base-year networks reflected expected conditions and the validation statistics were sufficiently close to the validation targets and no better fit could be achieved. The following sections present the validation results for the final AM and PM period models.

Volume Validation

The GEH statistics for average flow rates were calculated comparing the modeled hourly flows to the observed count data, and are reporting in Table 3.1 through Table 3.4 for the Freeway and Arterial road classes for the AM and PM peak periods in the final base year simulation model. The established target for the volume calibration was to have eighty-five percent (85%) of links with a GEH value of five (5) or lower.

Table 3.1: AM Peak Period Freeway Volume Validation Results

Number of Freeway & Ramp Count Locations	Criteria	7 - 8 AM		8 - 9 AM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
158	GEH <= 5	120	76%	111	70%
	GEH <= 6	132	84%	119	75%
	GEH <= 7	136	86%	130	82%
	GEH <= 8	139	88%	134	85%
	GEH <= 9	142	90%	141	89%
	GEH <= 10	147	93%	147	93%

Table 3.2: AM Peak Period Arterial Volume Validation Results

Number of Arterial Count Locations	Criteria	7 - 8 AM		8 - 9 AM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
343	GEH <= 5	187	55%	185	54%
	GEH <= 6	221	64%	209	61%
	GEH <= 7	239	70%	225	66%
	GEH <= 8	253	74%	245	71%
	GEH <= 9	263	77%	260	76%
	GEH <= 10	277	81%	276	80%

Table 3.3: PM Peak Period Freeway Volume Validation Results

Number of Freeway & Ramp Count Locations	Criteria	3 - 4 PM		4 - 5 PM		5 - 6 PM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
158	GEH <= 5	106	67%	112	71%	111	70%
	GEH <= 6	120	76%	122	77%	124	78%
	GEH <= 7	126	80%	130	82%	132	84%
	GEH <= 8	126	80%	130	82%	132	84%
	GEH <= 9	140	89%	140	89%	145	92%
	GEH <= 10	147	93%	146	92%	147	93%

Table 3.4: PM Peak Period Arterial Volume Validation Results

Number of Arterial Count Locations	Criteria	3 - 4 PM		4 - 5 PM		5 - 6 PM	
		# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria	# of Locations Satisfying Criteria	% of Locations Satisfying Criteria
333	GEH <= 5	189	57%	190	57%	158	47%
	GEH <= 6	221	66%	205	62%	177	53%
	GEH <= 7	242	73%	227	68%	201	60%
	GEH <= 8	257	77%	245	74%	218	65%
	GEH <= 9	266	80%	259	78%	233	70%
	GEH <= 10	284	85%	268	80%	251	75%

It is noted that while the validation targets were met for the ODME calibration, the microscopic model's volume validation are below the targets. There are several reasons that the validation targets for the mesoscopic model were below the ODME results. Foremost amongst these differences is the differences in the vehicle assignment methodologies. The microscopic model is a dynamic route choice model that considers varying travel time conditions throughout the simulated peak period, and the ODME macroscopic model is a static route choice model that routes vehicles against only the average conditions during the peak period. An additional difference between the assignment methodologies is in the number of paths used. In the ODME model, a single path is chosen for all vehicles traveling between each OD pair, while in the microscopic model vehicles are routed to a variety of routes with similar generalized route travel time costs. This is a more realistic assessment of the driver's route choice behavior in the real world, in that not all vehicles choose the same idealized shortest travel time/cost path. However, this also distributes the traffic across more paths and links than in the ODME model, which contributes to different volume validation numbers as compared to the ODME validation results. The ideal solution to avoid these differences would be to perform a dynamic ODME, where the OD adjustments are based on a dynamic assignment model instead of a static one. However, dynamic ODME is still an active focus of research and to date no reasonable solutions or algorithms are available to implement such a process and static ODME methods are still the most reasonable way to calibrate demands. As discussed in the previous sections, efforts were undertaken to incorporate the findings from the simulation model to influence the static routing used in the ODME subarea model to improve the overall fit of the final simulation results.

Another key set of differences is in the underlying differences between the vehicle flow models. The ODME macro model is an aggregate peak period model and does not consider the impacts of the time required for vehicles to traverse the network, queue spillback blockage delays, or other detailed operational delays at signals, turning delays, weaving sections, or other capacity constrained areas of the model. The microscopic model of course does consider these effects, which is why the model is a much better analysis platform for assessing operational

impacts. However, these additional delays and queuing concerns, combined with the temporal impacts of vehicles traversing the network over a period of time complicate the calibration of the mesoscopic model and result in lower validation numbers when compared to the ODME validation results.

Finally, the calibration of the microscopic model is not only a volume based validation, but also considers travel time and speed validation parameters. In order to properly calibrate the travel time and speed components (and the bottlenecks that cause these effects), the calibration of the microscopic model is often a balancing act between meeting the volume targets and the non-volume targets. This is yet another reason why the microsimulation validation targets are lower than the ODME validation results and lower than preferred.

Speed Contours

INRIX data of congested speeds for TMC links were available for the 2012 calendar year throughout the study area. While INRIX data was available for both freeways and major arterials, the large size of the TMC links, the uncertainty regarding directionality of the TMC link data, and the high variability in the data on the arterials precluded the use of the INRIX speed data for simulation calibration of the arterial operations. The remaining INRIX speed data for I-84 TMC links was processed to represent typical weekdays by selecting data from all Tuesdays, Wednesdays, or Thursdays. High or low demand seasonal months and holidays or days adjacent to major holidays were excluded from the data set, along with any days with recorded high rainfall or snow events. Finally, while detailed accident records were not available, extremely high or low speed hourly or daily outliers from the remaining dataset were removed under the assumption that they were impacted by incidents, accidents, or other undeterminable conditions. Finally, the TMC links were coded as point sensors at the middle of the TMC links in the simulation model to allow for a comparison of the simulation speeds to the observed INRIX speed data.

Figures 3.1 through 3.4 show the comparisons of the observed INRIX speed data and the simulation speed data throughout the AM and PM peak periods for eastbound and westbound direction along I-84.

Figure 3.1: Speed Profiles I-84 WB (AM)

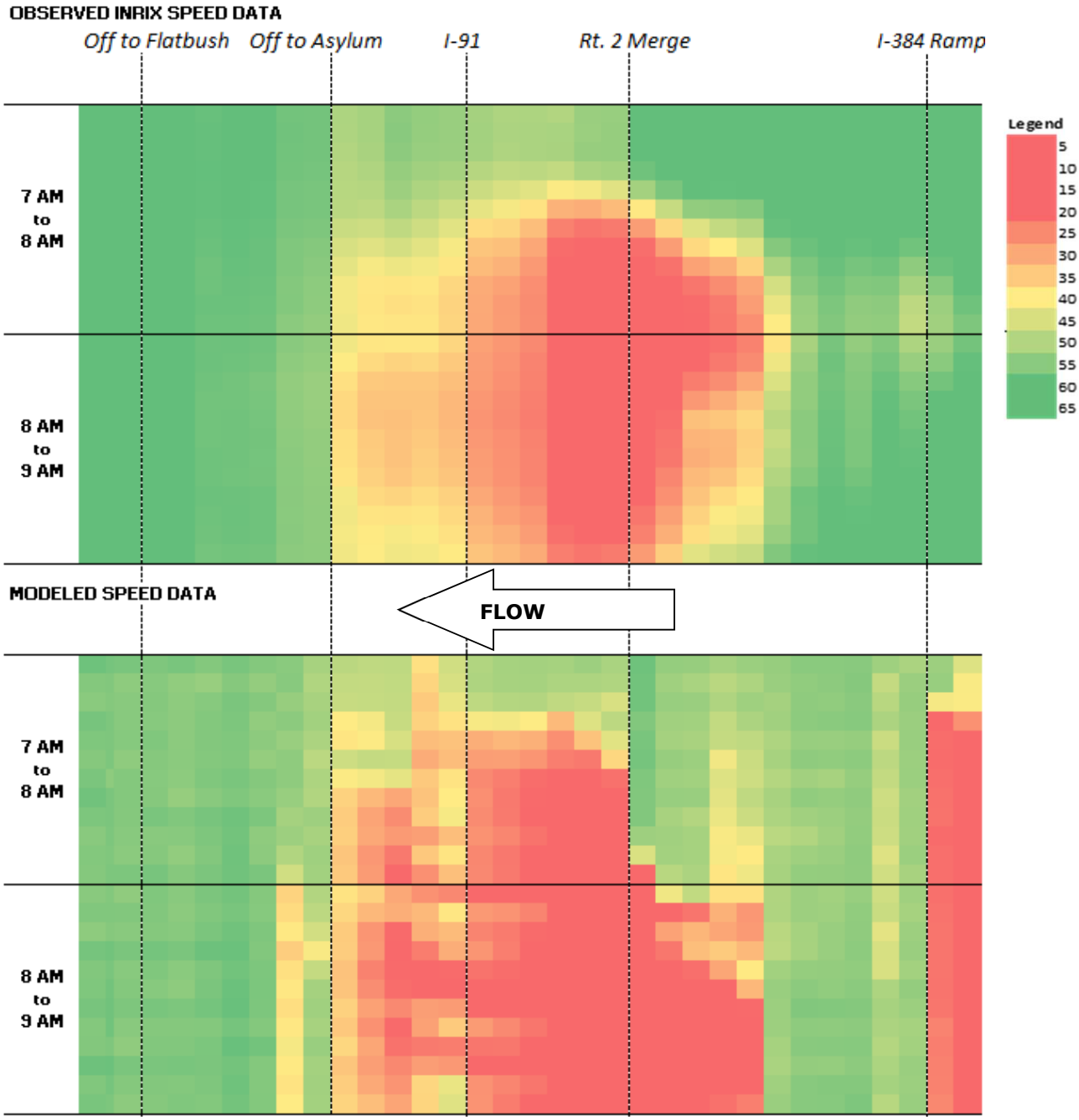
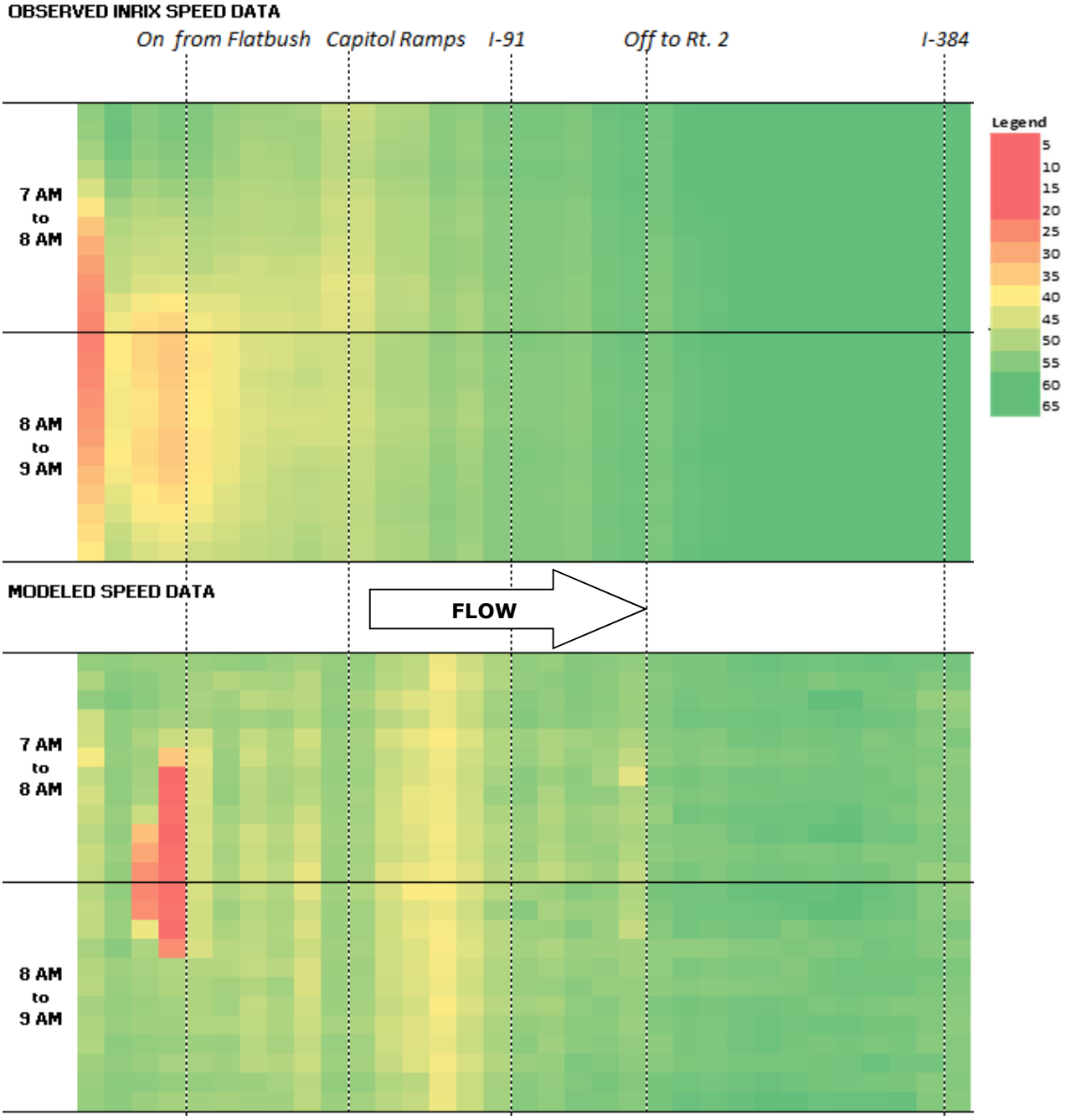


Figure 3.2: Speed Profiles I-84 EB (AM)



I-84 has many congested sections under existing conditions through downtown Hartford. This section of I-84 has many closely spaced interchanges that create weaving conflicts between traffic entering and exiting the freeway. This section of I-84 has substandard shoulder widths with an undesirable horizontal alignment. Within this section of I-84 there are some left side exit and entrance ramps. On I-84 through downtown Hartford the horizontal and vertical sight distances are insufficient due to the tunnel and the viaduct. These design deficiencies of I-84 combined with high demands lead to congestion slowdowns and frequent accidents.[1]

During the AM peak period, the I-84 westbound direction is the peak direction of traffic demand. As observed in the INRIX speed contours in Figure 3.1, significant congestion is seen to the east of the Asylum Street off ramp (exit 48). Just upstream of the Asylum Street off ramp, a weaving section is formed with the nearby High Street on ramp. The Asylum Street off ramp in the westbound direction combined with the proximity of the traffic signal at Asylum Avenue and Farmington Avenue coupled with complex nature off the intersection which demands quick lane changes create traffic slowdown and queues on the off ramp. On many occasions during the AM peak period, the congestion on the off ramp leads to standing queues which spills back on to the freeway mainline. When this off ramp failure occurs, the weaving section between High Street and Asylum Street sees delays increase enormously due to breakdown of the operations of the weaving section, and this can cause a cascading effect on the congestion on I-84. To the east of this weaving section there are number of on and off ramps with inadequate acceleration/deceleration lanes, along with the horizontal and vertical sight distances issues with the tunnel. During the AM peak period, the demand on I-84 and its ramps are very high. This combination of high demands and the inadequate design of I-84 leads to congestion and slow travel speeds on I-84 which extend back and beyond the Route 2 interchange.

In the AM peak period, the eastbound direction of I-84 is, for the most part, uncongested due to the lower demand. Some slowdown is observed west of Flatbush Avenue due to the friction in traffic stream flow on I-84 with vehicles getting on at the Flatbush on ramp Figure 3.2.

The calibrated simulation model well reproduces the location and the severity of congestion on I-84 as seen in Figure 3.1 and 3.2

[1] http://www.i84hartford.com

Figure 3.3: Speed Profiles I-84 WB (PM)

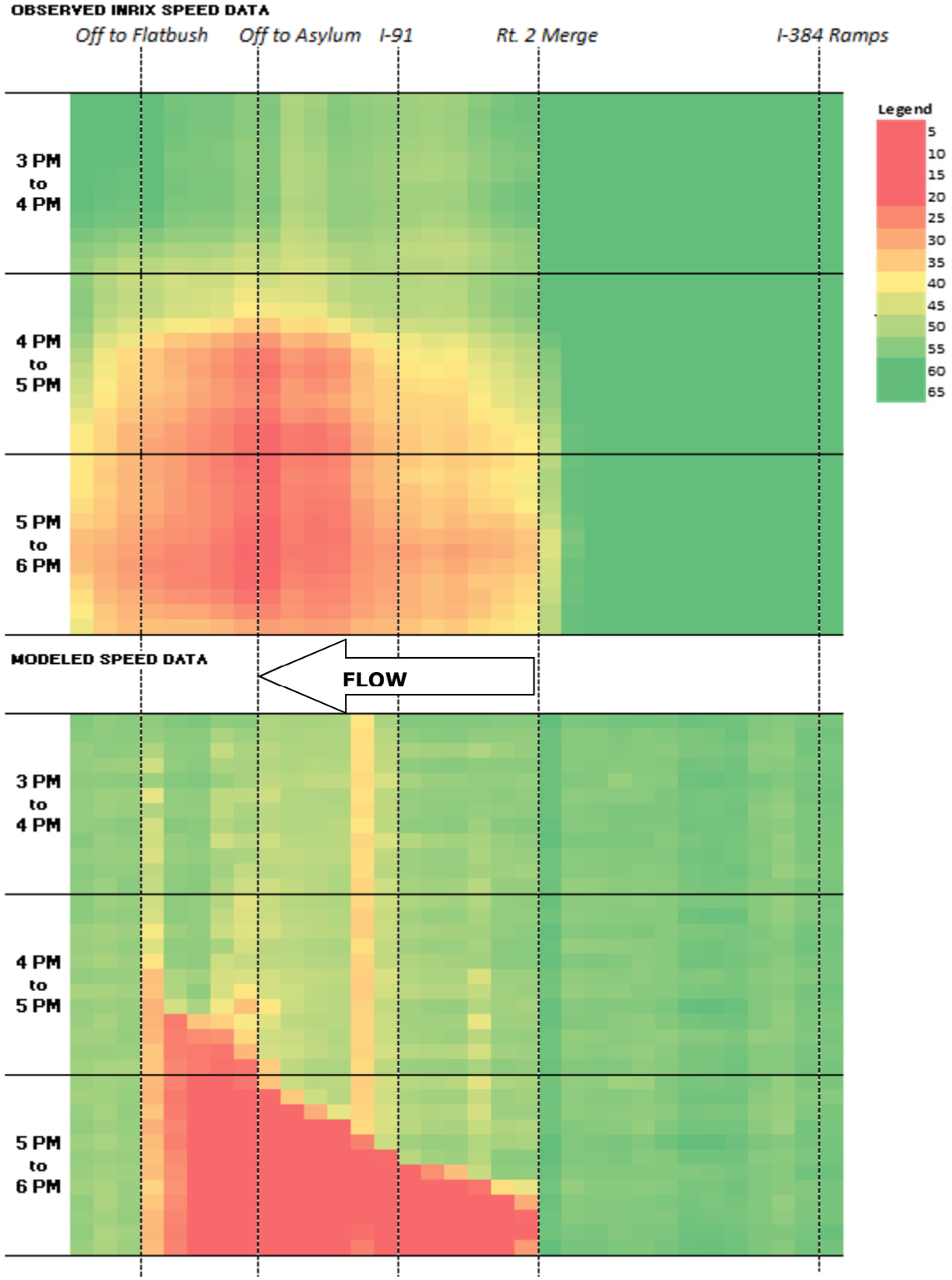
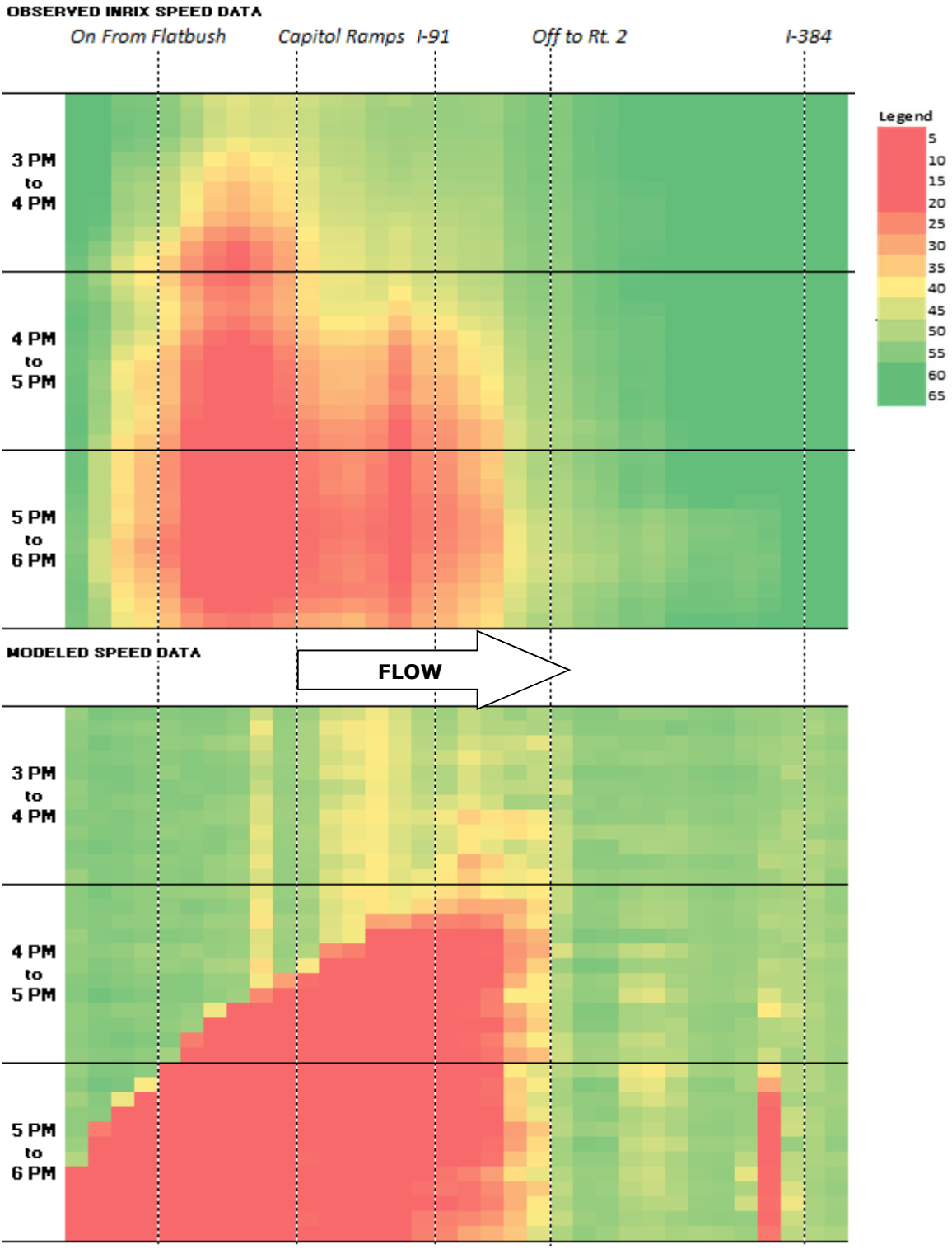


Figure 3.4: Speed Profiles I-84 EB (PM)



During the PM peak period, in the westbound direction the nature of the demand is different than the AM peak period. In the AM peak period, vehicles access the off ramps to Sigourney Street, Asylum Avenue, and Main Street to travel to the business district in the downtown Hartford area. In the PM peak period the demand patterns are different with reduced demands for these off ramps and increases in the demand for the left side Flatbush Avenue off ramp (Exit 45) further west of the downtown area. Due to the nature of the left hand exit and the friction with vehicles entering from the Sisson Avenue on ramp, significant slowdown of traffic is observed approaching the Flatbush Avenue off ramp. While the temporal nature of the simulated congestion patterns do not fully capture the observed congestion (Figure 3.3), the major bottleneck location at the Flatbush Avenue off ramp is well captured in the calibrated simulation.

During the PM period, the eastbound direction is the peak demand direction where the demand of vehicles depart the downtown Hartford area to destinations east of the Connecticut River are high. The Bulkeley Bridge (I-84) and Founders Bridge (Route 2) are the two local options for vehicles to cross the Connecticut River from the downtown area. The capacity over these bridges act as the limiting factor for vehicles wanting to cross the river during the PM peak period. In addition to the limited capacity over the Bulkeley Bridge, the reduced sight distances in the tunnel and design deficiencies of I-84 contribute to significant congestion on I-84 in the eastbound direction during the PM peak period. The calibrated simulation model reproduces the congestion and slowdown on the Bulkeley Bridge on I-84 in the eastbound direction, as shown in Figure 3.4. The secondary bottleneck seen between Sigourney Street and Capital Avenue, however, is not as well captured in the simulation model.

Queue Lengths and Areas of Congestion

The model results were checked to observe areas of queues and areas of high flow densities as simulated in the model, both on the freeways and the arterials. These congestion areas were qualitatively reviewed and validated against the Skycomp aerial photo survey imagery and summary report. The results of these modeler's audits found that simulation results accurately represent the congested locations known to exist in typical weekday peak period conditions.

4.0 Calibration Summary

The purpose of the simulation model development was to develop a tool in which to estimate the impacts on the operations of both I-84 and the downtown Hartford arterial network under possible tolling strategies along I-84 in the downtown Hartford. Though the volume validation targets below established targets for the microsimulation model due to the reasons discussed in this report, the model does a good job of simulating the congestion patterns in the study area. The model replicates the location and intensity of congestion at the major bottleneck locations along I-84, and locations of congestion on the arterial street grid. The model was found to be adequately capable of representing the base conditions and fit to be applied for future year alternative analysis to assess the impact to I-84 and the local network under various I-84 tolling alternatives in Hartford.

CAMBRIDGE SYSTEMATICS

I-84 Value Pricing Pilot Program Study

Future Year Simulation Report

final

report

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date

June 2016

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1.0 Introduction

As a part of the I-84 value pricing pilot program study, Cambridge Systematics was scoped to perform traffic operational analysis and to assess the impacts of various tolling scenarios on both I-84 and the downtown transportation network. The traffic operations analyses were conducted by developing detailed Dynamic Traffic Assignment (DTA) models of I-84 and the downtown Hartford area using the TransModeler microsimulation software.

The purpose of building a microsimulation model was to evaluate the traffic impacts of various pricing and operational improvement alternatives. The microsimulation model includes I-84 from Trout Brook Drive (Exit 42) in West Hartford to Middle Turnpike / U.S. 6 / U.S. 44 (Exit 61) in East Hartford. The model also includes portions of I-91 from Brainard Road (Exit 27) to Trumbull Street (Exit 32B). Also included are the connections to I-384, Route 15, and Route 2. The microsimulation model also includes a significant portion of the arterial system in downtown Hartford, an area bounded generally by Prospect Avenue in the west, I-91 in the east, Farmington Avenue in the north, and Park Street in the south. The figure below highlights the roadways in orange which are explicitly simulated in the model.

Figure 1.1 Simulation Study Area

Source of Aerial Imagery: Google Maps

The operations analyses started with the development of 2012 base year microsimulation models for the AM peak (7 to 9 AM) and PM peak (3-6 PM) peak periods. These models were calibrated to observed traffic counts, speeds and typical weekday congestion conditions. The development and calibration of the base year simulation models are detailed in a separate report entitled *I-84 Value*

Pricing Pilot Program Study: Base Year Simulation Model Development. After the development of base year simulation models, future year simulation models were developed to analyze the impacts of various alternatives which included proposed design improvements, growth, and tolling scenarios. This report presents the development of those future year condition simulation models and the findings for the studied alternatives. Specifically, this report summarizes the following future year condition models and analyses for:

- Future conditions without tolling improvement scenarios, including 2040 No Build, 2040 Build Alternative 6A, 2012 (no growth) No Build, and 2012 Alternative 6A scenarios
- Future conditions with tolling, including 2012 Point Toll and 2012 Split Toll scenarios.

2.0 2040 No Build Scenario

The 2040 No Build models were developed to assess the impact of 28 years of growth in traffic demand in the Hartford area transportation network assuming only committed and funded transportation projects. The future year committed transportation projects which could have an impact on traffic operations within the project area were identified and included in the 2040 year modeled no build network. The 2040 No Build scenario was developed to serve as reference to compare the impacts of the other future year alternative scenarios. The 2040 No Build scenario networks were created by incorporating the future committed transportation projects in the base year model networks.

2.1 NO BUILD IMPROVEMENT PROJECTS

In order to determine the committed improvement projects that should be included in the No Build subarea models, the following sources of information were reviewed:

- Capital Region Transportation Plan (CRCOG, 2011),
- Ozone Air Quality Conformity Determination of 2011 RTP and FY 2010-2013 TIP (CTDOT, 2011), and
- Downtown Hartford Transit Circulation and Through Routing Study (CRCOG 2013).

Following conversations with CTDOT regarding the projects discussed in these documents, additional local projects which were not included in the above documents but will be implemented within the 2040 timeframe were identified and included. The following lists the projects and the detailed changes that were incorporated in the No Build network:

1. The directionality of Union Place was reversed from existing condition to operate in southbound direction only.
2. The directionality of High Street was reversed from the existing conditions between Church Street and Asylum Street. Under No Build conditions, High Street operates in northbound direction only.
3. Several lane arrangement changes were made on Asylum Street, under the railroad overpass. As shown in Figure 2.1, changes include (i) the addition of a second westbound through lane on Asylum Street at the intersection of Asylum Street and Spruce Street, (ii) a change in lane configuration on eastbound and westbound Asylum Street at the intersection of Asylum Street and Spruce Street, and (iii) a reduction of one eastbound lane on Asylum Street at the intersection of Asylum Street and Union Place.

Figure 2.1 Asylum Avenue Lane Arrangement

Source: TranSystems Corporation

4. Reconstruction of the existing intersection of Park Terrace at Russ Street as a one lane roundabout.
5. Reconstruction of the Charter Oak Landing Bridge, including (i) the addition of a lane on I-91 NB before and after the I-91 and CT-15 interchange, (ii) a new left side two lane ramp from I-91 NB to CT-15 to replace the existing one lane ramp, and (iii) the relocation of the ramp connecting I-91 SB to Route 15 SB.

Though CTfastrak bus rapid transit system was not explicitly modeled within the microsimulation model, the opening of CTfastrak was included in the future year regional CRCOG travel demand model, which modeled the reduction in demand for autos and change in travel patterns due to potential mode shifts for drivers to CTfastrak. The operational impacts of CTfastrak on the downtown traffic was studied by virtue of the associated reduction in auto trips.

2.2 DEVELOPMENT OF 2040 NO BUILD DEMANDS

The first step of the future year subarea demand development included extracting subarea demands from the future year (2040) CRCOG time of day travel forecasting model developed by CDM Smith for the I-84 Value Pricing Pilot Program Study. This allows for the regional impacts and growth forecasts from the future year committed projects and forecasted growth conditions. Notably this includes forecasting the mode shifts and travel pattern changes from the opening of CTfastrak.

During the process of development of base year traffic demands, some zones in the subarea network were disaggregated to better allow distribution of traffic loading onto minor streets in the vicinity of count locations and to better match real world driveway access points. As with the base year demand ODs, the future

year (2040) CRCOG subarea demands were disaggregated to the new zone system. Without any additional information regarding changes in land use or indication that land use development density would significantly change within these zones, the same disaggregation factors were used for the future year demands as for the base year model.

In order to incorporate the improvements made during the ODME process for the base year demands for the AM and PM peak periods, the future year subarea demand was developed using a doubly constrained growth factor model in TransCAD to grow the base year OD trip tables. The doubly constrained growth factor model (also known as Fratar Balancing) applies the growth factors in such a way that the resulting origin destination matrix conforms to both forecasted zonal productions and attractions. The growth factors for total zonal productions and attractions were developed by multiplying the base year OD table marginals (origin and destination trip totals for each zone) by the ratio of the marginals of the future year disaggregated CRCOG OD table to the marginals of the base year disaggregated CRCOG OD table (see the following equations).

$$Productions_{z,v} = BaseODME\ Prod_{z,v} \times \frac{FutureCRCOG\ Prod_{z,v}}{BaseCRCOG\ Prod_{z,v}}$$

$$Attractions_{z,v} = BaseODME\ Attr_{z,v} \times \frac{FutureCRCOG\ Attr_{z,v}}{BaseCRCOG\ Attr_{z,v}}$$

Where: Productions & Attractions = Future year marginal targets for each zone z and vehicle type v,
Base ODME = Base year refined (ODME) OD marginals,
Future CRCOG = Future year CRCOG subarea extracted OD marginals, and
Base CRCOG = Base year CRCOG subarea extracted OD marginals

These production and attraction future year growth marginal targets were then balanced in TransCAD using the Trip Balancing procedure. The resulting balanced future year growth marginal targets were then applied to the base year subarea OD table by using Fratar Balancing to produce the final future year subarea OD trip tables.

The growth procedure was conducted separately for the LOVs, HOVs and Trucks vehicle types used in the CRCOG model. The final forecasted growth for the TransModeler subarea is summarized in Table 2.1.

Table 2.1 Forecasted Subarea Growth in Demand

Time Period	Vehicle Type	Subarea Base Year Demand (trips)	Subarea Future Year Demand (trips)	Growth in Demand
AM Peak Period (7-9AM)	Trucks	8,610	9,117	5.9%
	LOV	110,921	119,306	7.6%
	HOV	6,160	6,415	4.1%
	All Veh.	**125,691**	**134,838**	**7.3%**
PM Peak Period (3-6 PM)	Trucks	11,195	11,875	6.1%
	LOV	184,239	197,314	7.1%
	HOV	6,548	6,732	2.8%
	All Veh.	**201,982**	**215,921**	**6.9%**

Refinement of OD for Micro Simulation Purposes:

Following the development of the future year subarea trip tables, two additional steps were done to disaggregate the AM and the PM demands to better serve microsimulation analysis.

The AM and the PM trip tables were further split into heavy and medium truck vehicle classes for improved microsimulation of truck movements. The disaggregation of the trucks into medium and heavy classes was done using the same disaggregation factors used in the base year.

The AM and the PM peak period future year subarea trip tables were finally split into 15 minute intervals using the same time of day factors developed for the base year in order to produce final 15 minute vehicle type specific trip table demands to be used in the microsimulation model. Given limited growth in the corridor, no peak spreading of demand was assumed.

2.3 DEVELOPMENT OF THE 2040 FUTURE YEAR NO BUILD MICROSIMULATION MODEL

All committed improvement projects identified in Section 2.1 were coded into the Base Year TransModeler network to create 2040 No Build network. The refined 2040 No Build demands were then loaded into TransModeler to create the 2040 No Build model.

Simulation of all future year models was completed using the same Dynamic Traffic Assignment (DTA) framework developed for the base year model. As in the base year model, an iterative dynamic time dependent equilibrium based approach, Dynamic User Equilibrium (DUE), was adopted to implement the DTA model. However for all future year models, the habitual DUE vehicle paths developed during the base year calibration were used as a starting point for DUE

simulation when possible, and the future year DUE iterative process instead evolved those paths into optimum paths for the given future year scenario. This was done by incrementally loading demands for all the vehicle classes so that logical vehicular routes would be developed taking into account the future network improvements and growth in demand in the subarea.

As part of the future year simulation process, after the initial No Build DUE simulations were completed, minor adjustments were made to the signal timing plans as congestion mitigation measures to help offset the future year growth and forecasted changes in travel patterns within the subarea. These selective changes were made to mimic the regular signal operations maintenance improvements that would be made by the operating agencies over the years to maximize the available capacity on the arterials street system under the new congestion patterns. No major geometric improvements were considered or implemented through this process. Several iterations of DUE and signal plan improvements were undertaken to allow the simulated traffic to learn and adapt to the changes in the signal operations.

2.4 Operational Analysis of 2040 No Build Microsimulation Model

Apart from the relatively minor committed transportation projects listed in section 2.1, the subarea roadway network does not see significant additions of capacity. Additionally, the committed projects do not address the major bottlenecks in the existing conditions, and future year conditions can be expected to be worse with additional traffic growth. While that forecasted growth by CRCOG model for the study area is minimal on a per annum basis, the combined impact of the long-term planning horizon (28 years) with the already heavily congested base year conditions created significant increases in congestion within the study area, especially in the PM peak period.

The increased demand in the 2040 No Build model causes the operation at the current bottlenecks to worsen. Due to the increase in the modeled project area demands, vehicles try to find new routes through the arterials and even local streets which causes new secondary bottlenecks to form on the arterials and local streets. When these arterial bottlenecks become too large, gridlock conditions start developing on the subarea network, which spill back onto the freeway off-ramps to create systemwide congestion failure. At this level of congestion, the simulated throughput on the freeway drops significantly. Under these highly congested circumstances, an equilibrium cannot be reasonably found and as a result, no meaningfully quantifiable results can be extracted from the simulation model. Therefore the quantified results from the 2040 No Build simulations are not presented.

From the analyses of the 2040 No Build scenario simulations, it was determined that existing network could not realistically accommodate even a small levels of growth with the limited committed improvements made to the network. The

future roadway network would need a systemwide re-evaluation of the arterials and freeway roadways to accommodate the forecasted growth within the existing peak periods. As this level of mitigation was beyond the scope of this VPPP study and is in part currently being studied by the parallel I-84 Hartford Project to replace and meet future needs of the corridor, the 2040 No Build scenario analysis was halted and no further investigations into possible mitigations were investigated or tested.

3.0 2040 Build Alternative 6A

Parallel to this study, the I-84 Hartford Project was underway to evaluate a replacement for the I-84 Viaduct and the future operations of the I-84 corridor through downtown Hartford. At the time that this analysis needed to proceed, many designs had been discussed, proposed, and were being evaluated for feasibility, however a final recommended design had not yet been selected. However, due to conflicting schedules, one of the design alternatives needed to be selected to proceed with the VPPP project. At the time of the analysis, Build Alternative 6A was selected by the Viaduct analysis team to proceed into the VPPP testing for a future build condition to replace the viaduct.

Alternative 6A included consolidation of four interchanges (High Street, Asylum Avenue, Capital Avenue, and Sigourney Street) into one diamond interchange at Church Street and changing the configuration of Sisson street interchange into a full diamond interchange. The centerline location of the new ramps and arterial connections was determined with Alternative 6A. However, the design had not yet been fully flushed out with lane level details for the ramps and arterials. As part of the simulation of the Alternative, the number of turning lanes and approach lanes at the ramp termini intersections were estimated given the forecasted volumes.

Figure 3.1 Alternative 6A Design as Tested

Source: TranSystems, Inc.

These design elements were added on top of the 2040 No Build TransModeler network (keeping all No Build committed projects) to create the 2040 Build Alternative 6A TransModeler network. A similar approach to developing, simulating and analyzing the 2040 Future No Build microsimulation model was adopted for the 2040 Alternative 6A Scenario.

3.1 2040 ALTERNATIVE 6A DEMANDS

Similar to the development of other future year scenario demands, demands were first estimated using the CRCOG time-of-day enhanced model. The Alternative 6A details were added to the 2040 No Build CRCOG time-of-day model and modeled for 2040 growth conditions by CDM Smith, and the travel demands for the microsimulation subarea model were then extracted from the regional model for the AM and PM peak periods.

Using the same methods as for the 2040 No Build scenario (see section 2.2), the difference between the extracted subarea demands from the 2040 No Build and 2040 6A regional demand models were superimposed over the adjusted 2040 No Build TransModeler demands. While superimposing the demand care was taken that the demand patterns in CDM Smith regional model were preserved.

3.2 2040 ALTERNATIVE 6A OPERATIONS ANALYSIS

Similar to the 2040 No Build scenario, generating useful results for the 2040 Alternative 6A proved problematic due to the oversaturated demand conditions during the peak hours.

The alternative 6A design included consolidation of four existing partial interchanges (High Street, Asylum Avenue, Capital Avenue, and Sigourney Street) into one diamond interchange at Church Street and consolidated all the vehicular movements into one new interchange. While this may well suit the operations of the freeway, a diamond interchanges by virtue of its design does not handle high demand well due to restrictions in allowable green time and arterial storage space. In an attempt to make the design function at an acceptable level of operations, the approaches to the new interchange signals on Church Street were widened to through lanes and turn bays to the maximum extent that would be feasible without a major arterial reconstruction effort further away from the new interchange.

Even after adding the additional arterial approach and storage capacity on the off-ramps and Church Street, the operations of the diamond interchange were not able to reach acceptable levels. Under this design, queues from the new interchange signals during the peak hours cascade outward and create more congestion and gridlock than under the 2040 No Build conditions. Due to the high level of queue spillback onto the freeways, the speed contour plots for I-84 have been excluded from this report, as the freeway operations are more dependent on the queue failures from the off ramps rather than the operations of the freeway merges, diverges, and weaves themselves.

3.3 SYSTEMWIDE PERFORMANCE MEASURES FOR THE 2040 NO-TOLL SCENARIOS

Following the simulation of the 2040 No Build and 2040 Alternative 6A scenarios, simulated statistics like Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) were selected as good measure of effectiveness to gauge the performance of microsimulation network model at a high level to effectively gauge the performance of the whole network system and analyze the effects of diversion from freeways to lower class roadways and vice versa. The network statistics for the simulated conditions were captured and aggregated for three groupings of roadways; freeways and ramps, arterial streets, and local and connector roadways. Network-wide statistics were also developed for the entire network as a whole to assess the impacts on the entire simulated system, not just the individual groupings or roadways. None of the graphs should be analyzed in isolation. Instead the VMT, VHT and Average Speeds for a facility type should be analyzed

together to get the complete picture of performance of a facility type during the analysis period.

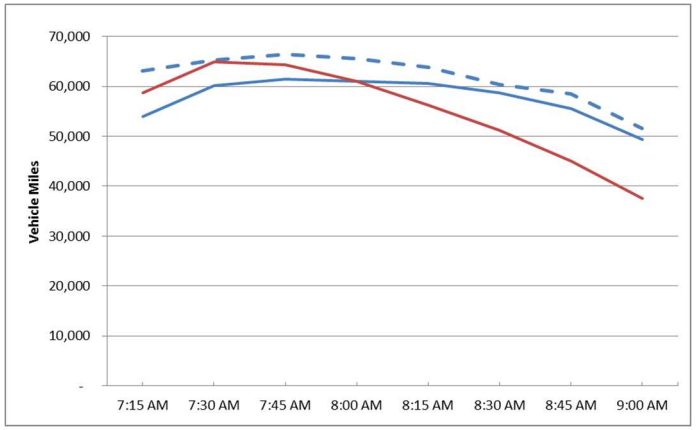
The aggregated operation statistics for throughout AM Peak Period are presented in Figures 3.2 through 3.4 for the 2040 No Build scenario, the 2040 Alternative 6A scenario, and the 2012 Base Year simulated conditions. In these figures, it can be observed that in the 2040 No Build scenario, the VMT and VHT are generally higher that the 2012 Base Year scenario due to the growth in demand over 28 years combined with the limited number of committed transportation projects to alleviate the existing traffic bottlenecks. The 2040 No Build scenario simulated average speeds on freeway, arterials, and local streets see much of the same congestion pattern throughout the AM peak period, with all classes of roadways seeing lower than the 2012 Base Year scenario.

In looking at the figures for statistics for the Alternative 6A scenario, where multiple interchanges are consolidated to a single interchange, the increased congestion impacts of many vehicles trying to either access the freeway from Church Street or exit the freeway onto Church Street and the adjoining arterials can be seen as VHT increases and speeds decrease dramatically on all roadway classes. For the 2040 Alternative 6A scenario, it can also be seen that the VMT on the freeways and ramps drops below the base year conditions close to 7:45 AM while the VMT on the arterials and local streets increase sharply with a sharp rise in VHT combined with drop in speed. The decrease in freeway VMT is caused when queues to the new Church Street interchange extend beyond the off-ramps and onto the freeway mainline, eventually creating extensive queuing on I-84.

The same statistics and scenarios for the PM Peak Period are presented in Figures 3.5 to 3.7. For the 2040 No Build scenario, patterns similar to the AM peak period can be seen as VMT and VHT are much higher and average speeds are much lower as compared to the Base Year scenario. However, the relative change in the statistics are larger than in the AM Peak Period, indicating a much higher relative level of congestion as compared to the Base Year simulated conditions. The systemic congestion creates average speeds on the arterials and local streets to drop well below the base year scenario.

In looking at the statistics for the Alternative 6A scenario in the PM peak period, congestion is severely increased and gridlock conditions quickly form in the simulation model due to oversaturated conditions resulting from the concentration of traffic at the new Church Street interchange. As seen in Figures 3.6 and 3.7, the sharp increase in VHT and decrease in Average Speed after approximately 4 PM is indicative of a gridlock condition forming in the simulation model with queues extending onto the freeway and throughout the arterial network. Under such conditions, the Dynamic User Equilibrium approach to traffic route choice begins to fails to reach an equilibrium state, and the results of the simulation model become unreliable beyond a recognition that congestion is rampant and widespread.

Figure 3.2 Vehicle Miles Traveled (VMT) – AM Peak Period



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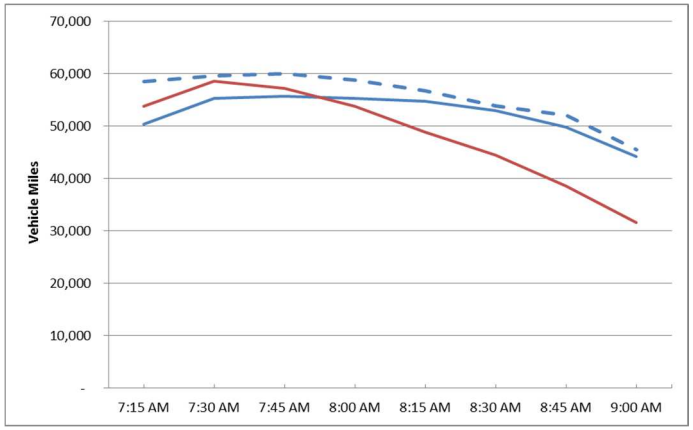
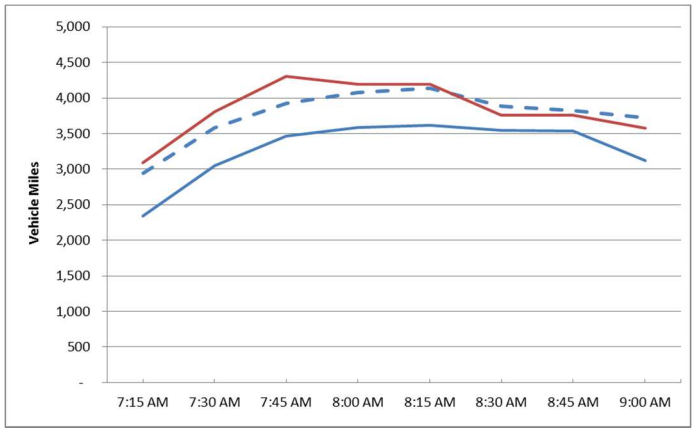
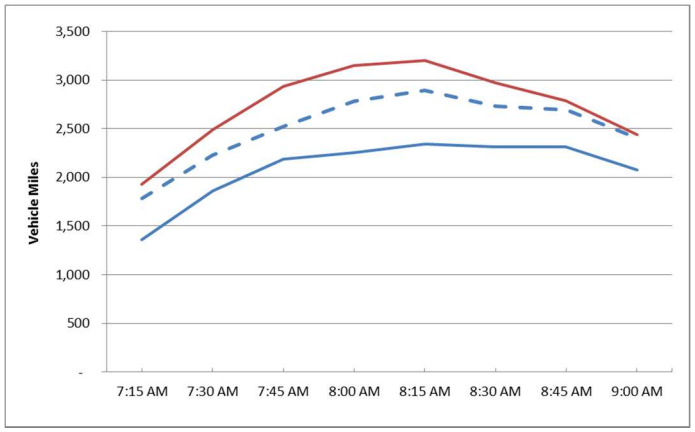


Freeway & Ramps



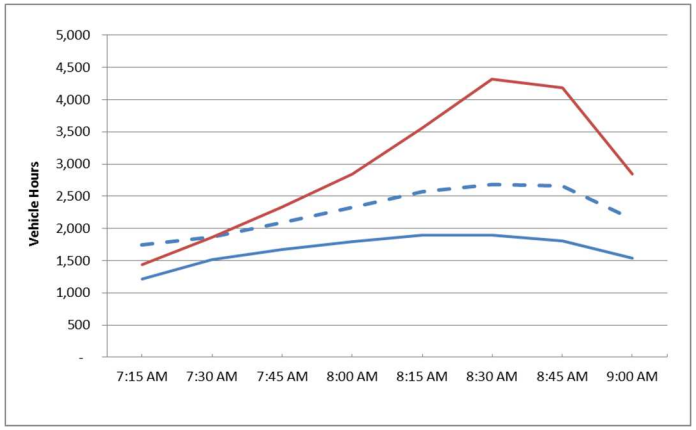
Arterials Streets



Local & Collector Streets

VMT 2012 Base — VMT 2040 No Build — VMT 2040 6A

Figure 3.3 Vehicle Hours Traveled (VHT) – AM Peak Period



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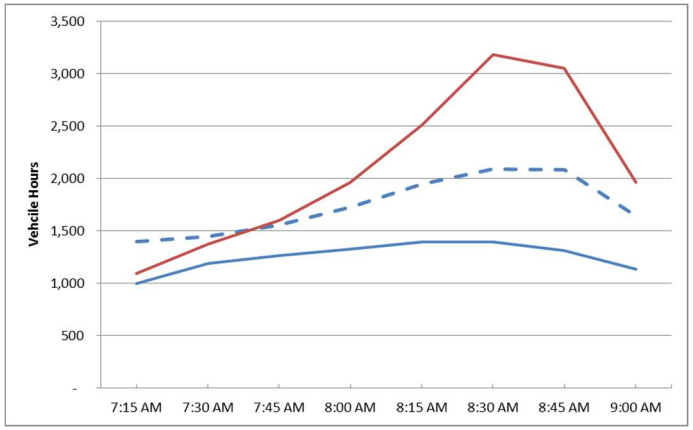
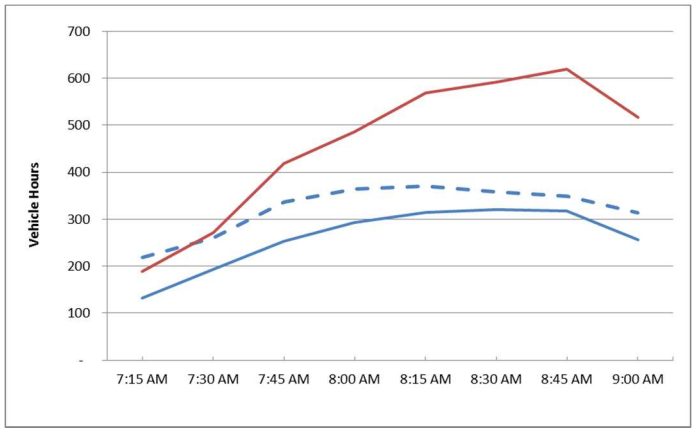
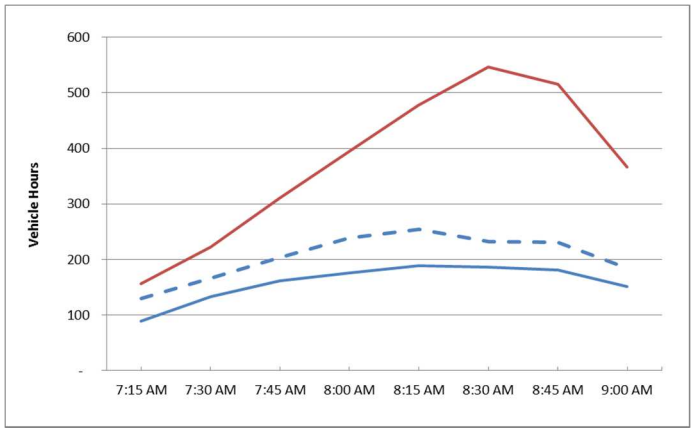


Freeway & Ramps



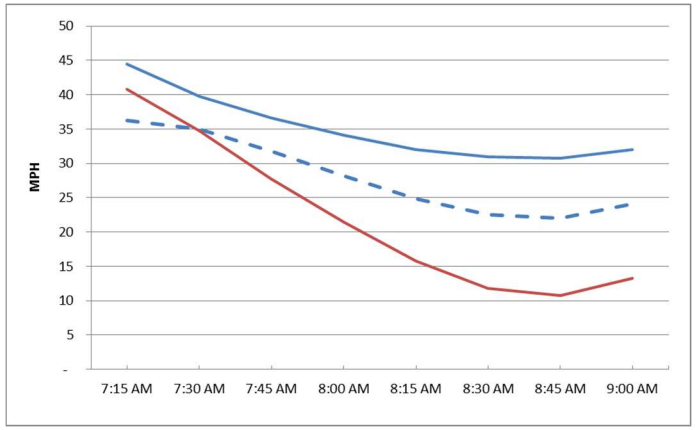
Arterials Streets



Local & Collector Streets

VHT 2012 Base — VHT 2040 No Build — VHT 2040 6A

Figure 3.4 Average Speed – AM Peak Period



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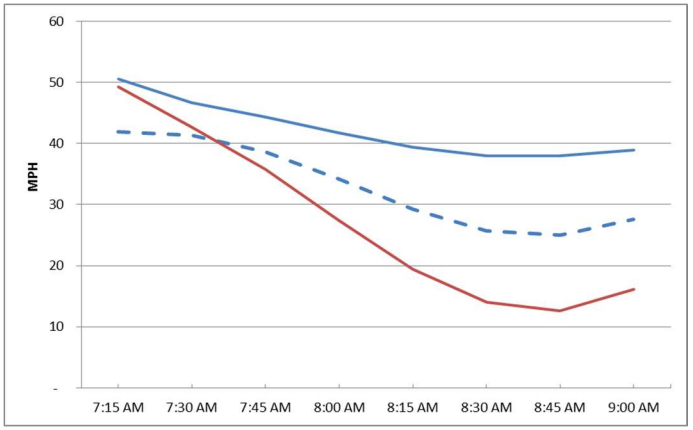
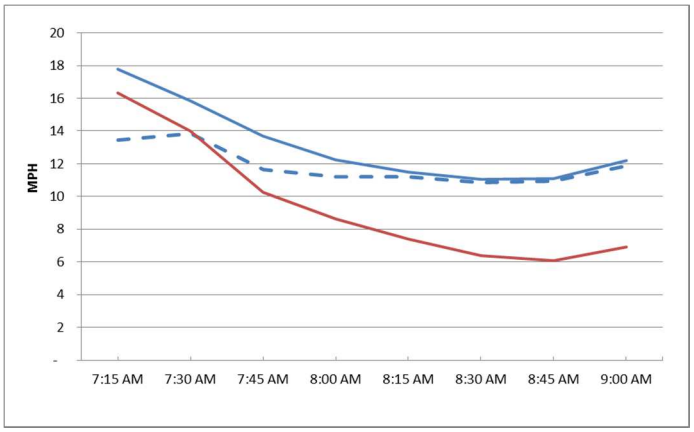
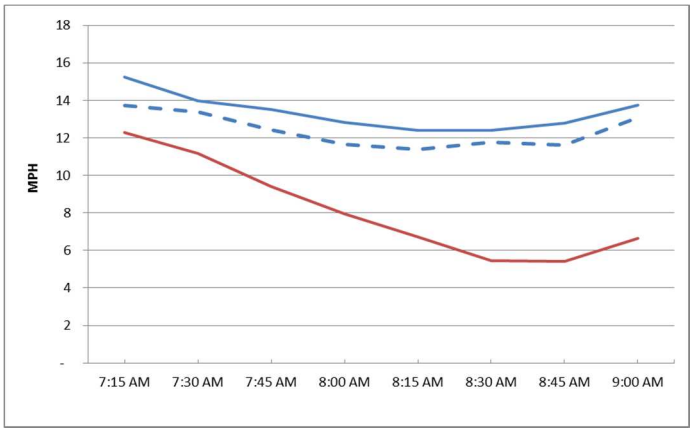


Freeway & Ramps



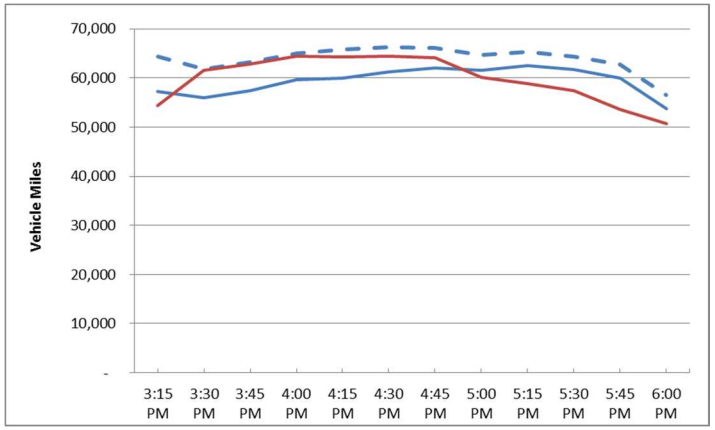
Arterials Streets



Local & Collector Streets

Avg. Speed 2012 Base — Avg. Speed 2040 No Build — Avg. Speed 2040 6A

Figure 3.5 Vehicle Miles Traveled (VMT) – PM Peak



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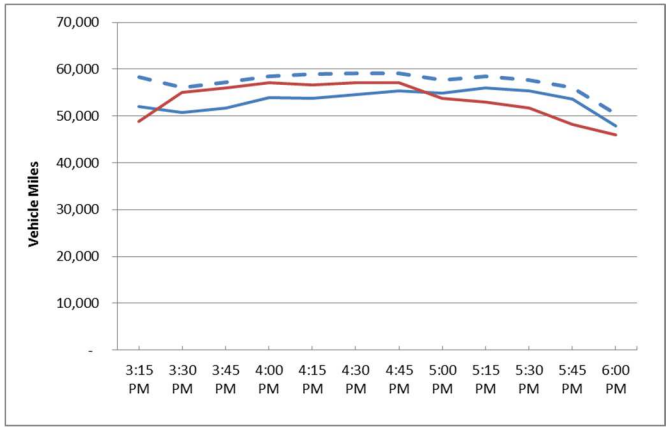
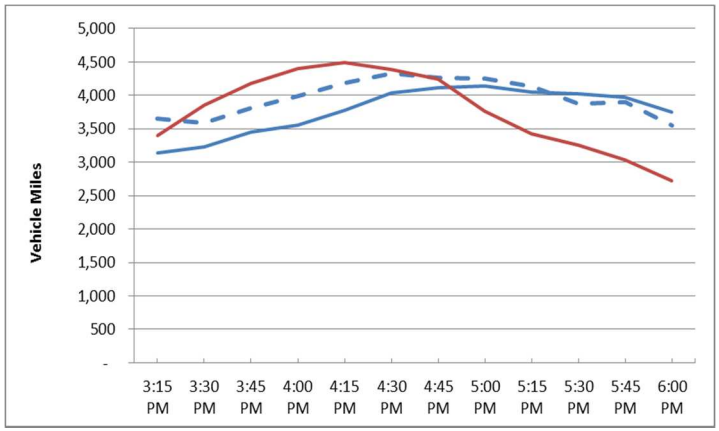


Freeway & Ramps



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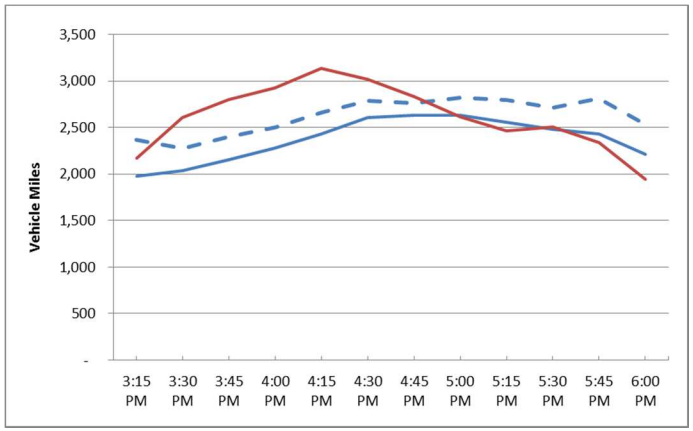
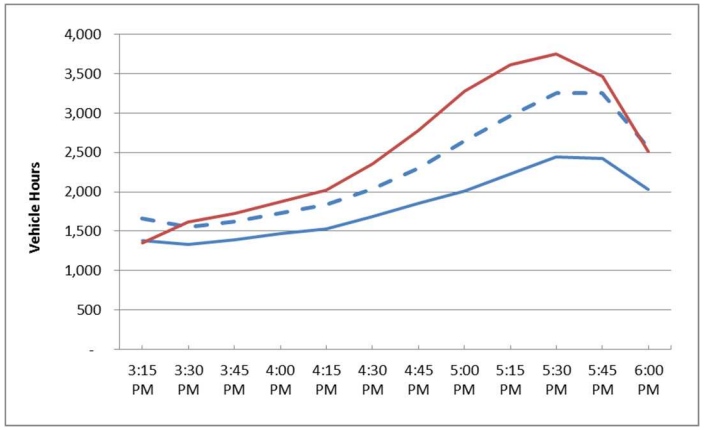


Local & Collector Streets

VMT 2012 Base — VMT 2040 No Build — VMT 2040 6A

Figure 3.6 Vehicle Hours Traveled (VHT) – PM Peak



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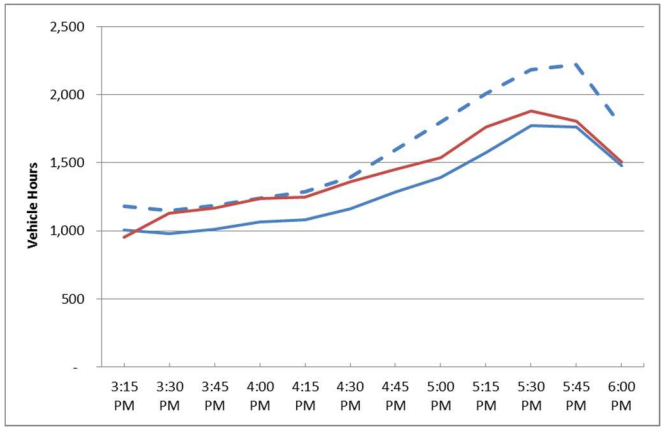
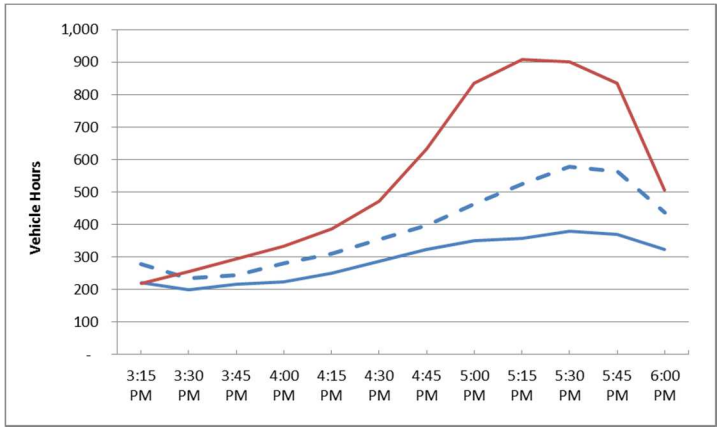
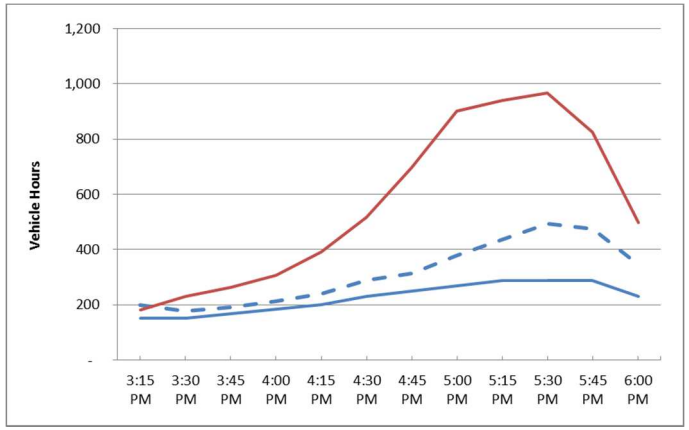


Freeway & Ramps



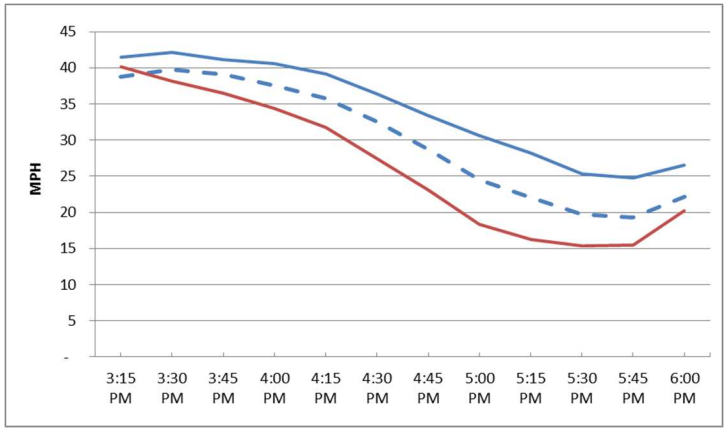
Arterials Streets



Local & Collector Streets

VHT 2012 Base — VHT 2040 No Build — VHT 2040 6A

Figure 3.7 Average Speed – PM Peak Period



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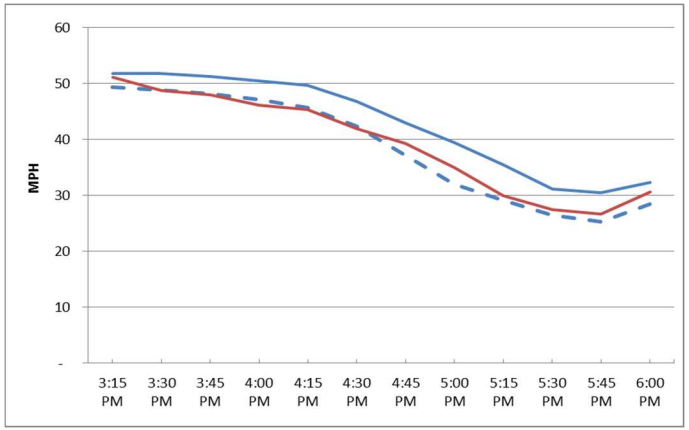
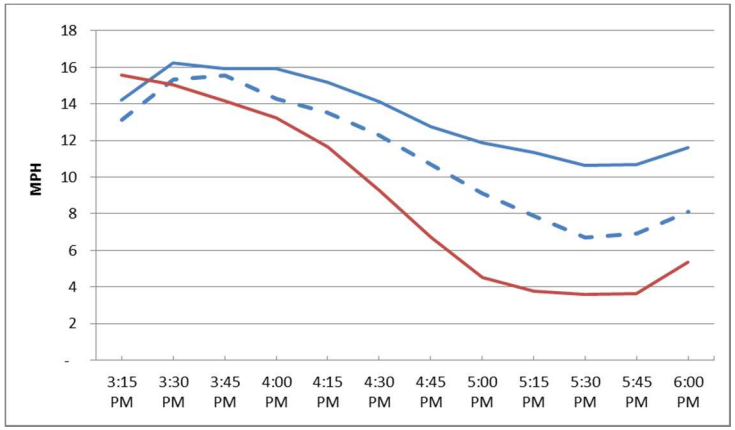
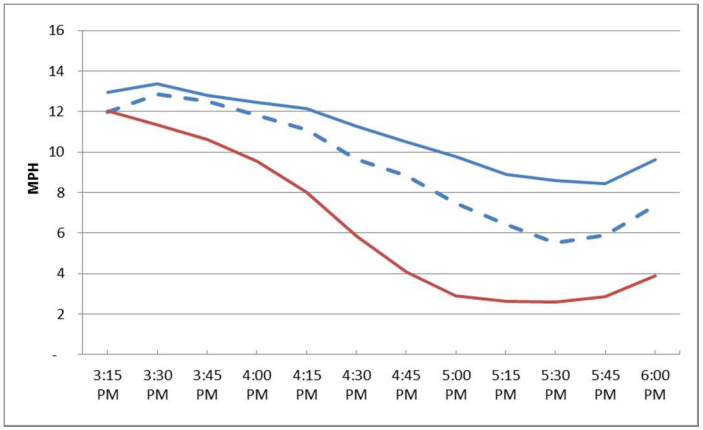


Freeway & Ramps



Arterials Streets



Local & Collector Streets

VHT 2012 Base — VHT 2040 No Build — VHT 2040 6A

3.4 CONCLUSIONS FOR 2040 NO-TOLL SCENARIOS

Based on the simulated results on the 2040 No Build and 2040 Alternative 6A scenarios, it was recognized that 2040 conditions would see significant increases in congestion far above the already heavily congested conditions of today.

It was also revealed that some design elements of alternative design 6A would need reconsideration as they might not be feasible to provide adequate levels of traffic operation, and in fact degrade operations levels above those of the No Build conditions network under 2040 demand levels.

Even though the forecasted growth over the 28 years from 2012 to 2040 is limited on a per annum basis, the growth is sufficient to push the existing congestion conditions far beyond the congestion levels of today and create conditions that approach systemic gridlock, particularly in the PM Peak Period. Given the simulated results of the limited forecasted growth in demand to the 2040 No Build conditions, it became clear that the future year demands would not be able to be accommodated in the existing peak periods. Instead, either peak spreading of demand would need to occur to limit the demands in the peak hours to the existing levels, or the growth may not occur at all without further improvements to the area roadways.

The goal of this Value Pricing Pilot Program Study was not to determine the roadway improvements needed to satisfy 2040 demand conditions, but was to estimate the operations impacts of potentially adding tolls on I-84 and the impacts of potential diversions onto the surrounding roadways, including onto Hartford's arterial roadways. Given that the 2040 No Build demands cannot be adequately served by the No Build network, the decision was made to examine the tolling impacts under the existing traffic demands conditions for the 2012 Base Year scenario. As such, all subsequent simulation analyses conducted were simulated using the 2012 demands over the 2040 No Build network. This scenario, called the 2012 No Build scenario was used as the basis for comparison for all tolling scenarios.

4.0 2012 No-Toll Scenarios

As discussed in the previous chapter, the congestion levels of the potential 2040 scenarios led the project team to instead use the 2012 existing level demands to assess the potential operations impacts of the tolling of I-84 on the freeway and the surrounding roadways. However, to assess if the Alternative 6A conditions would yield better operations than No Build conditions under 2012 demand conditions, both scenarios were developed and compared.

For the 2012 No Build model, the 2040 version of the AM and PM Peak Period networks were revised to include the 2012 Base Year demands. The limited changes in the committed improvements allow for the direct use of the 2012 Base Year demands, without consideration of changes to the subarea traffic travel patterns. However, for the 2012 Alternative 6A scenarios, changes to the 2012 subarea origin-destination demands could be expected due to the changes in the interchange and arterial network connections. To estimate the 2012 Alternative 6A demands, the CRCOG time-of-day demand forecasting model was rerun with the Alternative 6A improvements in place with the 2012 regional travel demands. The resulting subarea extraction of travel patterns for the subarea was used as the basis to create the demands for the 2012 No Build scenarios, using similar techniques as previously discussed in Section 2.2. While developing the trip tables, care was taken that the demand patterns in regional model for the Alternative 6A trip tables were preserved.

Each of the 2012 No-Toll scenarios were then simulated using Dynamic User Equilibrium route choice methods as previously discussed in Section 2.3. As was done for the 2040 conditions, a review of the signal operations in the both of the 2012 No Build and 2012 Alternative 6A simulation models was undertaken during the DUE process and signal timing adjustments to signal phasing and timing splits were made to improve the overall operations of the network. Similar to other non-tolling scenarios, these changes were limited to those that could be expected to be implemented in an ongoing signal maintenance program.

4.1 2012 NO-TOLL OPERATIONAL ANALYSIS

When analyzing the operations of a freeway corridor like I-84, identifying the congestion and bottleneck locations helps to understand the operational problems that exist in the corridor. A useful tool for qualitative analysis of the freeway operations is to use congestion heat maps or speed contour plots. These heat maps present time along one axis and distance on the other, to create a grid of time and space. The color of each cell represent the average speed on that portion of the freeway during that time interval, with green colors indicate free-flow speed and the red indicates significantly reduced speed. The following Figures 4.1 and 4.2 compare the congestion heat maps for the 2012 No Build and 2012 Alternative 6A

scenarios for the eastbound and westbound direction, respectively, of I-84 for the AM, while Figures 4.3 and 4.4 present the same for the PM Peak Period. In all figures, the simulated 2012 No Build speeds are presented in the top half of the figure, while the bottom half shows the simulated 2012 Alternative 6A speeds.

For the 2012 No Build scenario, the congestion on the freeway, arterials and local roadways were observed to be very similar to the 2012 Base Year scenario. This is to be expected given the limited committed improvements included in the 2012 No Build network and the same demands for travel. The major bottleneck in the AM Peak Period remains at the Asylum off-ramp and at the exit ramps to I-91 in the westbound direction. The PM Peak Period major bottlenecks observed in the westbound direction of I-84 at the Flatbush Avenue left exit off ramp and in the eastbound direction of I-84 crossing the Connecticut River both continue as per the 2012 Base Year simulated conditions.

Even with the lower traffic demands of the 2012 Alternative 6A scenario, the congestion issues and oversaturation conditions seen in the simulated 2040 Alternative 6A conditions and discussed in the previous chapter remain.

In the AM Peak Period, all the Hartford-bound traffic that would have used the multiple partial interchanges now seek to exit via the Church Street off-ramp in both eastbound and westbound direction. Because of the increase in demand for the Church Street off-ramp and the east/west roadways connecting Church Street, congestion forms on the arterial network and eventually the off-ramp queues spill back on I-84 and create unsafe and congested conditions on the I-84 mainline approaching the new interchange.

In the PM Peak Period, the congestion heat maps indicate that the freeway operations see some limited improvements under the 2012 Alternative 6A scenario as compared to the 2012 No Build scenario. While the eastbound queue in the PM Peak Period may be shorter than in the 2012 conditions, this improvement is in fact caused by the metering effect that the severe arterial congestion has in limited the number of vehicles which can access the I-84 eastbound corridor. As such, there are fewer vehicles approaching the Bulkeley Bridge crossing the Connecticut River and the existing and unchanged bottleneck sees a shorter queue than under 2012 No Build conditions. However, this apparent improvement to the I-84 eastbound conditions in the PM Peak Period is more than offset by the systemic gridlocking occurring on the arterial network.

Similar to the 2040 No-Toll scenarios, the simulation of the 2012 No Build and 2012 Alternative 6A scenarios lead to the conclusion that the 2012 No Build scenario should serve as the basis for comparison of the tolling strategies.

In parallel efforts to this study, the I-84 Viaduct Replacement study team found similar conclusions and when combined with constructability concerns regarding the Alternative 6A subsequently abandoned the Alternative 6A concept design and are seeking other improvement alternatives. However, the schedule conflicts between the two studies did not allow for another improvement design to be tested. Furthermore, this study was aimed primarily at assessing the addition

impact (diversion) to the local network that might occur under tolling of I-84 and not to assess and test preliminary physical design concepts.

Figure 4.1 I-84 Westbound Speed Contours for AM Peak Period

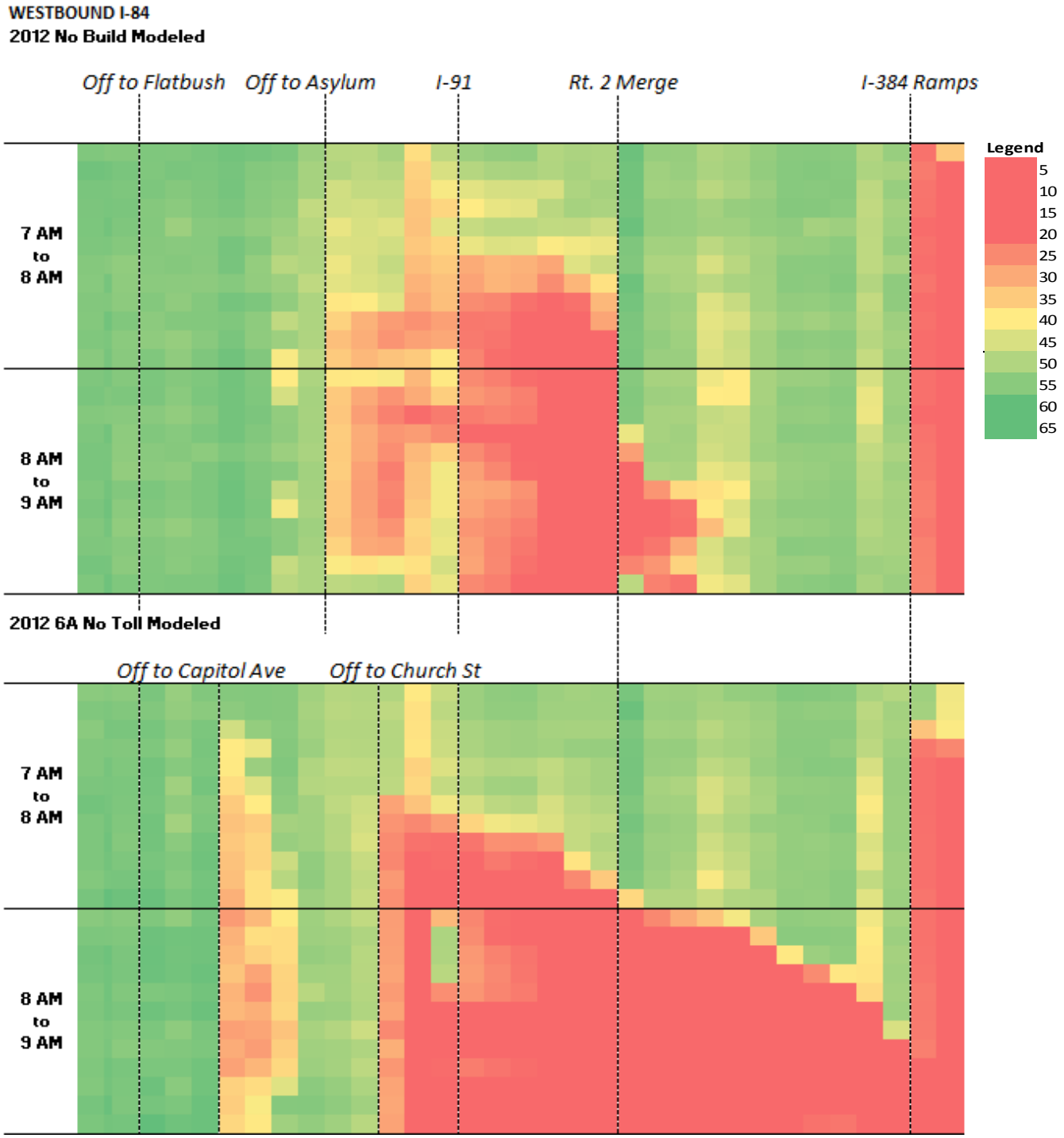


Figure 4.2 I-84 Eastbound Speed Contours for AM Peak Period

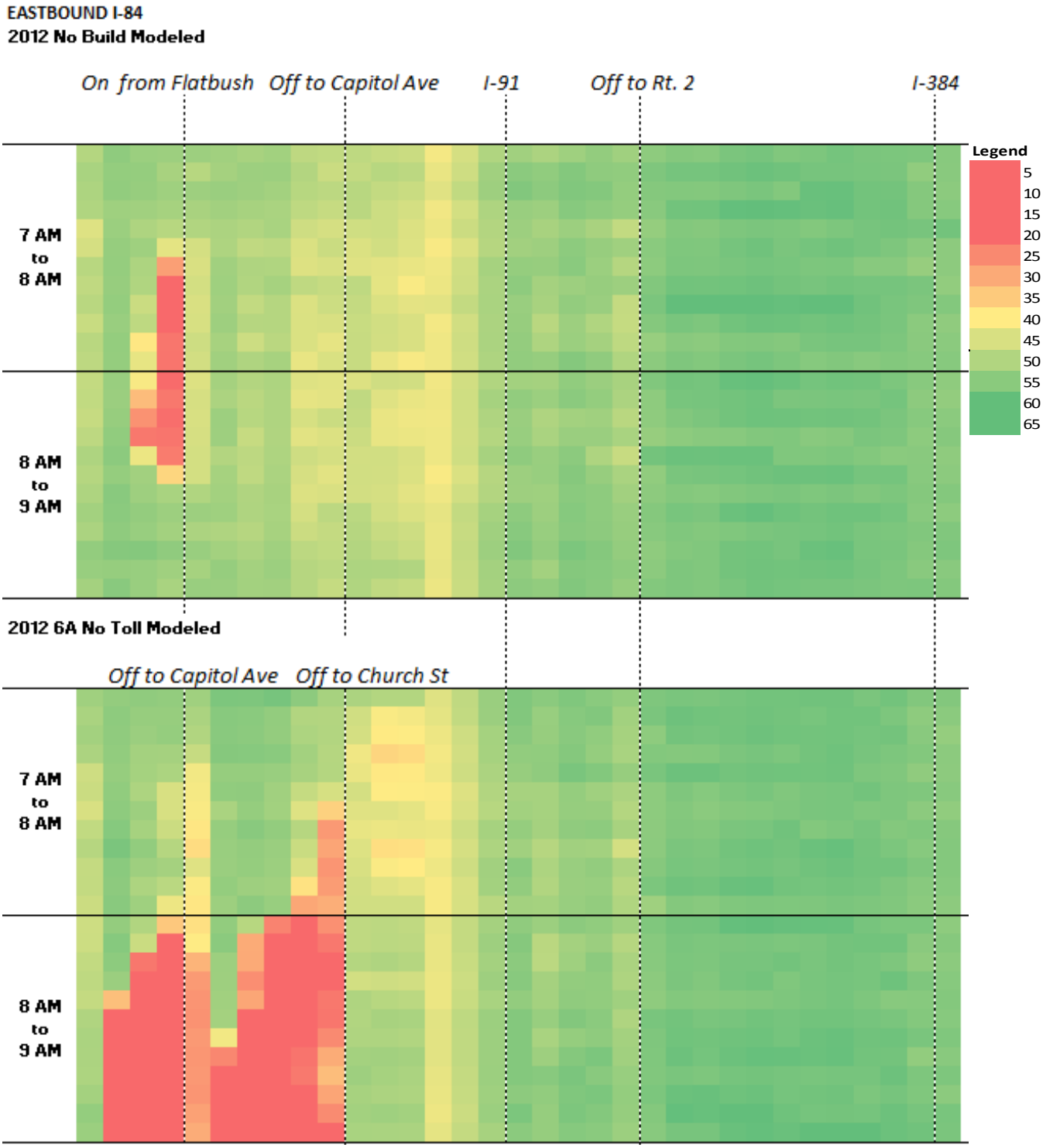


Figure 4.3 I-84 Westbound Speed Contours for PM Peak Period

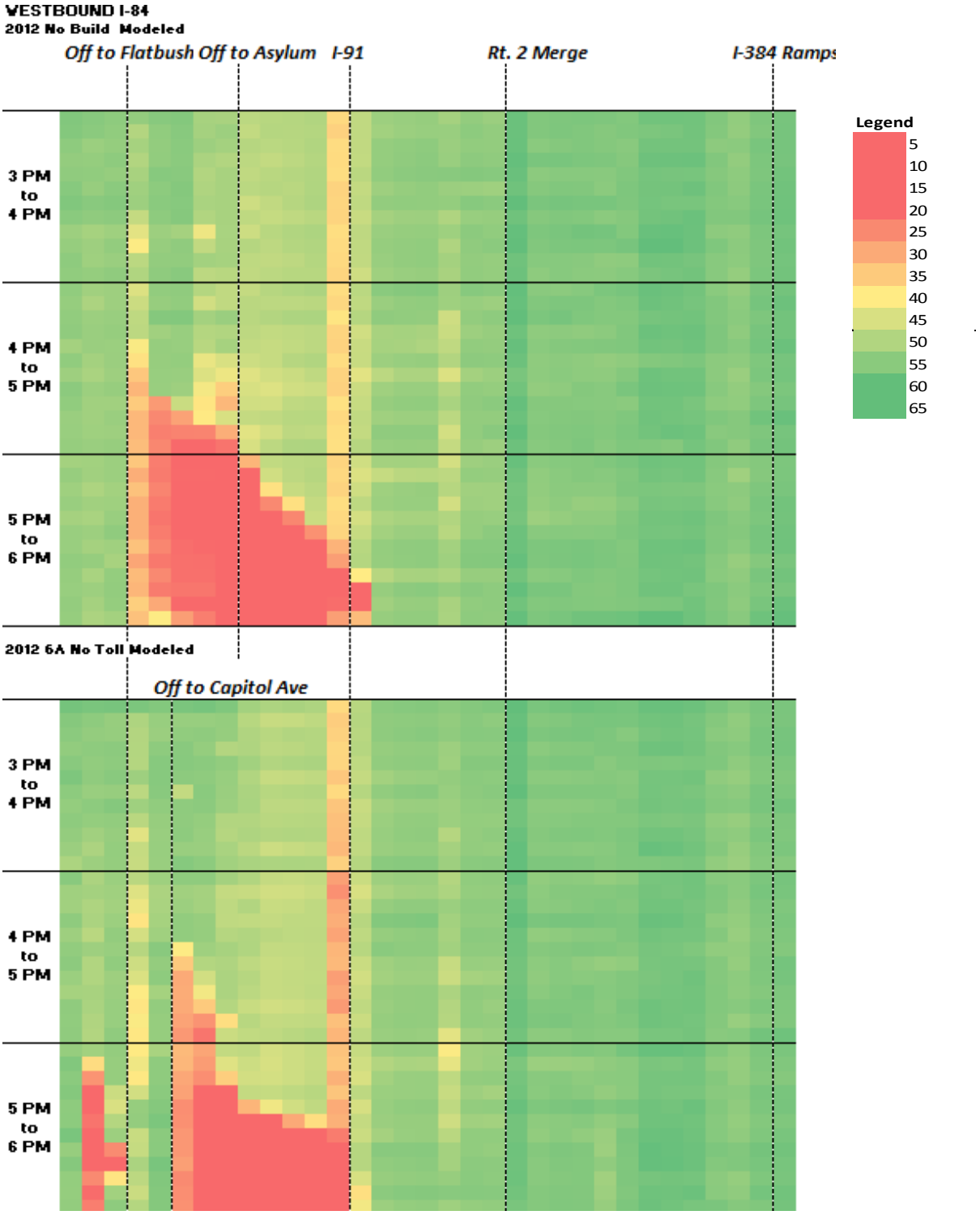
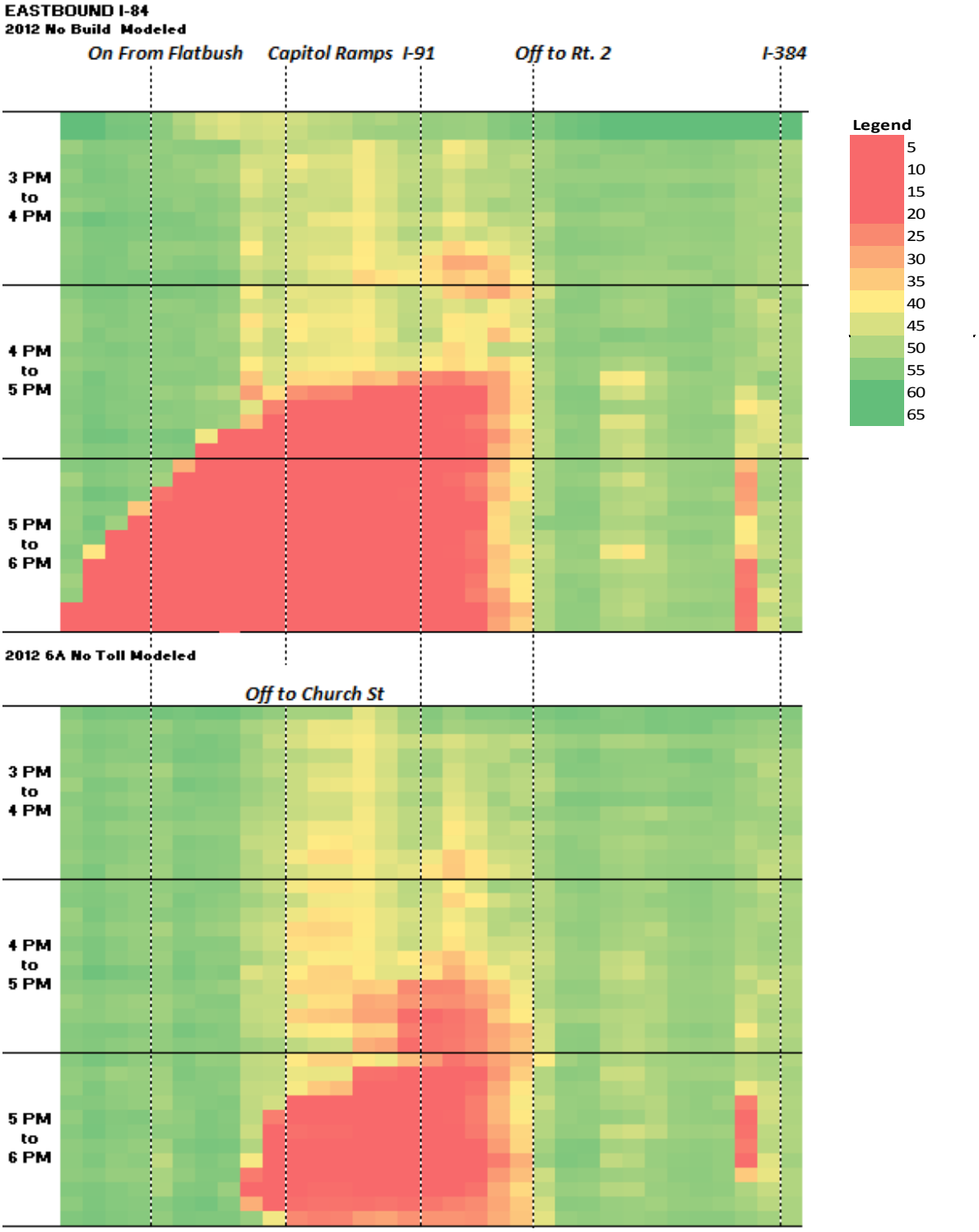


Figure 4.4 I-84 Eastbound Speed Contours for PM Peak Period



5.0 Tolling Scenarios

Following the determination of the best non-tolling scenario to be used as a point of comparison, two different tolling scenarios were simulated to access the potential impact of tolling on operations of I-84 and the adjoining arterial streets in Hartford and West Hartford. The two scenarios considered different configurations of tolling gantry locations and toll rates. As it was determined that the 2040 future year demands were too high for the modeled network to analyze the diversions due to tolling without consideration of significant additional arterial roadway capacity, all tolling scenario analyses were performed with 2012 Base Year demand level.

The two tolling configurations analyzed under the tolling scenarios are the point toll (a single tolling location) and the split toll (two tolling locations). In both cases, tolling operations would be fully electronic and no toll barriers would exist. Traffic passing under the tolling gantries would either have a transponder (e.g. E-ZPass) in the vehicle, or a photo of the license plate of the vehicle would be captured and a bill for the toll sent by mail. In either case, toll collection would happen at freeway speeds and no slow-down would be needed for the toll collection process.

Point Toll Scenario

In the point toll scenario, a single toll gantry would be located along the current Aetna viaduct location between the Sigourney Street and Capital Avenue ramps, approximately as illustrated in Figure 5.1. At the gantry location, a peak period toll of one dollar ($1.00) for a passenger vehicle equipped with a transponder would be charged per vehicle passing the gantry in either the eastbound or westbound direction. Vehicles without a transponder were assumed to be assessed a $1.50 toll to account for the additional cost of processing, mailing, and collecting the toll from video toll users. Trucks would be assessed a proportionally higher toll rate.

Split Toll Scenario

In the split toll scenario, two toll separate gantries would be located approximately as illustrated in Figure 5.2. The first gantry would be located east of the westbound I-84 Asylum Street off-ramp, while the second gantry would be located west of the West Boulevard ramps. At the each gantry location, a fifty cent ($0.50) peak period toll would be collected in either direction. While the overall toll for a through trip on I-84 would remain the same as for the point toll scenario, splitting the toll into two collection points could reduce diversion impacts for local Hartford-based traffic.

Figure 5.1 Point Toll Proposed Gantry Location

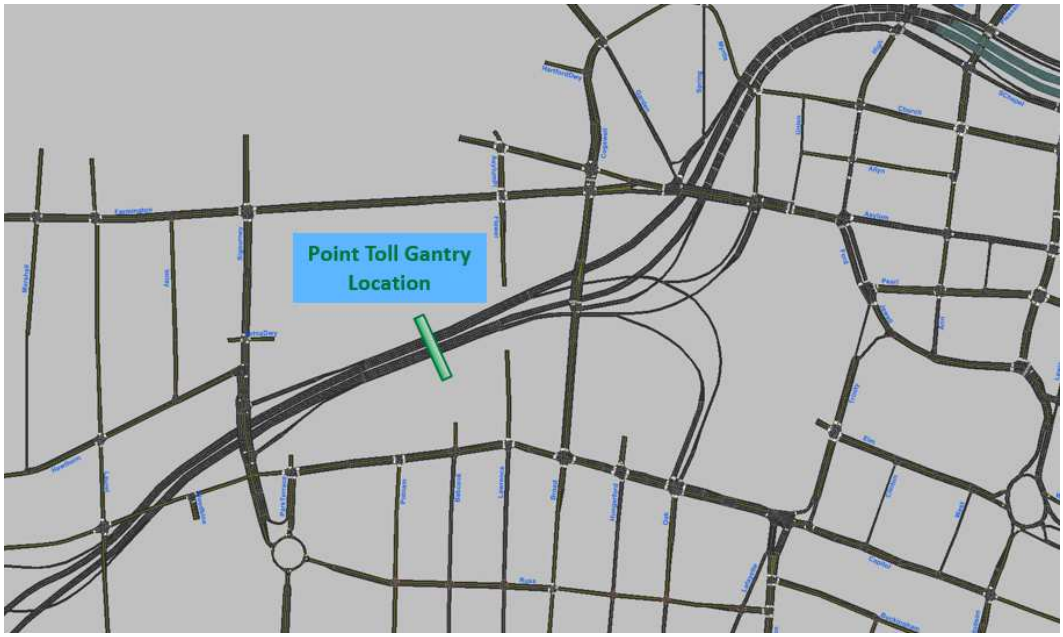
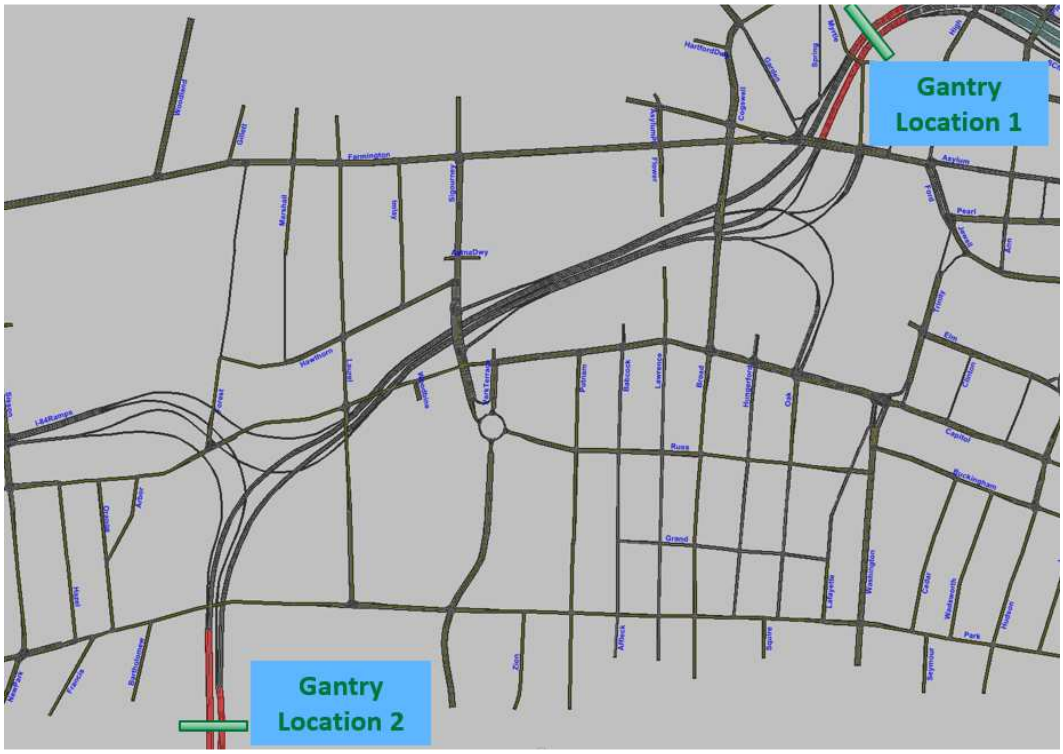


Figure 5.2 Split Toll Proposed Gantry Locations



5.2 OPERATIONS SIMULATION OF THE TOLLING SCENARIOS

The simulation approach adopted to model the tolling scenarios was to keep the toll choice modeling within the larger macroscopic travel demand forecasting model as developed for this study by CDM Smith. This model was calibrated against survey data to perform larger regional assumptions about the willingness to pay the toll and different values of time for different user classes. It also includes a temporal diversion model to assess the time shifting of trips from the peak period shoulders to just outside of the peak period to pay a reduced off-peak toll rate, and also assess the regional diversion impacts to other travel routes outside of the microscopic simulation model study area. Further details regarding the modeling of the toll payment decision (and the resulting revenue forecasts) can be found in a separate report.

For each of the tolling scenarios completed, a regional subarea extraction from the regional demand model was completed. As part of this extraction the demands for paying and non-paying trips were recorded separately. Using similar methods to the previous scenarios, the demands for the tolling scenarios were developed by superimposing the difference in demand between the 2012 tolling scenario and 2012 Base Year to the 2012 No Build TransModeler demands. However, an additional step was then undertake to split the simulation demand into toll paying and non-toll paying vehicles for each origin-destination pair using the pay/no-pay split as estimated by the regional travel demand model. Throughout this process, care was taken to preserve the forecasted percentage of vehicles paying a toll, and the overall forecasted toll paying vehicles as each gantry location.

To match the toll payment decisions as predicted by the demand model, all vehicle classes in TransModeler were split into toll paying vehicles and non-toll paying vehicles. Non-toll paying vehicles were restricted from using the links where the toll paying gantries would be located, and they would need to complete their trip without using those now tolled links. Similar, to ensure that the toll vehicles would remain on the freeway toll links and would not divert due to any stochastic effects of the simulation model, selected arterial or ramp locations were restricted to the toll paying vehicles to ensure these vehicles would remain on the freeway and pay the toll(s). All vehicles would still be allowed to find their own shortest path through the network (via the DUE process) given the new restrictions in effect by their pay/no-pay decision as forecasted by the demand model.

Finally, during the analysis process, there was some allowance for the results of the simulation modeling analyses and results to feed back into the regional model to better reflect the operational conditions on the arterials. From this feedback, and the resulting cost/time toll trade-offs that the drivers would make on deciding to either pay the cost of the toll or take additional travel time to complete the desired trip were updated to better include the operational findings of the simulation results.

5.3 TOLLED FREEWAY OPERATIONS

Point Toll Scenario

In the 2012 point toll scenario, the toll gantry is located at the existing Aetna Viaduct between the Asylum Street and Sigourney Street ramps. Under these conditions, the Asylum Street off-ramp from I-84 Westbound serves as the last exit before the toll gantry, and sees additional traffic demands from those vehicles trying to avoid paying the toll. Under the AM Peak Period No Build conditions, this off-ramp and the resulting signal delays at Asylum Street and Farmington Avenue are the source of a major bottleneck, with the demand frequently exceeding the storage space on the off-ramp and queues can be seen to spill back and affect the mainline operations of I-84 eastbound. In the AM Peak Period Point Toll simulation conditions (see congestion heat map in Figure 5.3), the effects of the additional demand for the Asylum Street off-ramp create even more congestion problems along I-84 Eastbound. While attempts were made to adjust and optimize the signal timings at the intersections of Farmington Avenue, Asylum Ave, and Broad Street, no significant increase in intersection capacity can be gained without considering a major reconstruction of the area.

During the PM Peak Period in the westbound direction (Figure 5.5), the No Build sees the largest bottleneck in the westbound direction approaching at the left hand exit to Flatbush Avenue. Under the point toll scenario, the volume of traffic traveling along westbound I-84 is somewhat reduced due to local diversions to arterial streets and long distance diversion to regional alternatives (e.g. I-684). However, despite the reduced traffic demand, the increased demand for traffic exiting I-84 at the Asylum Street off-ramp to avoid paying the toll creates a new bottleneck that is reminiscent of the bottleneck in the same location in the AM Peak Period, but is more minor in nature than in the AM peak, but can still be seen to create slow moving traffic along I-84 westbound as far east as the tunnel on I-84 in the downtown area.

In the PM Peak Period in the eastbound direction (Figure 5.6), the severe bottleneck seen in the 2012 No Build conditions at the Bulkeley Bridge over Connecticut River remains in the 2012 Point Toll scenario. However, due to the slightly reduced volumes for traffic on I-84 from combined arterial and regional toll diversions, the bottleneck, while still severe and backing up for miles, is reduced over the 2012 No Build conditions.

Figure 5.3 I-84 Westbound Speed Contours for AM Peak – Point Toll Scenario

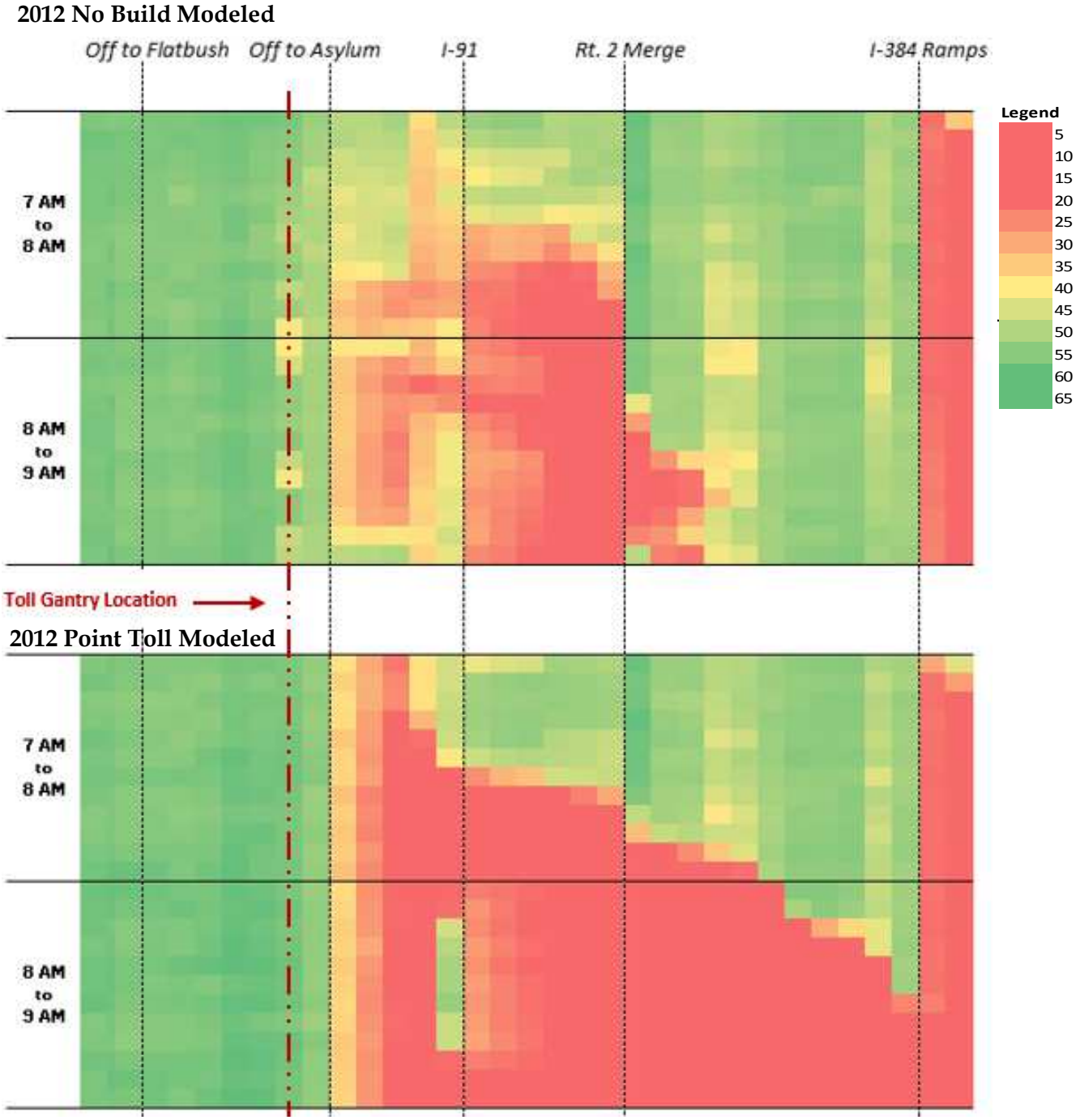


Figure 5.4 I-84 Eastbound Speed Contours for AM Peak – Point Toll Scenario

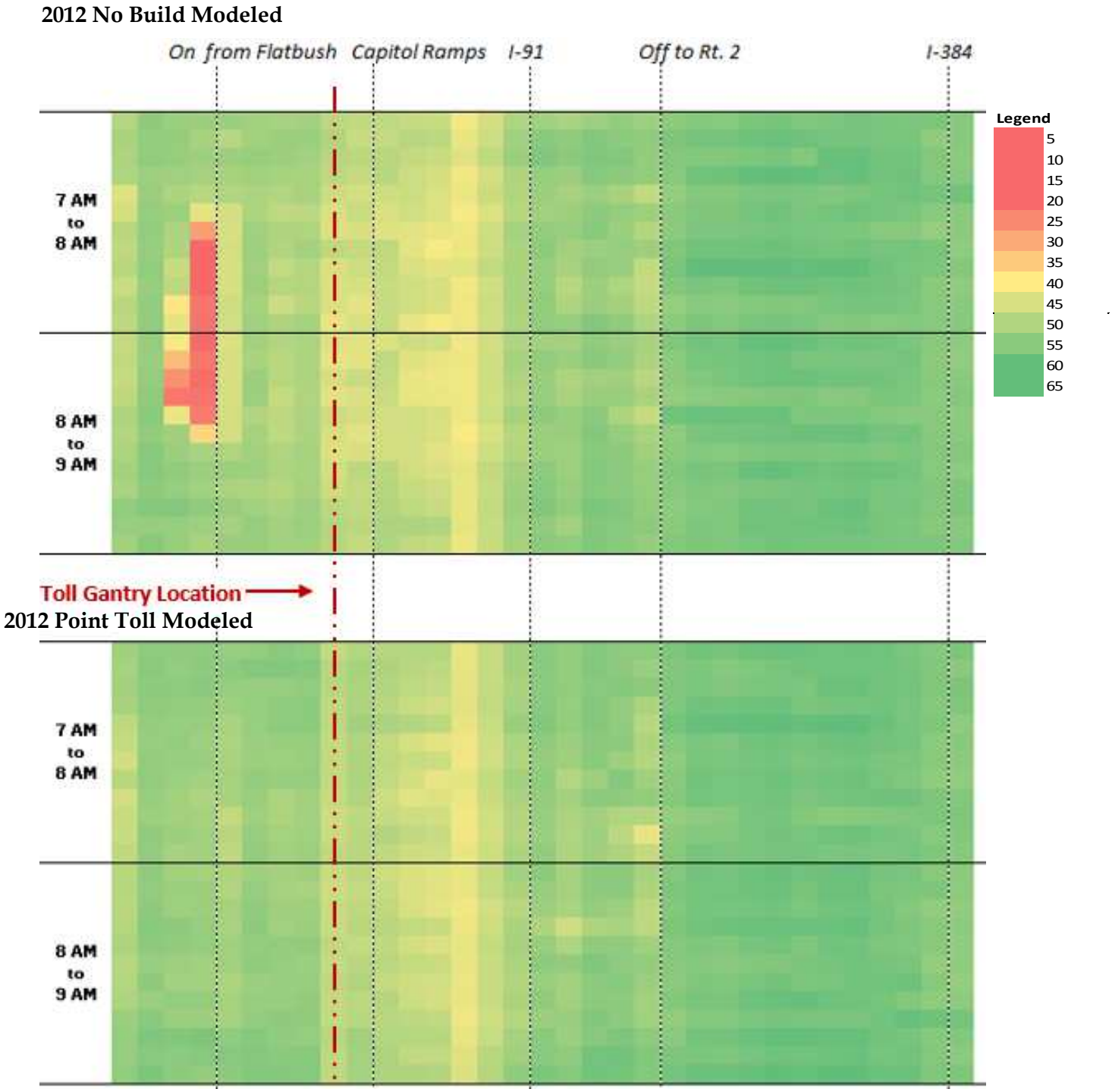


Figure 5.5 I-84 Westbound Speed Contours for PM Peak – Point Toll Scenario

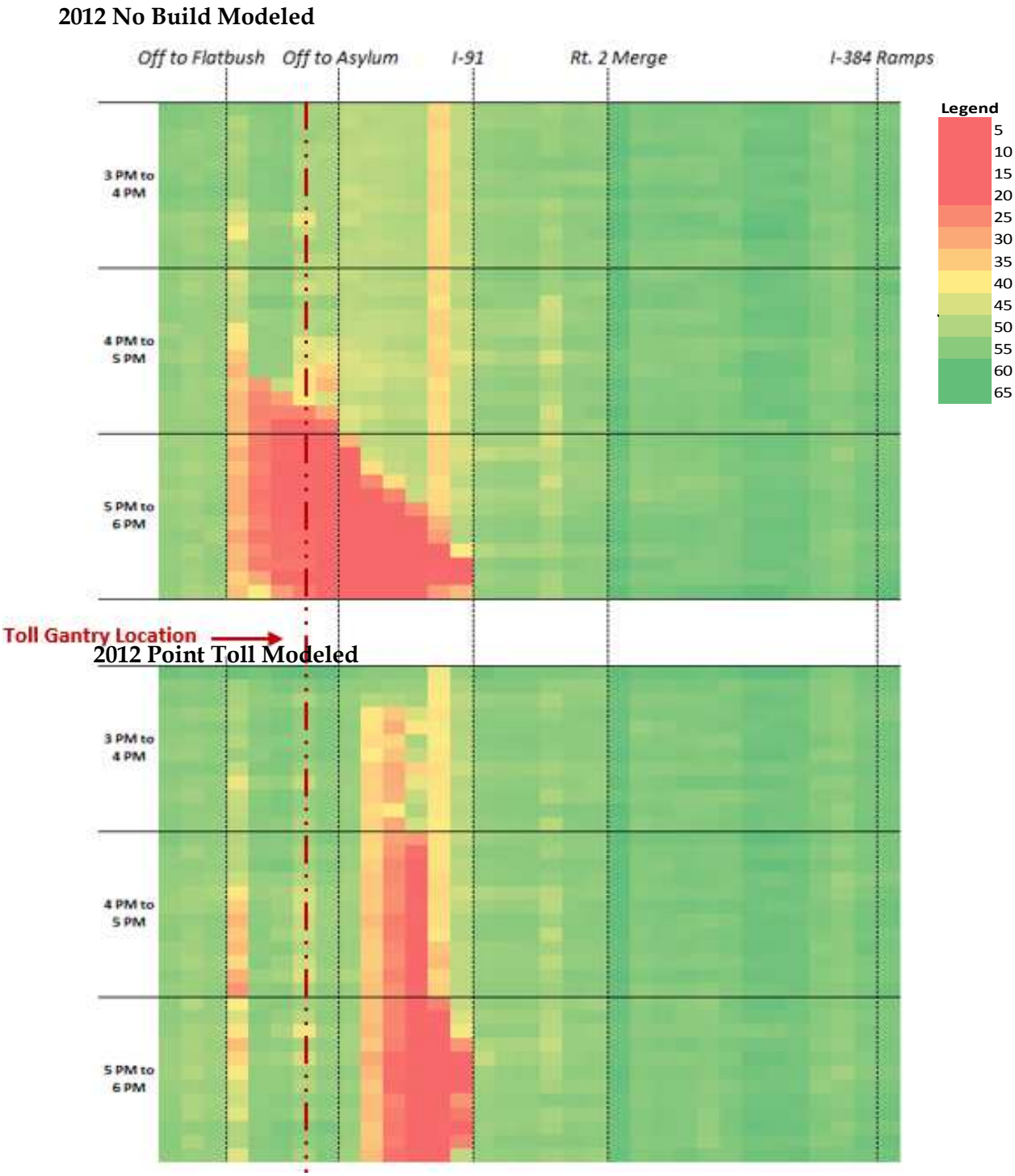
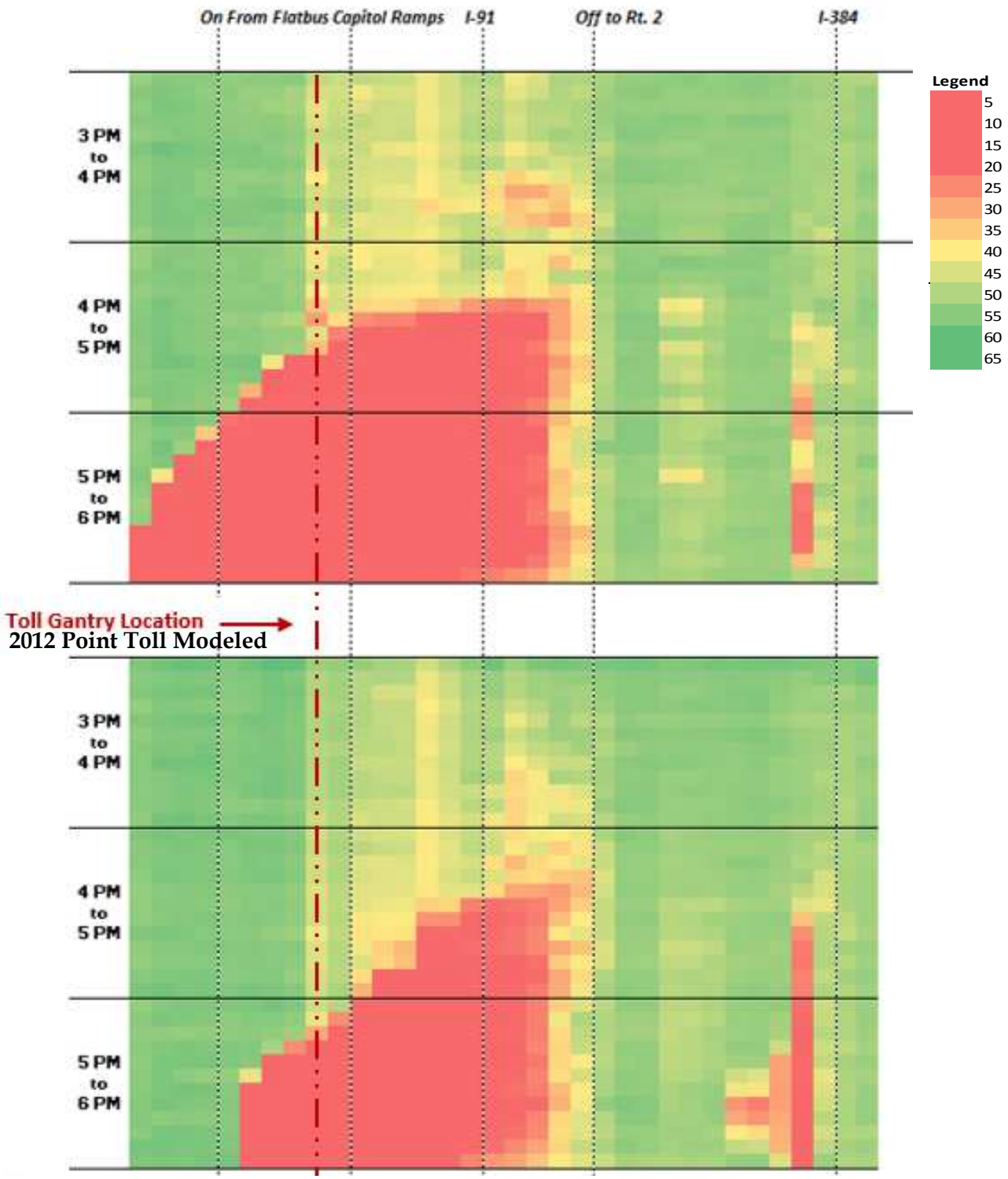


Figure 5.6 I-84 Eastbound Speed Contours for PM Peak – Point Toll Scenario

2012 No Build Modeled



Split Toll Scenario

In the 2012 Split Toll simulated scenario for the AM Peak Period, the westbound direction of I-84 (Figure 5.7) sees large operational improvements at the Asylum off-ramp, with traffic now flowing near free flow conditions throughout the AM Peak Period. This improvement in operations is caused by the combined reduction in the demand from traffic diverting from the toll locations. This diversion traffic takes two forms; first, regional diversions which avoid the I-84 Corridor through Hartford, and second, local diversion traffic. For local diversion traffic, drivers avoid paying the toll at the first gantry location east of Asylum off ramp by exiting at the previous off-ramp to Main Street immediately upstream of the first toll gantry location. Traffic trying to get to the downtown Hartford area use the Main Street off-ramp to Chapel Street, and then have to make a left turn at either Market Street, Main Street or Trumbull Street to reach the downtown area, while more westerly destined trips continue along Chapel and then seek to turn left at Pleasant Street or High Street. All these intersection have limited left turn capacity, and even with timing adjustments to increate left turn capacities, the signals are not able to accommodate the additional diversion traffic and eventually queues extend along Main Street and back onto the I-84 mainline. Immediately downstream of the Bulkeley Bridge, the four travel lanes of I-84 split to feed the off-ramp to I-91 Northbound and the Main Street off-ramp, with only two lanes continuing on I-84. These diverges are very closely spaced, and create additional weaving friction as vehicles position themselves in the correct lane. When the Main Street off-ramp queue eventually spills back to the I-84 Mainline, this weaving becomes increasing more difficult, and queues quickly build on I-84.

Eastbound operations in the AM Peak Period (Figure 5.8) improve slightly, as the reduced I-84 demand eliminates the minor 2012 No Build bottleneck approaching Flatbush Avenue, and the entire corridor to operates at or near free flow speed conditions.

In the PM Peak Period in the westbound direction (Figure 5.9), operations at the Flatbush Avenue bottleneck improve as the toll diversions reduce the throughput demand at this location. While the bottleneck does still form, it occurs later in the PM Peak Period and is lessened in its severity.

In the eastbound direction (Figure 5.10) in the PM Peak Period, the major bottleneck approaching the Bulkeley Bridge over Connecticut River continues to form and create severe congestion, although the effects of the congestion are somewhat improved due to the reduction in demand to cross the Bulkeley Bridge on westbound I-84 from both regional and local toll diversion traffic. The bottleneck west of the I-384 diverge, which is caused by merging and weaving vehicles approaching the I-384 diverge is increased in severity. This bottleneck is worsened as the Split Toll scenario sees diversion traffic joining back onto I-84 after crossing the Connecticut river at the Founders Bridge (local diversion traffic) or the Charter Oak Bridge (regional diversions). The addition demands on merging and weaving along I-84 approaching the I-384 diverge create a moderate increase in the bottleneck severity.

Figure 5.7 I-84 Westbound Speed Contours for AM Peak – Split Toll Scenario

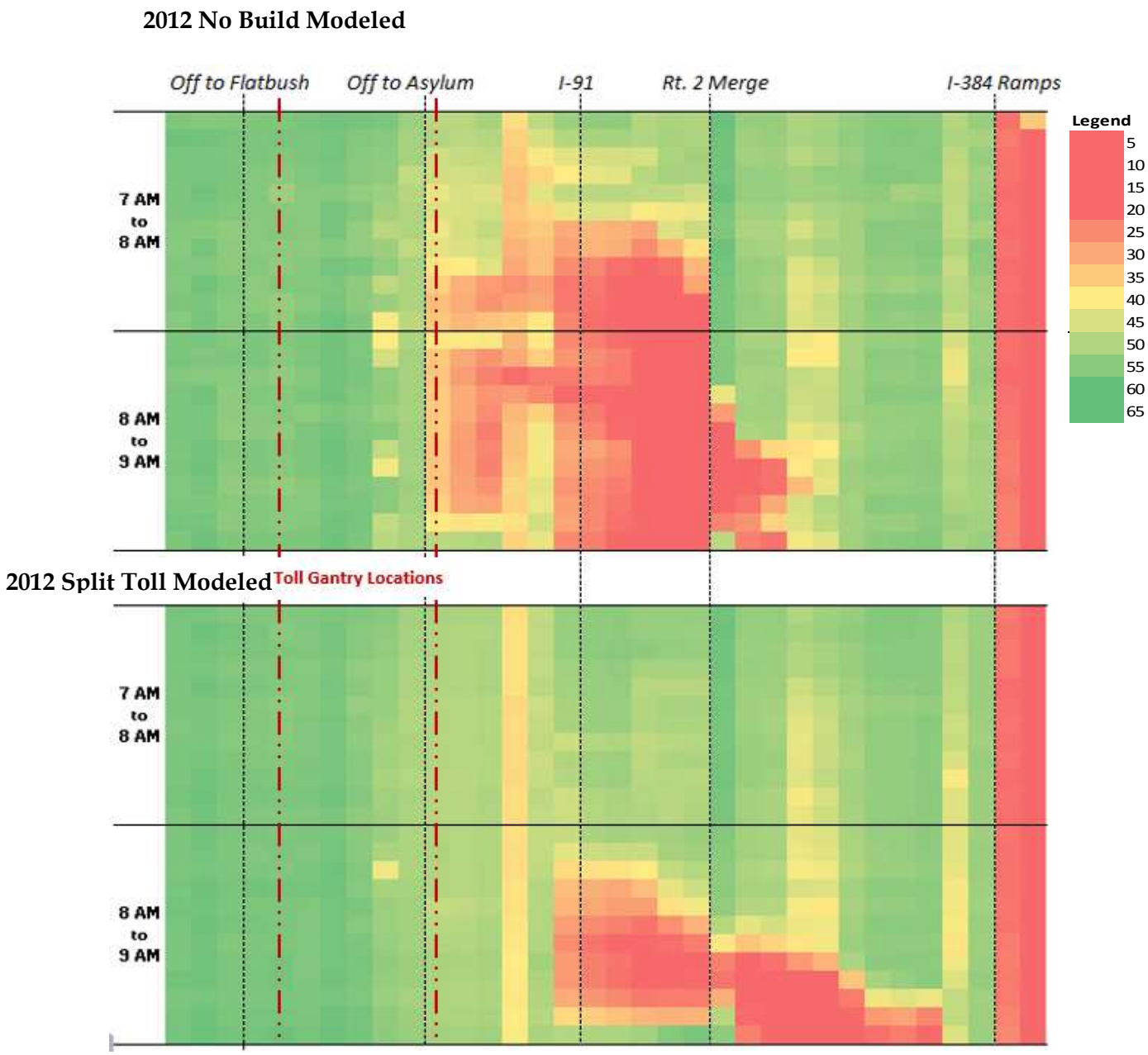


Figure 5.8 I-84 Eastbound Speed Contours for AM Peak – Split Toll Scenario

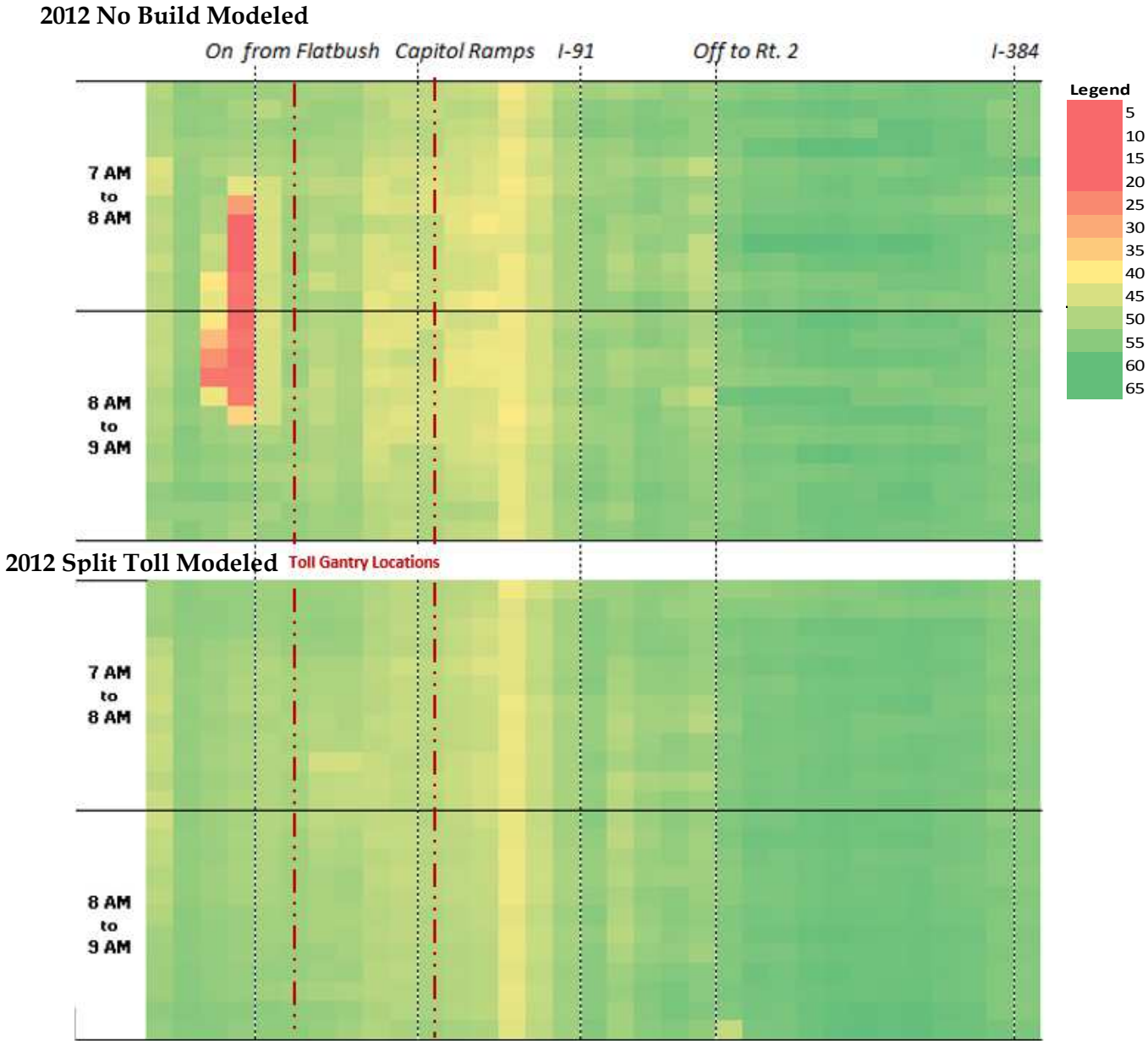
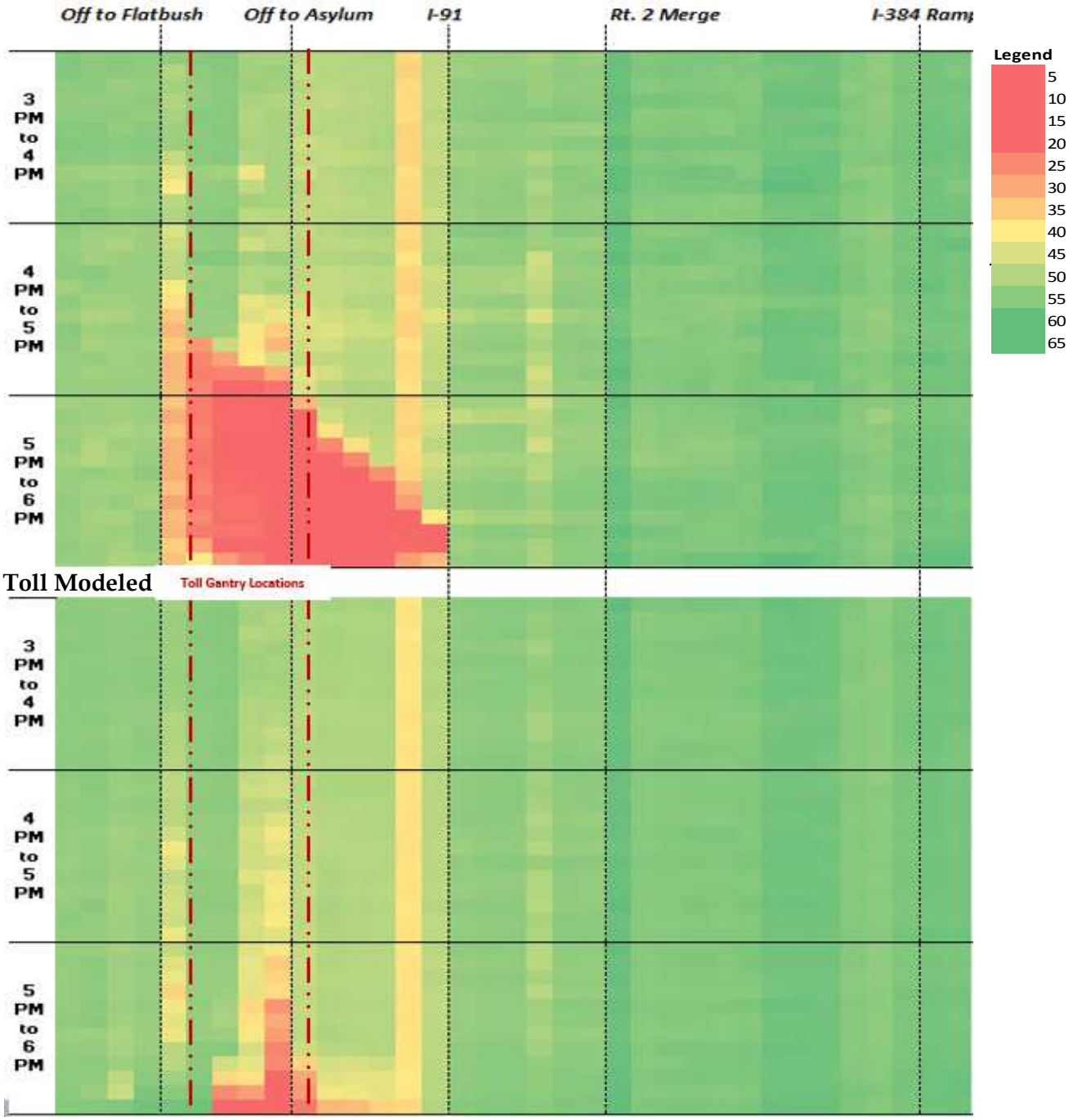


Figure 5.9 I-84 Westbound Speed Contours for PM Peak – Split Toll Scenario

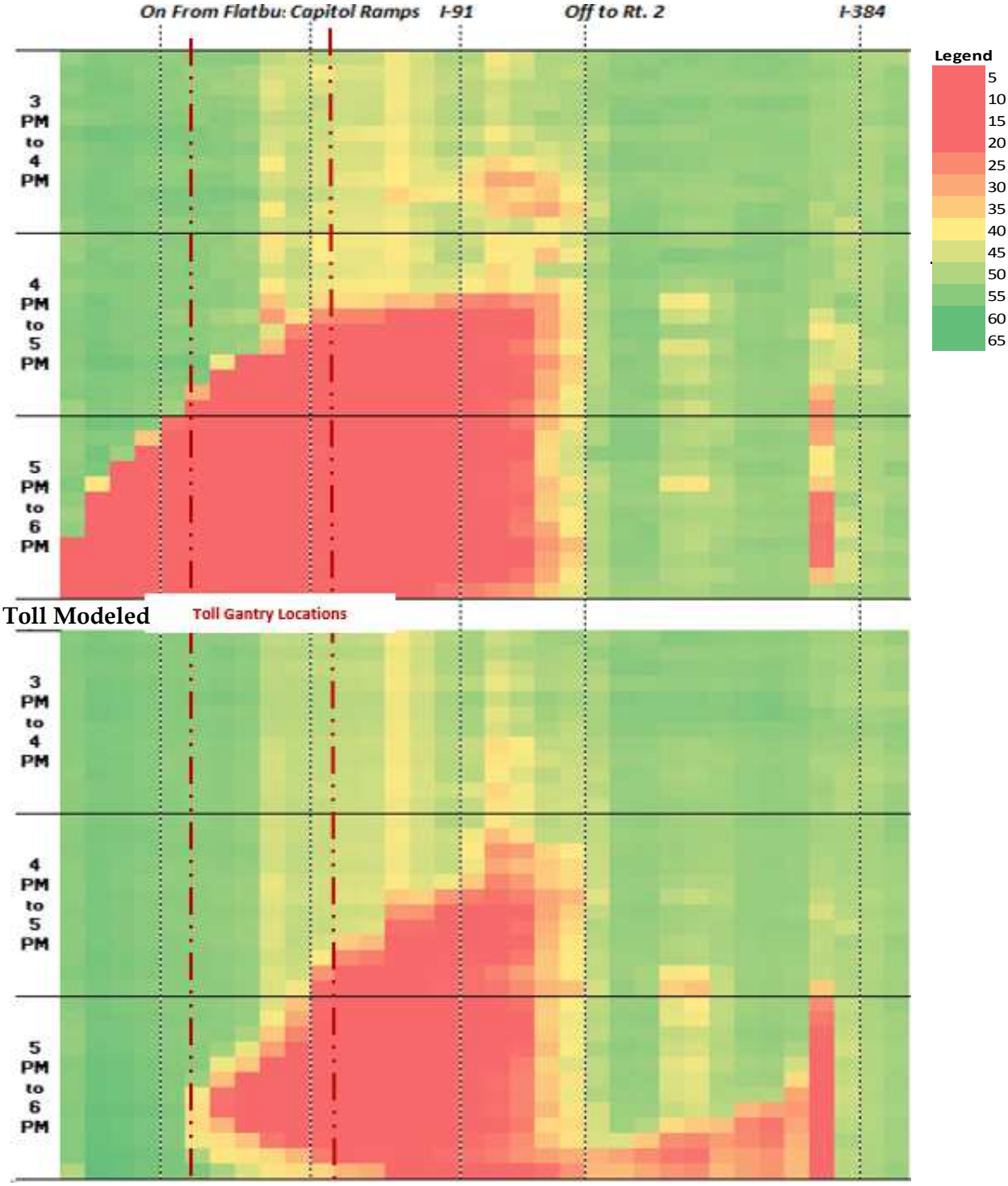
2012 No Build Modeled



2012 Split Toll Modeled

Figure 5.10 I-84 Eastbound Speed Contours for PM Peak – Split Toll Scenario

2012 No Build Modeled



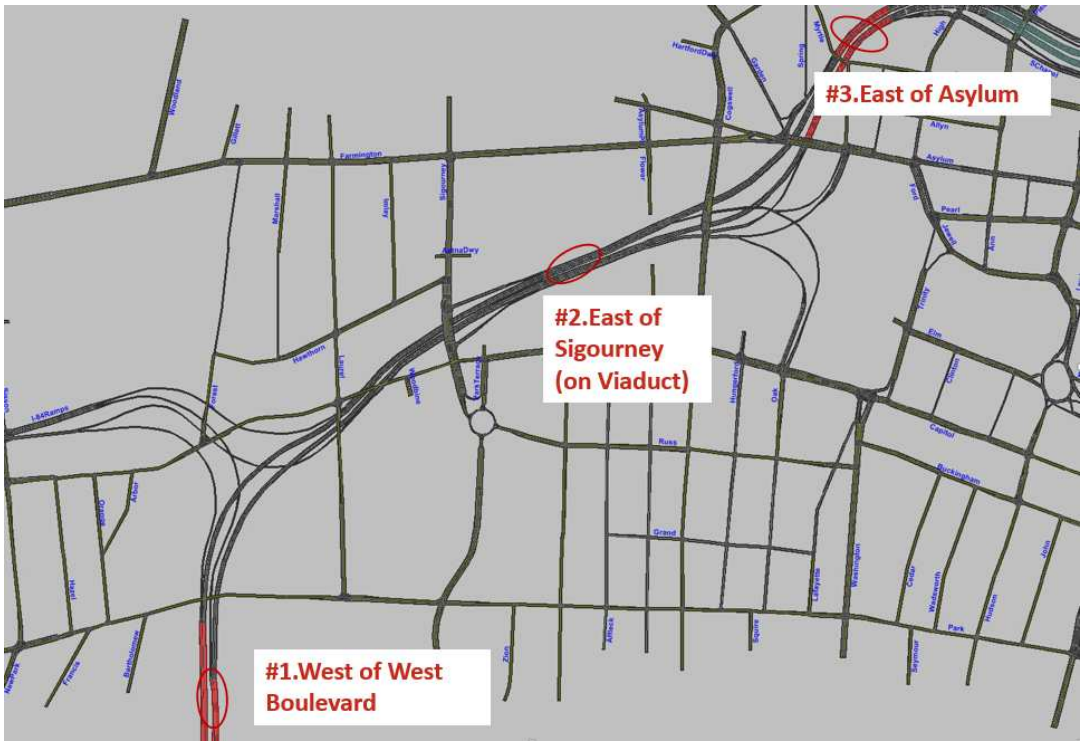
2012 Split Toll Modeled

5.4 SIMULATED THROUGHPUT ON I-84

Following the simulation of the point and split toll scenarios, the simulated throughput at each of the three possible toll gantry locations (as shown in Figure 5.11) was measured.

1. West of the West Boulevard interchange
2. Between the Sigourney Street and Capital Avenue interchanges
3. East of the Asylum Street interchanges

Figure 5.11 I-84 Throughput Measurement Locations



Figures 5.12 and 5.13, respectively, report the resulting simulated total throughput volume for the two hour AM Peak Period and the three hour PM Peak Period. The simulated throughput tracks that actual simulated volume that passes through the potential gantry locations and is reported to understand where and to what degree diversions in traffic is seen in response to tolling and congestion. It is important to note that the throughput may be less than the demand under heavily congested queuing conditions.

Point Toll Scenario

In the 2012 Point Toll scenario during the AM Peak Period, the eastbound direction of I-84 sees overall reductions in the throughput along the mainly free-flow I-84

corridor can be seen at all locations, but larger reductions at the tolling location along the viaduct, indicative of the local diversion response to avoid paying the toll. The westbound direction of I-84 sees a drop in throughput both east of Sigourney Street and east of the Asylum Street off-ramp. There are slight reductions in the throughput from regional diversions away from the I-84 corridor to avoid tolls, as is evident in the overall reduction in throughput at all three measurement locations. However, the majority of the drop in throughput is caused by local toll diversions to avoid using the now tolled viaduct segment east of Sigourney Street as more traffic tries to exit to the local roadways by using the Asylum Street off-ramp. However, this additional off-ramp demand exacerbates the existing off-ramp congestion and queue spillback issues, creating additional queues and congestion on the mainline. This is evident in both the congestion heat maps presented in the previous section, but also in the reduced volume throughput on I-84 Westbound before the Asylum Street off-ramp.

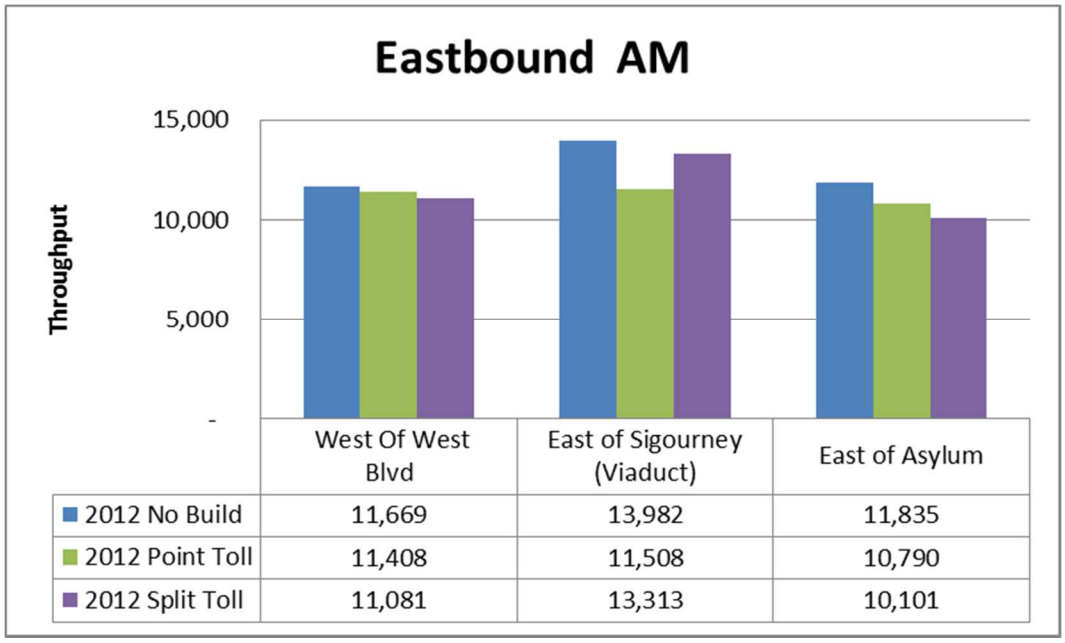
In the PM Peak Period, the eastbound direction of I-84 expectedly sees a reduction in the throughput at the viaduct tolling locations, but also sees an increase in throughput at the western most location (west of West Boulevard). This increase in throughput is created by the improvement in the bottleneck conditions further downstream approaching the Bulkeley Bridge. The overall reduced demand for the I-84 corridor improves reduces the severity of that existing bottleneck and in turns lessens the metering effect that the bottleneck has on throughput upstream of this location, thus increasing the throughput in over the 2012 No Build scenario. In the westbound direction, similar effects are seen in the PM Peak Period as the AM Peak Period, as traffic attempts to avoid the toll on the viaduct and creates a PM Period congestion condition at the Asylum Street off-ramp that is similar in nature to the existing bottleneck seen in the AM Peak Period, although lessened in severity.

Split Toll Scenario

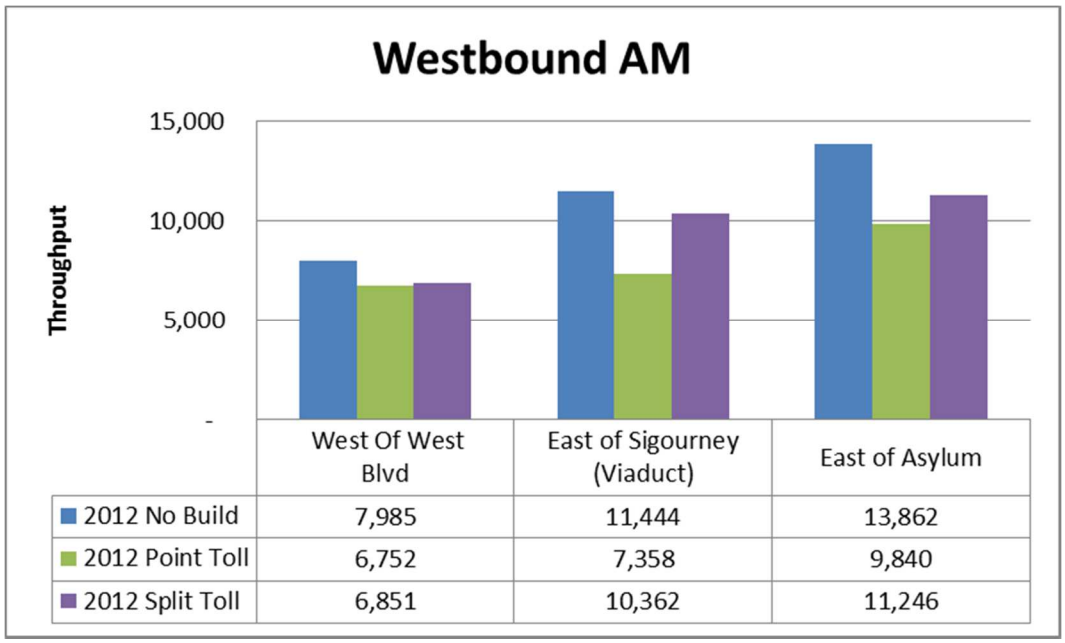
In the 2012 Split Toll scenario there is small reduction in throughput at the two split toll gantry locations (west of West Boulevard and east of the Asylum Street off-ramp) in both directions and in each peak period as compared to the 2012 No Build scenario. Overall, the Split Toll scenario retains more traffic along the I-84 corridor than the Point Toll scenario does.

As expected, the split toll lessens the severity of the local diversions through the study area by spreading more of the diversions throughout the system instead of concentrating it at a single point. However, there are still diversions that are seen throughout the study area, most notably eastbound traffic exiting at Kane Street to use local arterials to access downtown, and westbound traffic exiting at Main Street.

Figure 5.12 Simulated Throughput on I-84: AM Peak

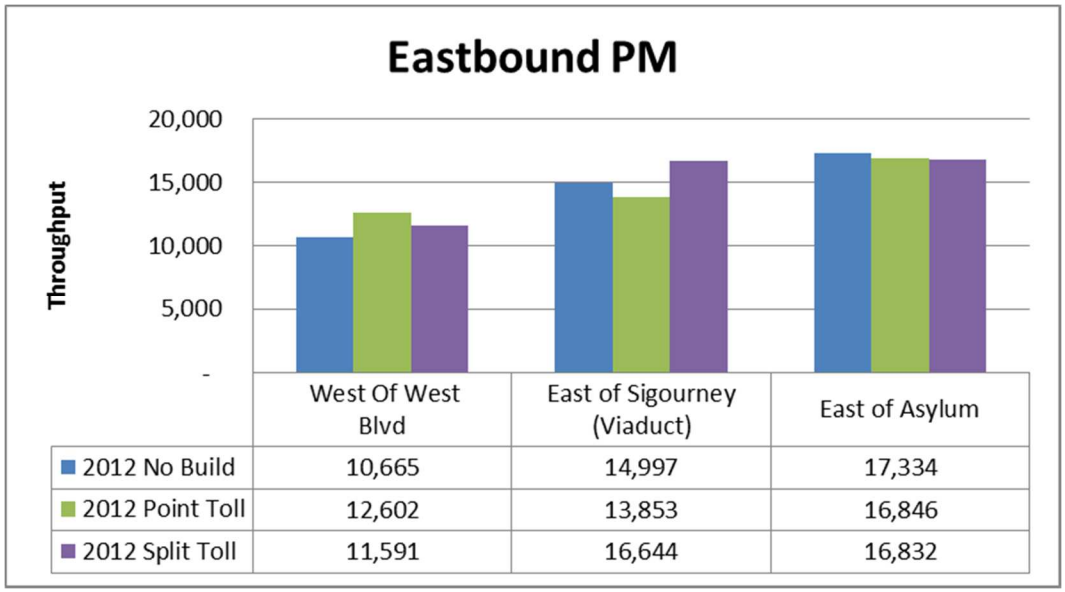


	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	11,669	13,982	11,835
2012 Point Toll	11,408	11,508	10,790
2012 Split Toll	11,081	13,313	10,101

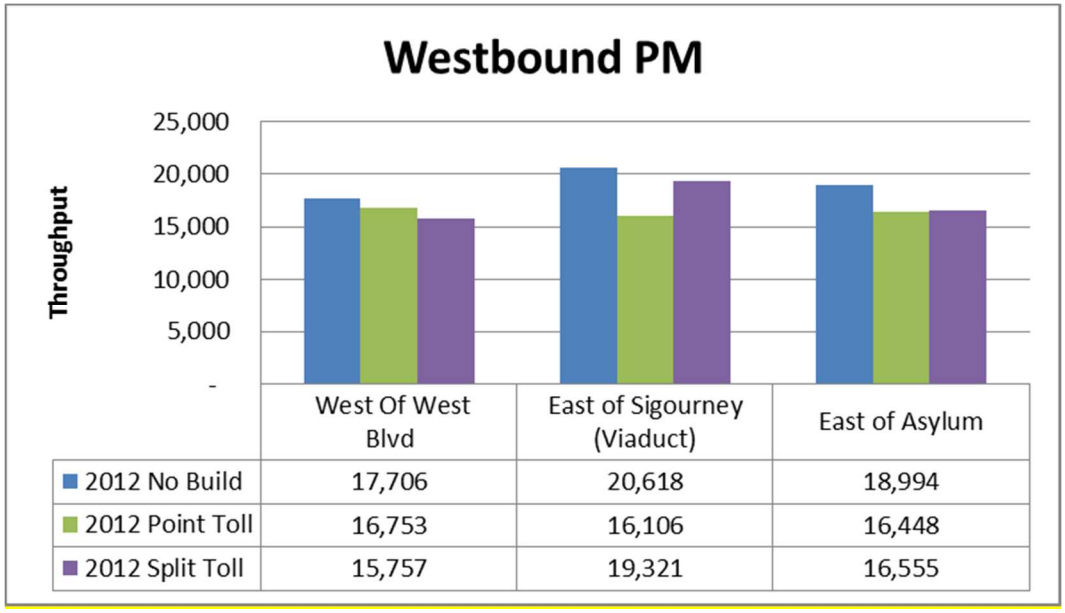


	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	7,985	11,444	13,862
2012 Point Toll	6,752	7,358	9,840
2012 Split Toll	6,851	10,362	11,246

Figure 5.13 Simulated Throughput on I-84: PM Peak



	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	10,665	14,997	17,334
2012 Point Toll	12,602	13,853	16,846
2012 Split Toll	11,591	16,644	16,832



	West Of West Blvd	East of Sigourney (Viaduct)	East of Asylum
2012 No Build	17,706	20,618	18,994
2012 Point Toll	16,753	16,106	16,448
2012 Split Toll	15,757	19,321	16,555

5.5 SYSTEMWIDE PERFORMANCE MEASURES IN TOLLING SCENARIOS

While the previous sections quantified the impacts of tolling on the I-84 freeway operations, the operational impacts on the arterials and local roadways of the local diversion traffic must also be examined. The following figures present the VMT, VHT, and average speed for different classes of roadways throughout the AM and PM Peak Periods for the 2012 No Build, 2012 Point Toll, and 2012 Split Toll scenarios.

In the 2012 Point Toll scenario, westbound traffic seeks to exit from I-84 predominately at the Asylum Street off-ramp and use alternative local diversion routes through the surface street network to avoid paying the toll. Similarly, eastbound traffic on I-84 exits early at Prospect Avenue to avoid the point toll gantry along the viaduct. In the 2012 Split Toll scenario, local diversion traffic is somewhat more dispersed, but the network still sees diversion traffic exiting westbound I-84 onto the Main Street off-ramp and eastbound off-ramp traffic at Prospect Avenue and Capital Avenue. Under both tolling scenarios, from these exit points the local diversion traffic will use the surface street arterial network to complete their trips, with relatively significant increase in traffic seen along the major east-west arterials, including Farmington Avenue, Capital Avenue, Park Street, and Chapel Street.

In both the AM and PM Peak Periods, this local diversion traffic creates additional demand for the arterial and local street roadways, some which are already operating at or near capacity during peak conditions. While the simulation analyses considered minor additional improvements such as re-striping of turn lanes or addition or extension of turn bays which would not likely require right-of-way takings or major construction efforts, the arterial system still operates at capacity in key locations and significant increases in congestion can be seen in the decrease in the arterial and local roadway average speeds. In both conditions, this effect is more impactful in lowering the operational conditions on the arterial in the already more congested PM Peak Period.

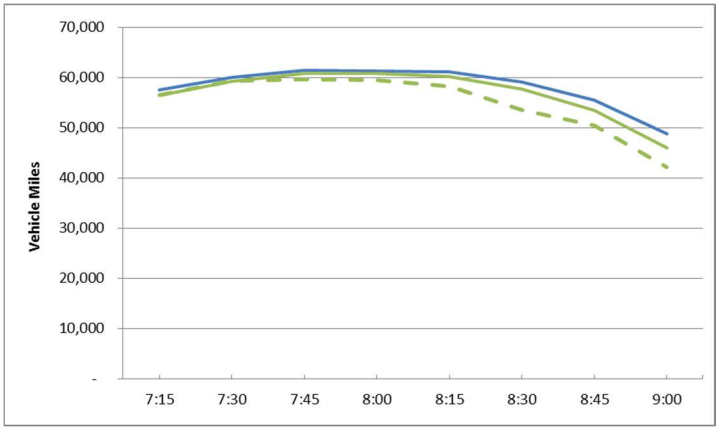
These impacts are much more significant in the Point Toll scenario where the diversion vehicles are more concentrated and add to an already oversaturated operating condition at the Asylum Street off-ramp. While these problems may possibly be resolved with a redesign of the Asylum Avenue, Farmington Avenue, and Broad Street intersections, significant improvements would likely be needed Overall in the AM Peak Period, the total VMT on the study area roadways can be seen to increase on the arterials and local roadways, with more substantial increases in VHT and decreases in the average speed. This effect is even stronger in the PM Peak Period, with average travel speeds across the entire surface street network dropping by more than half during the core of the peak period.

The Split Toll scenario operates better that the Point Toll scenario as the vehicles avoiding to pay the toll are spread across more exits as compared to the point toll

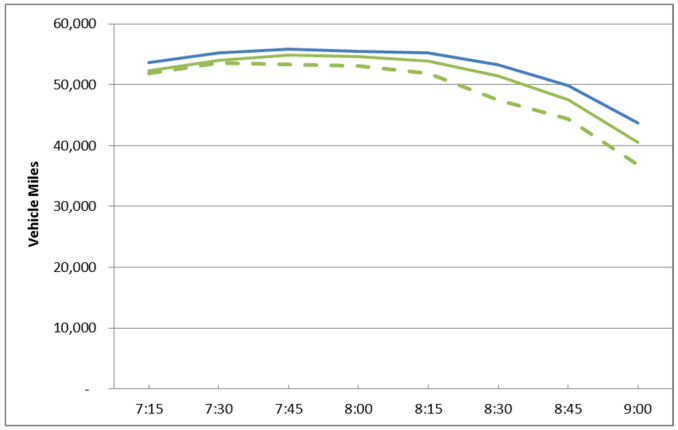
scenario. An additional benefit for the Split Toll scenario is that is discourages travel on the already congested Asylum Street off-ramp. While that traffic primarily diverts to the Main Street off-ramp, there could be better opportunities to add capacity along Chapel Street.

Overall in the AM Peak Period in the Split Toll scenario, the operations on the arterials see more demand, with VHT increases and average speed decreases. However, the local roadways do not see as large of deterioration of operational conditions, which is an indication that the arterial roadways are better able to serve the additional local diversion traffic without that traffic seeking even lower class roadways to avoid increased congestion. During the PM Peak Period, however, the increase in VHT and decrease in average speeds are relatively close in relative magnitude, indicating that the surface street network is saturated and vehicles are seeking even the lowest local class roadways to attempt to avoid congestion on the arterial network.

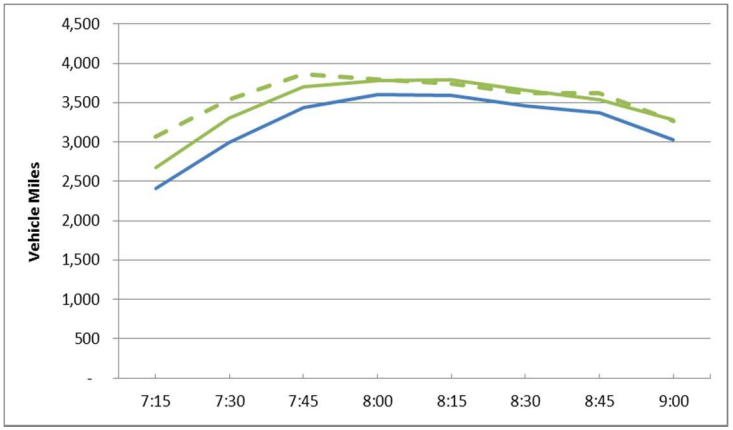
Figure 5.14 Vehicle Miles Traveled (VMT) – AM Peak



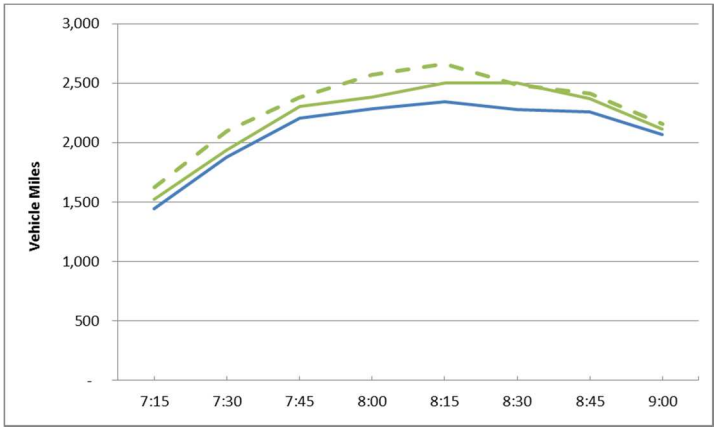
Network Wide



Freeway & Ramps



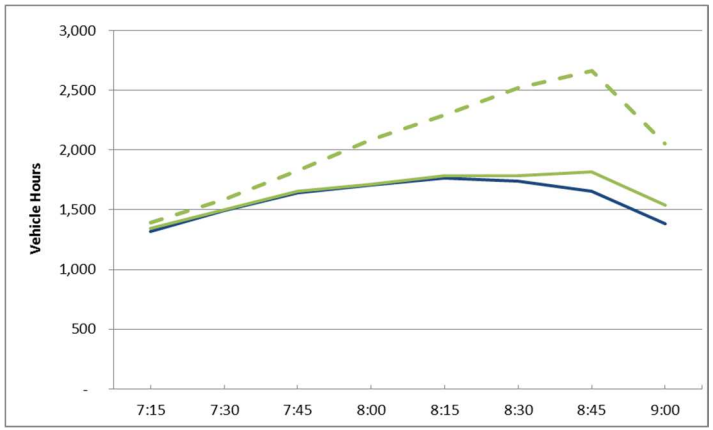
Arterials Streets



Local & Collector Streets

VMT 2012 No Build
VMT 2012 Point Toll
VMT 2012 Split Toll

Figure 5.15 Vehicle Hours Traveled (VHT) – AM Peak



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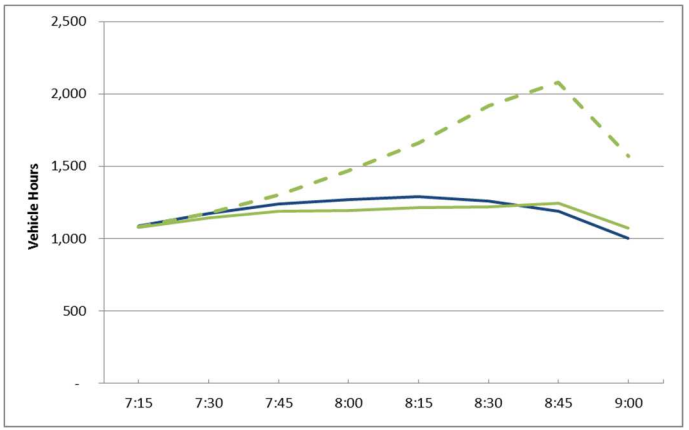
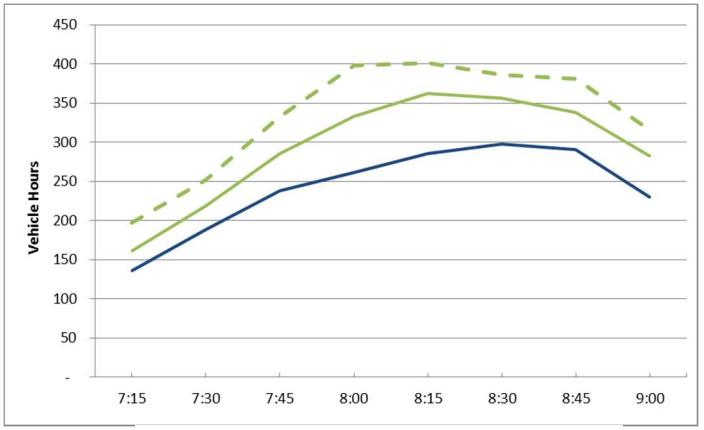
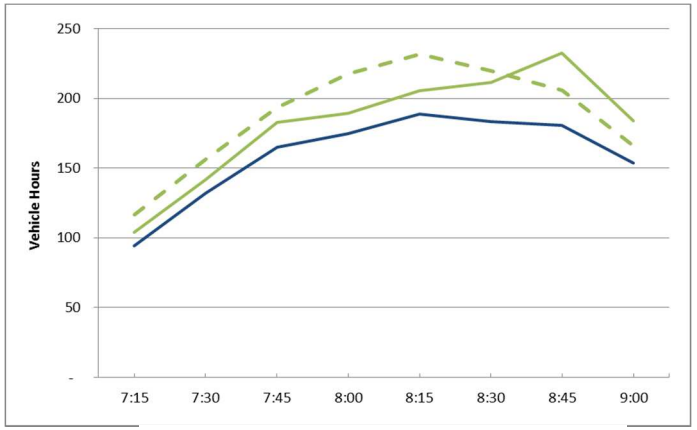


Freeway & Ramps



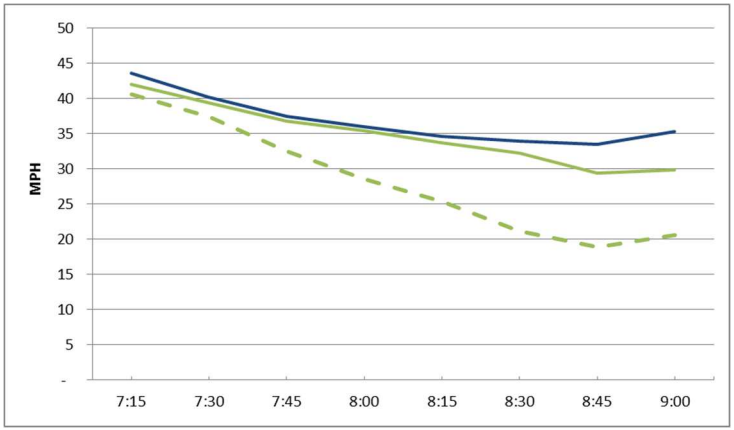
Arterials Streets



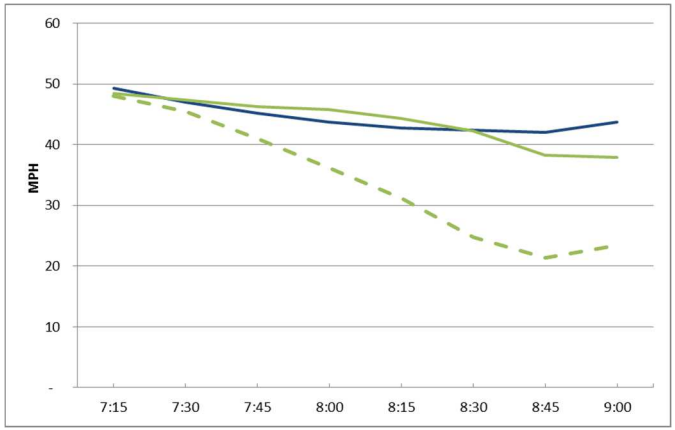
Local & Collector Streets

VHT 2012 No Build
VHT 2012 Point Toll
VHT 2012 Split Toll

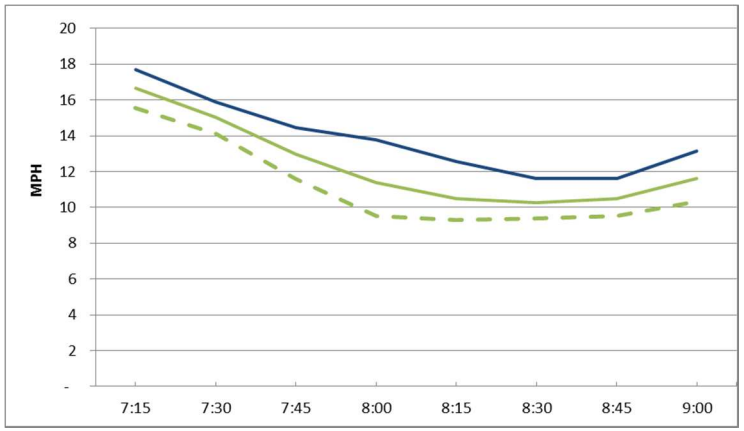
Figure 5.16 Average Speed – AM Peak Period



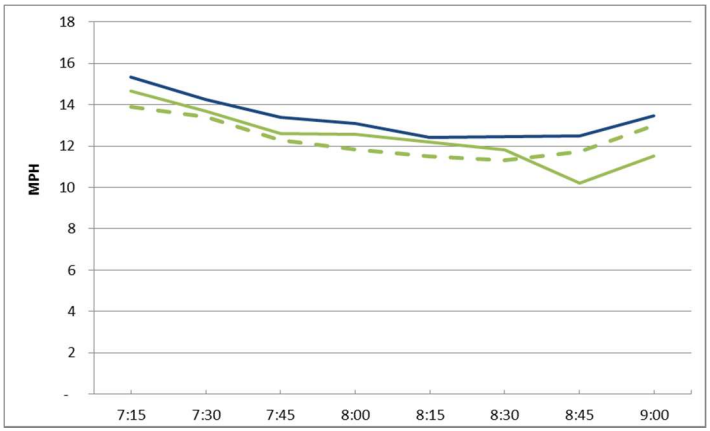
Network Wide



Freeway & Ramps



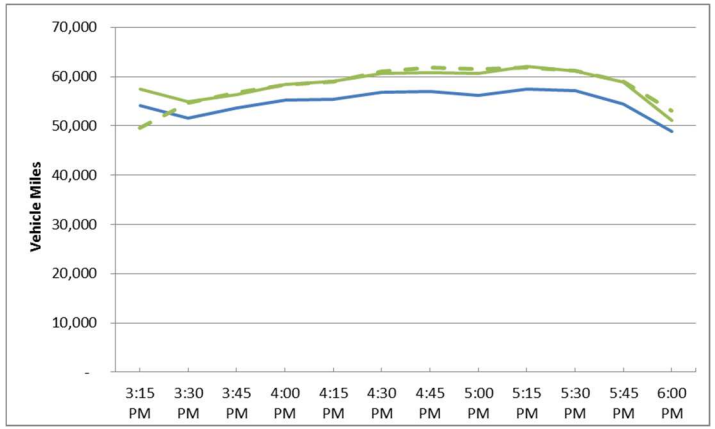
Arterials Streets



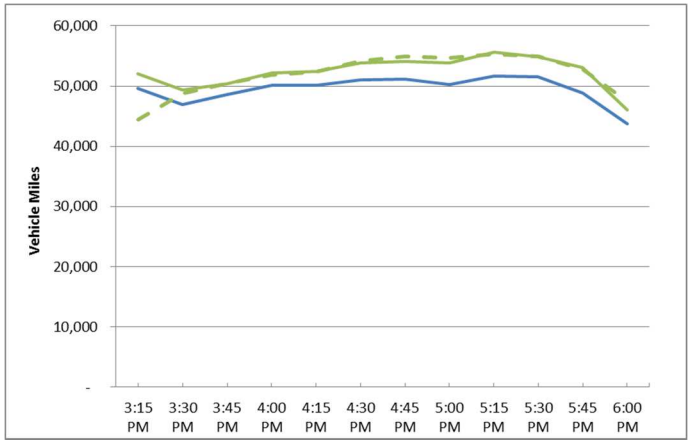
Local & Collector Streets

Avg. 2012 Speed No Build
Avg. 2012 Speed Point Toll
Avg. 2012 Speed Split Toll

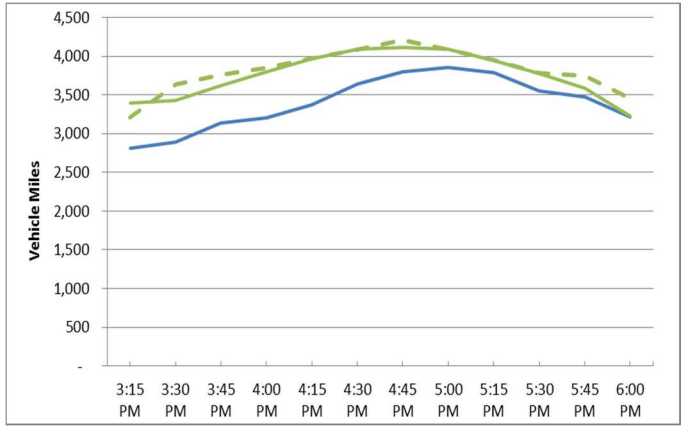
Figure 5.17 Vehicle Miles Traveled (VMT) – PM Peak



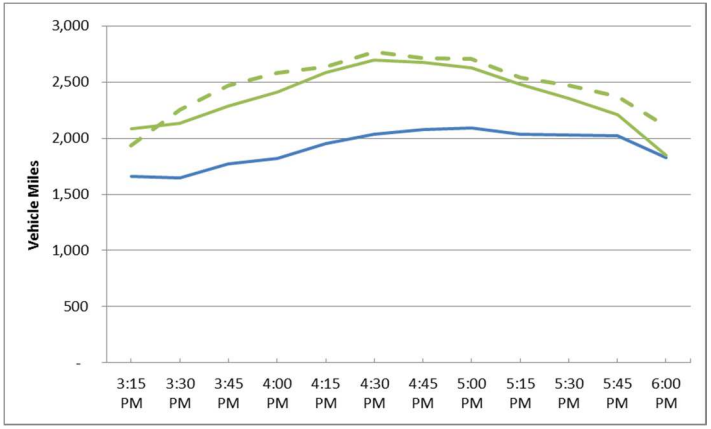
Network Wide



Freeway & Ramps



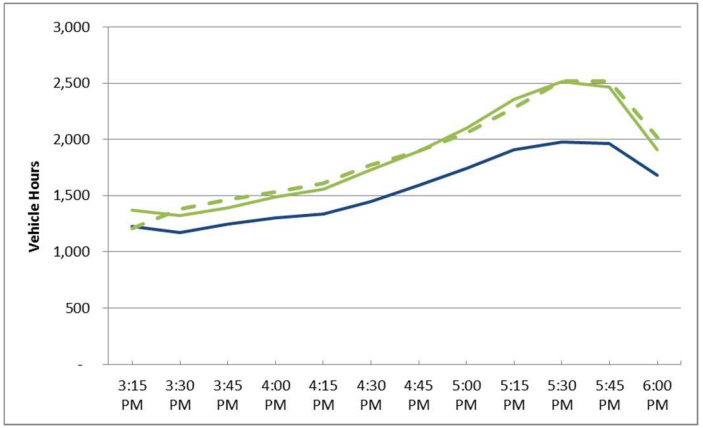
Arterials Streets



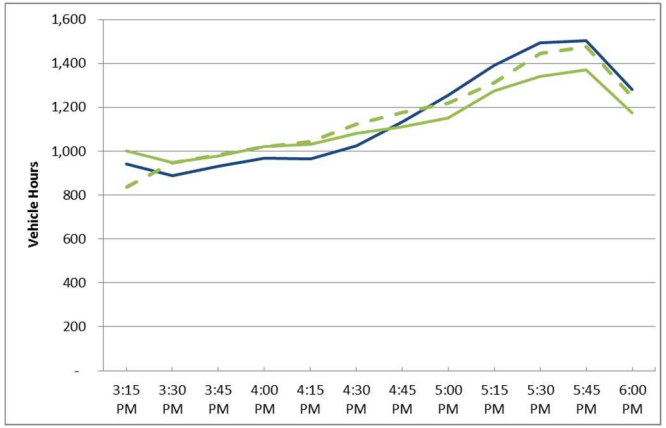
Local & Collector Streets

VMT 2012 No Build
VMT 2012 Point Toll
VMT 2012 Split Toll

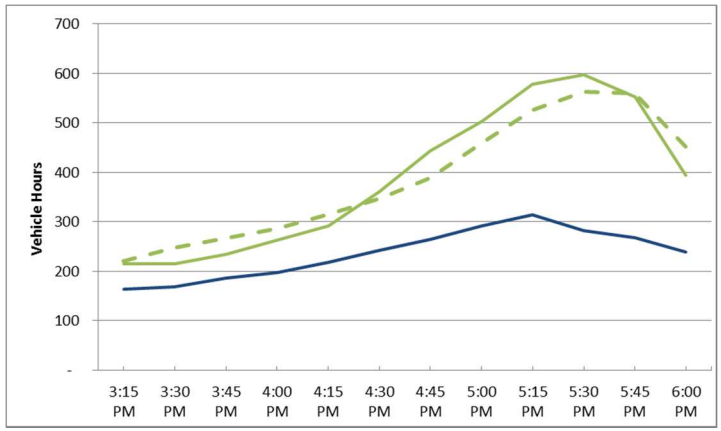
Figure 5.18 Vehicle Hours Traveled (VHT) – PM Peak



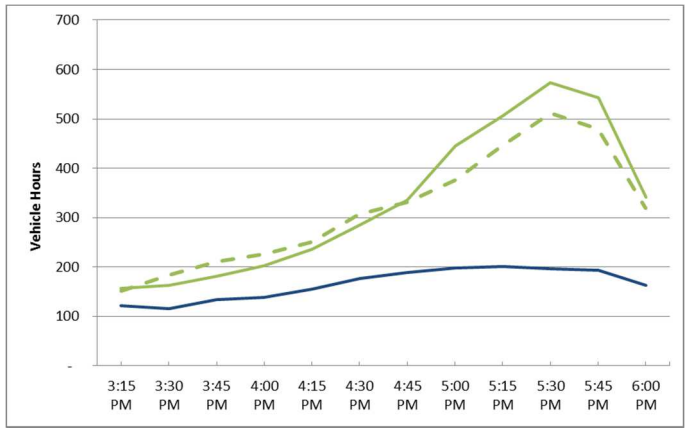
Network Wide



Freeway & Ramps



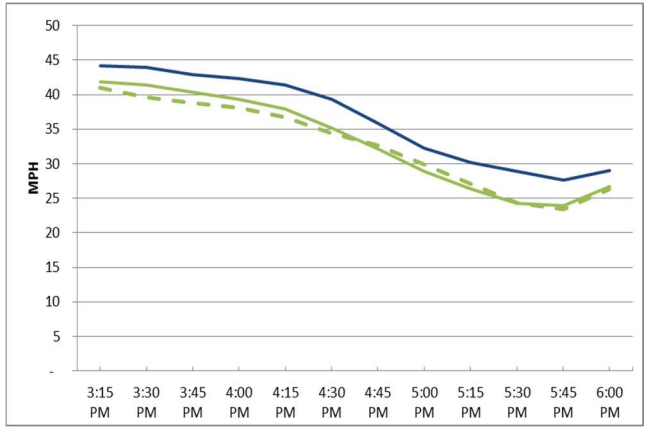
Arterials Streets



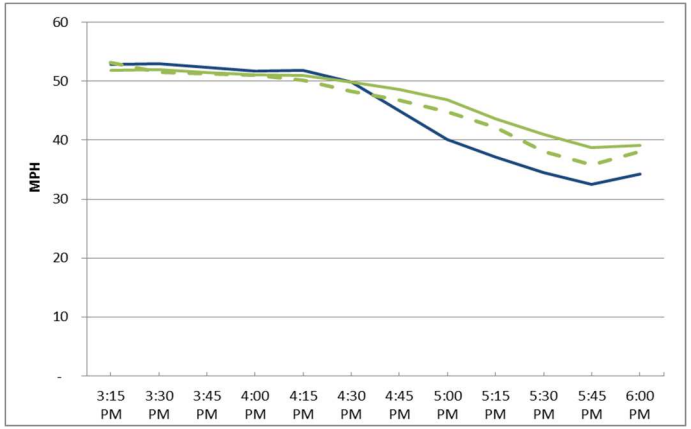
Local & Collector Streets

VHT 2012 No Build
VHT 2012 Point Toll
VHT 2012 Split Toll

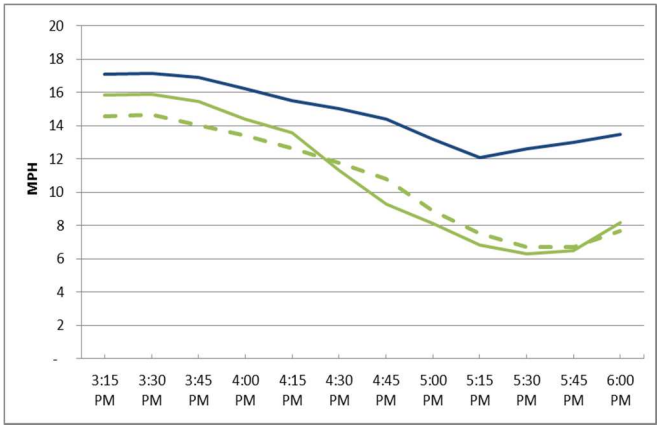
Figure 5.19 Average Speed – PM Peak Period



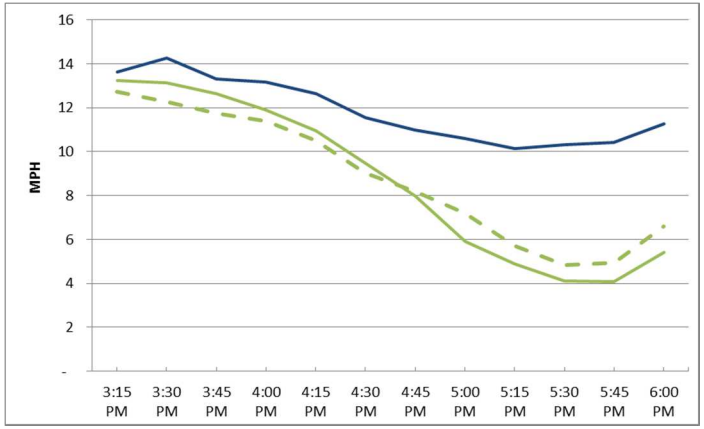
Network Wide



Freeway & Ramps



Arterials Streets



Local & Collector Streets

Avg. 2012 Speed No Build
Avg. 2012 Speed Point Toll
Avg. 2012 Speed Split Toll

6.0 Conclusions

The purpose of the microsimulation components of the I-84 Value Pricing Pilot Program Study was to estimate the impacts of tolling on the operations of both I-84 and the adjoining surface street roadways in Hartford and its surrounding communities. Based on the microsimulation modeling analysis completed for this project, significant insight was gained in terms of probable impacts of the viaduct tolling scenarios which will help in identifying locations in the transportation network which should be considered for operational and design improvements.

Even with a slight per annum increase in demand over 28 years it was noticed that the current committed projects would not be enough to handle the transportation demand in the Hartford region under the forecasted 2040 conditions. While the best available alternative (Alternative 6A) which as available at the time of this analysis was shown to be insufficient in addressing the future traffic needs of the corridor, the ongoing parallel I-84 Hartford Project is actively considering multiple designs to replace or rehabilitate the aged existing viaduct infrastructure with an improved corridor operations for the future needs are being considered.

Should tolling be included in those future development plans, the findings of this analysis effort study can shed light on how the tolling diversion impacts may impact the future corridor needs. The tested toll scenarios have a potential to improve the operation of the freeway, but the toll gantry location(s) should be considered keeping in mind the possible locations of diversions to the arterial network. Even with moderate toll rates and a limited number of local diversion trips, the existing capacity of the Hartford surface street system may not be able to accommodate those drivers who attempt to avoid paying the toll.

Of the two tested tolling scenarios, the Split Toll scenario is the better candidate for further detailed study with improved operations of the freeway. The Split Toll scenario both minimizes and better distributes the local toll diversion traffic onto the surrounding arterial street system. However, there are still several areas and intersections of the Hartford street network that may need additional capacity improvements to accommodate the toll diversion traffic and to keeping Hartford's roadways operating at acceptable levels of operations.