Appendices

Connecticut I-95 Corridor Congestion Relief Study

Appendix A

I-95 / MERRITT PARKWAY DENSITY SURVEY

APRIL 2013

Prepared for the Connecticut Department of Transportation
By Skycomp, Inc.
in association with CD Smith

Skycomp

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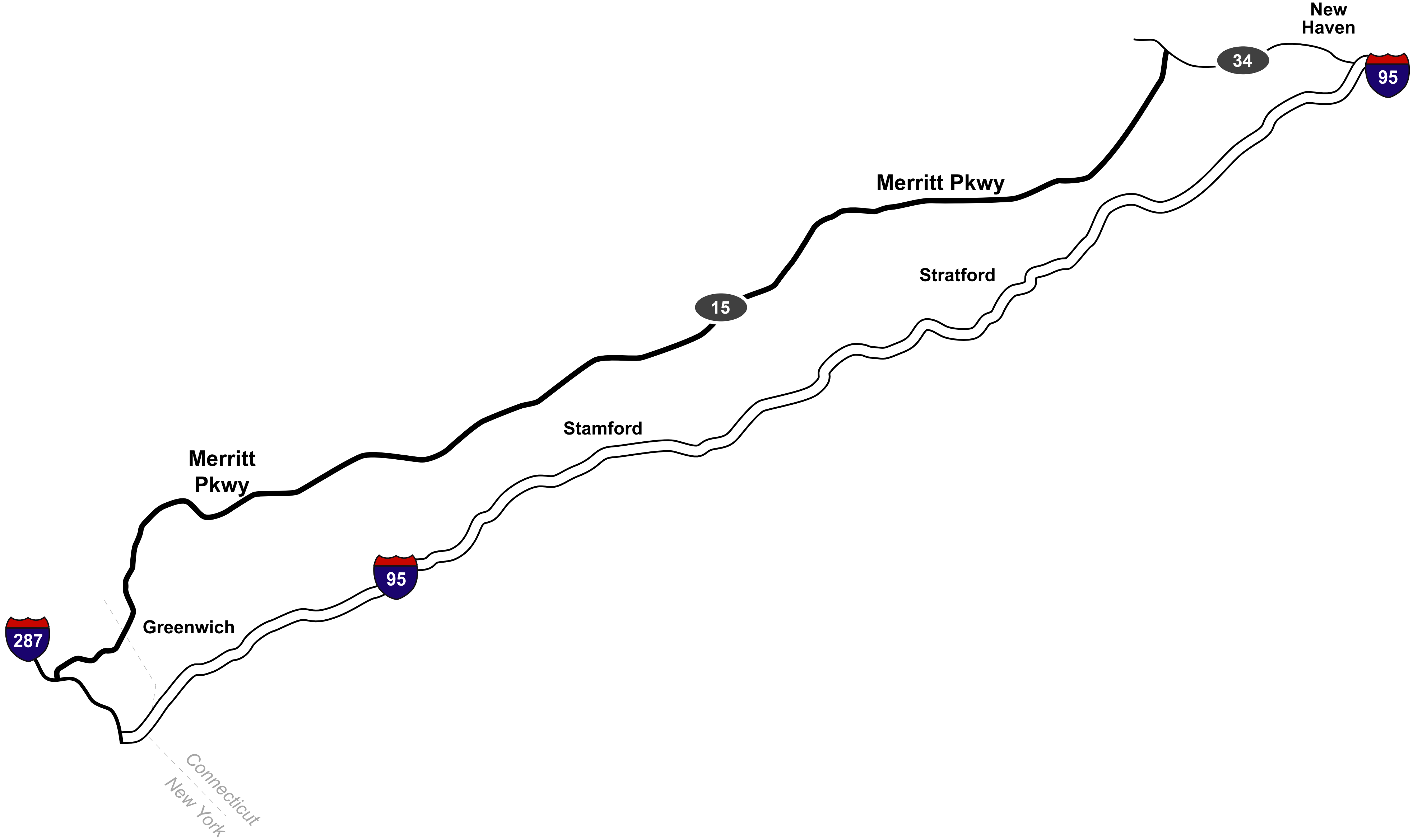
SURVEY AREA
I-95 & Merritt Parkway



Introduction
In April 2013, Skycomp acquired overlapping aerial photography of I-95 and Merritt Parkway for the purpose of obtaining traffic densities. Using a fixed winged aircraft, Skycomp documented traffic conditions during 3-hour morning and evening peak periods over the course of four days.

Survey Area
As shown in the graphic on opposite page, the survey limits for each highway were between I-287 to the south and SR 34 in New Haven to the north.

Survey Schedule
Skycomp conducted four morning survey flights and four evening flights. The on-station times were 6:30-9:30 a.m. and 4:00-7:00 p.m., restricted to Tuesdays, Wednesdays and Thursdays. The sample interval was 60 minutes, resulting in an average of three samples of all highway miles during each flight (12 morning and 12 evening passes total).

Methodology - Densities
After survey flights were completed, all photographs were sorted by highway and by time period. A segmentation "guidebook" was then assembled for each highway to guide data reduction. From the overlapping time-stamped photographs, densities by highway segment were determined by manual counts taken along the entire segment length. Vehicles were classified as cars, trucks, buses, or tractor-trailers when counted; later, passenger-car equivalents (PCE's) were derived according to the following table:

<u>Vehicle type: PCE's:</u>
Cars 1.0
Buses 1.5
Trucks 1.5
Tractor-trailers 2.0

Data that were atypical due to roadwork or to known or suspected incidents were coded for exclusion from the averaging process. All data were then entered into the density database (Microsoft Access), which performed the following tasks: 1) samples were grouped by time slice (30 minutes); 2) average densities were calculated (typically two observations per 30 minute period); and 3) densities were converted into service levels "A" through "F". The computer then prepared matrices showing each averaged service level rating plotted by time and highway segment. These data matrices were then copied into Density and Level-of-Service tables.

Methodology – Bottlenecks Database
In addition to density and level-of-service tables, Skycomp produced a "bottlenecks" database for I-95 and Merritt Parkway. During the analysis stage, all locations on the ramps and mainlines that generated persistent queuing were listed in each database. The location of the head of each queue, the approximate queue length, and apparent underlying cause, where evident, were included.

Highlight Aerial Photography
For each congested zone or interchange in the bottlenecks database, highlight digital photographs (drawn from the photo sets used for data reduction) were selected that illustrate typical conditions found. These photographs have been grouped by bottleneck number and delivered in a suitable viewing format (jAlbum).

Deliverables
1. Density Database: All data associated with densities in a Microsoft Access database.
2. Density and Level-of-Service Tables: Average density and level-of-service tables are provided in this report.
3. Bottlenecks Database: A list of all mainline bottlenecks to include the location of the head of the queue, the approximate queue length, and apparent underlying cause where evident.
4. Ramp and side road queues: A list of locations where queuing was found on the entrance and exit ramps as well as roads crossing the surveyed highway.
5. Archive of Highlight Aerial Photography: For each congested zone in the bottlenecks database, highlight digital photographs illustrate typical conditions found; these photographs are grouped by bottleneck number and assembled in a jAlbum catalog for viewing.

Questions
If there are any questions about this survey effort, the findings or the underlying methodology, please direct them to Greg Jordan at 410-884-6900, ext. 33, or to jordan@skycomp.com.

Part I: I-95

MORNING DENSITY (I-95)

I-95

(Between I-287 & US 1/Boston Post Rd)

Density

Morning (April, 2013)

SOUTHBOUND

Time	21 I-287 – 2 Delavan Ave Density	2 Delavan Ave – 3 Arch St Density	3 Arch St – 4 Indian Field Rd Density	4 Indian Field Rd – 5 E Putnam Ave Density	5 E Putnam Ave – 6 West Ave Density	6 West Ave – 7 Washington Blvd Density	7 Washington Blvd – 8 Elm St Density	8 Elm St – 9 US 1 (Boston Post Rd) Density
6:30-7:00	15	18	21	20	23	27	26	21
7:00-7:30	17	19	21	23	24	33	16	25
7:30-8:00	21	21	27	30	37	43	26	25
8:00-8:30	20	20	37	28	34	49	79	42
8:30-9:00	20	21	39	44	43	45	35	29
9:00-9:30	17	17	44	25	31	36	38	28

I-95

NORTHBOUND

Time	21 I-287 – 2 Delavan Ave	2 Delavan Ave – 3 Arch St	3 Arch St – 4 Indian Field Rd	4 Indian Field Rd – 5 E Putnam Ave	5 E Putnam Ave – 6 West Ave	6 West Ave – 7 Washington Blvd	7 Washington Blvd – 8 Elm St	8 Elm St – 9 US 1 (Boston Post Rd)
6:30-7:00	24	21	23	20	23	20	11	21
7:00-7:30	21	22	18	22	20	20	14	21
7:30-8:00	25	27	24	28	27	36	17	26
8:00-8:30	43	42	35	44	32	39	17	28
8:30-9:00	63	47	32	42	29	39	22	18
9:00-9:30	50	49	50	43	31	39	26	19

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (I-95)

I-95

(Between US 1/Boston Post Rd & SR 476/Sherwood Connector)

Density

Morning (April, 2013)

SOUTHBOUND ←

Time	Density	Density	Density	Density	Density	Density	Density	Density	Density
	9 US 1 (Boston Post Rd) – 10 Noroton Ave	10 Noroton Ave – 11 US 1 (Boston Post Rd)	11 US 1 (Boston Post Rd) – 12 SR 136 (Tokeneke Rd)	12 SR 136 (Tokeneke Rd) – 13 US 1 (Boston Post Rd)	13 US 1 (Boston Post Rd) – 14 South Norwalk	14 South Norwalk – 15 US 7	15 US 7 – 16 East Ave	16 East Ave – 17 Saugatuck Ave	17 Saugatuck Ave – 18 SR 476 (Sherwood Connector)
6:30-7:00	28	25	30	34	31	44	47	33	35
7:00-7:30	26	30	33	30	33	59	69	39	41
7:30-8:00	35	31	36	34	57	58	92	72	58
8:00-8:30	32	31	43	51	53	64	94	72	85
8:30-9:00	34	36	32	49	59	72	96	74	98
9:00-9:30	32	35	36	54	41	56	67	70	85

I-95

NORTHBOUND →

Time	9 US 1 (Boston Post Rd) – 10 Noroton Ave	10 Noroton Ave – 11 US 1 (Boston Post Rd)	11 US 1 (Boston Post Rd) – 12 SR 136 (Tokeneke Rd)	12 SR 136 (Tokeneke Rd) – 13 US 1 (Boston Post Rd)	13 US 1 (Boston Post Rd) – 14 South Norwalk	14 South Norwalk – 15 US 7	15 US 7 – 16 East Ave	16 East Ave – 17 Saugatuck Ave	17 Saugatuck Ave – 18 SR 476 (Sherwood Connector)
6:30-7:00	14	20	17	12	16	18	13	17	14
7:00-7:30	19	17	24	21	20	11	12	17	16
7:30-8:00	19	22	33	24	26	23	26	26	14
8:00-8:30	25	23	32	34	33	17	23	23	21
8:30-9:00	11	23	25	31	49	20	23	28	21
9:00-9:30	20	32	21	19	44	12	19	20	18

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (I-95)

I-95
(Between SR 476 & Connecticut Ave)
Density
Morning (April, 2013)

Interchanges: 18 SR 476 (Sherwood Connector); 19 US 1 (Post Rd); 20 Bronson Rd; 21 Mill Plan Rd; 22 SR 135 (Benson Rd); 23 Meadowbrook Rd; 24 US 1 (Kings Hwy); 25 Fairfield Ave; 26 Wordin Ave; 27 SR 8 / SR 25; 28 Stratford Ave; 29 Connecticut Ave

SOUTHBOUND ←

Time	Density 18–19	Density 19–20	Density 20–21	Density 21–22	Density 22–23	Density 23–24	Density 24–25	Density 25–26	Density 26–27	Density 27–28	Density 28–29
6:30-7:00	38	38	39	46	59	88	62	108	79	85	47
7:00-7:30	44	39	44	53	82	82	87	129	95	75	74
7:30-8:00	49	74	45	56	76	96	86	106	107	86	86
8:00-8:30	70	73	75	80	69	90	49	115	99	72	53
8:30-9:00	77	40	53	87	96	75	60	98	66	65	52
9:00-9:30	75	78	62	83	93	83	70	80	42	26	35

I-95

Time	18–19	19–20	20–21	21–22	22–23	23–24	24–25	25–26	26–27	27–28	28–29
6:30-7:00	15	7	4	12	16	12	9	13	14	10	23
7:00-7:30	16	19	18	12	10	14	12	13	17	14	22
7:30-8:00	19	14	21	26	24	21	20	19	20	15	26
8:00-8:30	21	18	19	17	17	21	13	14	25	15	20
8:30-9:00	18	22	18	26	32	28	18	15	19	15	23
9:00-9:30	16	23	29	11	13	18	13	9	25	15	17

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (I-95)

I-95

(Between Connecticut Ave & Milford Pkwy)

Density

Morning (April, 2013)

SOUTHBOUND ←

Time	Density	Density	Density	Density	Density	Density	Density	Density
	29 Connecticut Ave – 30 SR 113 (Hollister Ave)	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd	31 Honeyspot Rd – 32 Broad St	32 Broad St – 33 Ferry Blvd	33 Ferry Blvd – 34 US 1 (Bridgeport Ave)	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd	35 Schoolhouse Rd – 36 Plains Rd	36 Plains Rd – 38 Milford Pkwy
6:30-7:00	20	21	27	22	20	16	20	23
7:00-7:30	22	25	20	20	17	24	19	27
7:30-8:00	45	47	29	27	25	21	30	31
8:00-8:30	32	54	26	21	19	25	22	22
8:30-9:00	39	41	39	21	20	13	27	22
9:00-9:30	17	17	13	20	19	26	17	18

I-95

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave)	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd	31 Honeyspot Rd – 32 Broad St	32 Broad St – 33 Ferry Blvd	33 Ferry Blvd – 34 US 1 (Bridgeport Ave)	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd	35 Schoolhouse Rd – 36 Plains Rd	36 Plains Rd – 38 Milford Pkwy
6:30-7:00	21	17	10	17	12	13	15	17
7:00-7:30	14	13	10	16	17	14	12	17
7:30-8:00	22	21	28	20	21	24	25	21
8:00-8:30	21	17	16	22	19	15	14	12
8:30-9:00	19	13	17	21	13	12	16	20
9:00-9:30	18	18	8	16	13	12	12	12

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
Yellow	31-40
Orange	41-62
Red	> 62

MORNING DENSITY (I-95)

I-95

(Between Milford Pkwy & SR 34)

Density

Morning (April, 2013)

SOUTHBOUND ←

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd) Density	39 US 1 (Boston Post Rd) – 40 Woodmont Rd Density	40 Woodmont Rd – 41 Marsh Hill Rd Density	41 Marsh Hill Rd – 42 Sawmill Rd Density	42 Sawmill Rd – 43 1st Ave Density	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd) Density	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34 Density
6:30-7:00	23	22	18	21	25	28	26
7:00-7:30	24	24	22	22	25	24	28
7:30-8:00	33	21	21	26	29	35	28
8:00-8:30	29	21	25	24	23	23	28
8:30-9:00	28	28	20	23	21	25	27
9:00-9:30	22	20	20	23	19	23	22

I-95 ← I-95

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd)	39 US 1 (Boston Post Rd) – 40 Woodmont Rd	40 Woodmont Rd – 41 Marsh Hill Rd	41 Marsh Hill Rd – 42 Sawmill Rd	42 Sawmill Rd – 43 1st Ave	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd)	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34
6:30-7:00	15	15	22	17	30	15	
7:00-7:30	20	21	19	24	44	29	25
7:30-8:00	32	30	25	31	44	44	31
8:00-8:30	25	25	22	33	54	46	35
8:30-9:00	26	18	21	22	42	21	29
9:00-9:30	21	17	14	19	21	20	18

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (I-95)

I-95

(Between I-287 & US 1/Boston Post Rd)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND

Time	21 I-287 – 2 Delavan Ave LOS	2 Delavan Ave – 3 Arch St LOS	3 Arch St – 4 Indian Field Rd LOS	4 Indian Field Rd – 5 E Putnam Ave LOS	5 E Putnam Ave – 6 West Ave LOS	6 West Ave – 7 Washington Blvd LOS	7 Washington Blvd – 8 Elm St LOS	8 Elm St – 9 US 1 (Boston Post Rd) LOS
6:30-7:00	B	B	C	C	C	D	C	C
7:00-7:30	B	C	C	C	C	D	B	C
7:30-8:00	C	C	D	D	E	E	C	C
8:00-8:30	C	C	E	D	D	F	F	E
8:30-9:00	C	C	E	E	E	E	D	D
9:00-9:30	B	B	E	C	D	E	E	D

I-95

NORTHBOUND

Time	21 I-287 – 2 Delavan Ave	2 Delavan Ave – 3 Arch St	3 Arch St – 4 Indian Field Rd	4 Indian Field Rd – 5 E Putnam Ave	5 E Putnam Ave – 6 West Ave	6 West Ave – 7 Washington Blvd	7 Washington Blvd – 8 Elm St	8 Elm St – 9 US 1 (Boston Post Rd)
6:30-7:00	C	C	C	C	C	C	A	C
7:00-7:30	C	C	B	C	C	C	B	C
7:30-8:00	C	D	C	D	D	E	B	C
8:00-8:30	E	E	D	E	D	E	B	D
8:30-9:00	F	F	D	E	D	E	C	B
9:00-9:30	F	F	F	E	D	E	C	C

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (I-95)

I-95

(Between US 1/Boston Post Rd & SR 476/Sherwood Connector)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND ←

Time	9 US 1 (Boston Post Rd) – 10 Noroton Ave LOS	10 Noroton Ave – 11 US 1 (Boston Post Rd) LOS	11 US 1 (Boston Post Rd) – 12 SR 136 (Tokeneke Rd) LOS	12 SR 136 (Tokeneke Rd) – 13 US 1 (Boston Post Rd) LOS	13 US 1 (Boston Post Rd) – 14 South Norwalk LOS	14 South Norwalk – 15 US 7 LOS	15 US 7 – 16 East Ave LOS	16 East Ave – 17 Saugatuck Ave LOS	17 Saugatuck Ave – 18 SR 476 (Sherwood Connector) LOS
6:30-7:00	D	C	D	D	D	E	F	D	D
7:00-7:30	C	D	D	D	D	F	F	E	E
7:30-8:00	D	D	E	D	F	F	F	F	F
8:00-8:30	D	D	E	F	F	F	F	F	F
8:30-9:00	D	E	D	F	F	F	F	F	F
9:00-9:30	D	D	E	F	E	F	F	F	F

I-95

NORTHBOUND →

Time	9 US 1 (Boston Post Rd) – 10 Noroton Ave	10 Noroton Ave – 11 US 1 (Boston Post Rd)	11 US 1 (Boston Post Rd) – 12 SR 136 (Tokeneke Rd)	12 SR 136 (Tokeneke Rd) – 13 US 1 (Boston Post Rd)	13 US 1 (Boston Post Rd) – 14 South Norwalk	14 South Norwalk – 15 US 7	15 US 7 – 16 East Ave	16 East Ave – 17 Saugatuck Ave	17 Saugatuck Ave – 18 SR 476 (Sherwood Connector)
6:30-7:00	B	C	B	B	B	B	B	B	B
7:00-7:30	C	B	C	C	C	A	B	B	B
7:30-8:00	C	C	D	C	C	C	C	C	B
8:00-8:30	C	C	D	D	D	B	C	C	C
8:30-9:00	A	C	C	D	F	C	C	D	C
9:00-9:30	C	D	C	C	E	B	C	C	B

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (I-95)

I-95

(Between SR 476/Sherwood Connector & Connecticut Ave)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND ←

Time	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd) LOS	19 – 20 Bronson Rd LOS	20 – 21 Mill Plan Rd LOS	21 – 22 SR 135 (Benson Rd) LOS	22 – 23 Meadowbrook Rd LOS	23 – 24 US 1 (Kings Hwy) LOS	24 – 25 Fairfield Ave LOS	25 – 26 Wordin Ave LOS	26 – 27 SR 8 / SR 25 LOS	27 – 28 Stratford Ave LOS	28 – 29 Connecticut Ave LOS
6:30-7:00	E	E	E	F	F	F	F	F	F	F	F
7:00-7:30	E	E	E	F	F	F	F	F	F	F	F
7:30-8:00	F	F	E	F	F	F	F	F	F	F	F
8:00-8:30	F	F	F	F	F	F	F	F	F	F	F
8:30-9:00	F	E	F	F	F	F	F	F	F	F	F
9:00-9:30	F	F	F	F	F	F	F	F	E	C	D

I-95

Time	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd)	19 – 20 Bronson Rd	20 – 21 Mill Plan Rd	21 – 22 SR 135 (Benson Rd)	22 – 23 Meadowbrook Rd	23 – 24 US 1 (Kings Hwy)	24 – 25 Fairfield Ave	25 – 26 Wordin Ave	26 – 27 SR 8 / SR 25	27 – 28 Stratford Ave	28 – 29 Connecticut Ave
6:30-7:00	B	A	A	B	B	B	A	B	B	A	C
7:00-7:30	B	C	B	B	A	B	B	B	B	B	C
7:30-8:00	C	B	C	C	C	C	C	C	C	B	C
8:00-8:30	C	B	C	B	B	C	B	B	C	B	C
8:30-9:00	B	C	B	C	D	D	B	B	C	B	C
9:00-9:30	B	C	D	A	B	B	B	A	C	B	B

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (I-95)

I-95
(Between Connecticut Ave & Milford Pkwy)
Level-of-Service
Morning (April, 2013)

SOUTHBOUND ←

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave) LOS	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd LOS	31 Honeyspot Rd – 32 Broad St LOS	32 Broad St – 33 Ferry Blvd LOS	33 Ferry Blvd – 34 US 1 (Bridgeport Ave) LOS	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd LOS	35 Schoolhouse Rd – 36 Plains Rd LOS	36 Plains Rd – 38 Milford Pkwy LOS
6:30-7:00	C	C	D	C	C	B	C	C
7:00-7:30	C	C	C	C	B	C	C	D
7:30-8:00	E	F	D	D	C	C	D	D
8:00-8:30	D	F	C	C	C	C	C	C
8:30-9:00	E	E	E	C	C	B	D	C
9:00-9:30	B	B	B	C	C	C	B	B

I-95

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave)	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd	31 Honeyspot Rd – 32 Broad St	32 Broad St – 33 Ferry Blvd	33 Ferry Blvd – 34 US 1 (Bridgeport Ave)	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd	35 Schoolhouse Rd – 36 Plains Rd	36 Plains Rd – 38 Milford Pkwy
6:30-7:00	C	B	A	B	B	B	B	B
7:00-7:30	B	B	A	B	B	B	B	B
7:30-8:00	C	C	D	C	C	C	C	C
8:00-8:30	C	B	B	C	C	B	B	B
8:30-9:00	C	B	B	C	B	B	B	C
9:00-9:30	B	B	A	B	B	B	B	B

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (I-95)

I-95

(Between Milford Pkwy & SR 34)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND ←

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd) LOS	39 US 1 (Boston Post Rd) – 40 Woodmont Rd LOS	40 Woodmont Rd – 41 Marsh Hill Rd LOS	41 Marsh Hill Rd – 42 Sawmill Rd LOS	42 Sawmill Rd – 43 1st Ave LOS	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd) LOS	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34 LOS
6:30-7:00	C	C	B	C	C	D	C
7:00-7:30	C	C	C	C	C	C	D
7:30-8:00	D	C	C	C	D	D	D
8:00-8:30	D	C	C	C	C	C	D
8:30-9:00	D	D	C	C	C	C	D
9:00-9:30	C	C	C	C	C	C	C

I-95 ← 38 — 39 — 40 — 41 — 42 — 43 — 45 — 47 I-95

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd)	39 US 1 (Boston Post Rd) – 40 Woodmont Rd	40 Woodmont Rd – 41 Marsh Hill Rd	41 Marsh Hill Rd – 42 Sawmill Rd	42 Sawmill Rd – 43 1st Ave	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd)	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34
6:30-7:00	B	B	C	B	D	B	A
7:00-7:30	C	C	C	C	E	D	C
7:30-8:00	D	D	C	D	E	E	D
8:00-8:30	C	C	C	D	F	F	D
8:30-9:00	C	B	C	C	E	C	D
9:00-9:30	C	B	B	C	C	C	B

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MAINLINE BOTTLENECKS (I-95 MORNING)

During the morning peak period, a mostly continuous zone of southbound congestion (approximately 20-25 miles) was found on I-95 between Stratford and Darien. Two short zones of southbound congestion were also found farther south in Stamford and Greenwich. The primary bottlenecks are listed below along with associated queue lengths.

In the northbound direction, congestion was found later in the survey period (8:00-9:30 a.m.) between I-287 and E Putnam Ave in Stamford. Farther north, a short zone of congestion was found intermittently in Norwalk where construction appeared to exacerbate delays. Lastly, at the north end of the survey area, recurring northbound congestion was found in New Haven between Sawmill Rd and SR 10 (Ella T Grasso Blvd).

Bottleneck #	Direction	Queue Type	Head of Queue (Lat/Long)	Head of Queue Location	Tail of Queue Location	Time Period	Queue Length	Contributing factors to congestion	Photos
1	SB	Mainline	41 08 36 / 73 16 03	Int. 21 (Mill Plan Rd)	Int. 29 (Connecticut Ave)	6:30-9:30 a.m.	5-6 miles	Weaving/merging at the series of interchanges along this section of I-95	I-95_AM_1
2	SB	Mainline	41 06 22 / 73 25 27	Int. 15 (US 7)	Int. 21 (Mill Plan Rd)	7:00-9:30 a.m.	8-9 miles	Weaving/merging at the series of interchanges along this section of I-95. Bridges/narrow shoulders.	I-95_AM_2
3	SB	Mainline	41 04 26 / 73 28 13	Int. 12 (SR 136 - Tokeneke Rd)	Int. 15 (US 7)	7:30-9:30 a.m.	3-4 miles	Weaving/merging at the series of interchanges along this section of I-95	I-95_AM_3
4	SB	Mainline	41 02 43 / 73 32 60	Int. 6 (West Ave)	Int. 8 (Elm St)	7:30-9:30 a.m.	1-2 miles	The primary cause of congestion was traffic entering at Int. 7 (Washington Blvd)	I-95_AM_4
5	SB	Mainline	41 01 13 / 73 37 28	Int. 3 (Arch St)	Int. 5 (E Putnam Ave)	8:00-9:30 a.m.	1-3 miles	Traffic exiting at Arch St backing into the right lane on I-95	I-95_AM_5
6	SB	Mainline	41 10 31 / 73 09 53	Int. 30 (Hollister Ave)	Int. 32 (Broad St)	7:30-9:00 a.m.	1-2 miles	Traffic entering at Honeyspot Rd and Hollister Ave	I-95_AM_6
7	NB	Mainline	41 02 27 / 73 34 42	Int. 5 (E Putnam Ave)	Int. 21 (I-287)	8:00-9:30 a.m.	4-6 miles	Traffic entering at the series of interchanges along this section of I-95	I-95_AM_8
8	NB	Mainline	41 06 20 / 73 25 31	Int. 14 (South Norwalk)	Int. 13 (US 1 - Boston Post Rd)	8:30-9:30 a.m.	1-2 miles	Construction at the South Norwalk interchanges	I-95_AM_7
9	NB	Mainline	41 17 03 / 72 56 01	Int. 45 (SR 10 / Ella T Grasso Blvd)	Int. 42 (Sawmill Rd)	7:00-9:00 a.m.)	2-3 miles	Traffic entering at 1st Ave and weaving/merging at the closely spaced interchanges at SR 122 and SR 10	I-95_AM_9

RAMP AND SIDE ROAD QUEUES (I-95 MORNING)

Highway	AM / PM	Queue #	Interchange	Ramp / Side Road	Direction	Head of Queue (Lat/Long)	Time	Queue Population (vehicles per lane)	Frequency	Notes	Photos
I-95	AM	1	Int. 3 (Arch St)	Exit ramp	SB	41 01 12.6 / 73 37 35.4	8:00-9:00 a.m.	20-30 vpl (2 lanes)	Intermittent	The head of the queue was found at the signal at the head of the ramp (2 dedicated right-turn lanes)	I-95 Ramps AM_1
I-95	AM	2	Int. 15 (US 7)	Entrance ramp	SB	41 06 22.3 / 73 25 27.3	7:00-9:00 a.m.	50-80 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto the Parkway	I-95 Ramps AM_2
I-95	AM	3	Int. 27 (SR 8 / SR 25)	Entrance ramp	SB	41 10 14.2 / 73 11 39.9	7:00-9:00 a.m.	30-50 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto I-95	I-95 Ramps AM_3
I-95	AM	4	Int. 21 (I-287)	Entrance ramp	NB	40 59 26.4 / 73 39 47.9	8:59 a.m.	90-100 vpl (2 lanes)	One time	The head of the queue was found where vehicles waited to merge onto I-95 (possibly atypical congestion)	I-95 Ramps AM_4

EVENING DENSITY (I-95)

I-95

(Between I-287 & US 1/Boston Post Rd)

Density

Evening (April, 2013)

SOUTHBOUND ←

Time	21 I-287 – 2 Delavan Ave Density	2 Delavan Ave – 3 Arch St Density	3 Arch St – 4 Indian Field Rd Density	4 Indian Field Rd – 5 E Putnam Ave Density	5 E Putnam Ave – 6 West Ave Density	6 West Ave – 7 Washington Blvd Density	7 Washington Blvd – 8 Elm St Density	8 Elm St – 9 US 1 (Boston Post Rd) Density
4:00-4:30	17	24	23	22	24	28	24	24
4:30-5:00	25	25	26	26	25	29	16	19
5:00-5:30	28	33	29	26	28	33	17	27
5:30-6:00	39	40	49	41	42	57	42	21
6:00-6:30	34	46	35	33	55	67	39	11
6:30-7:00	32	40	39	32	34	39	19	19

I-95

Time	21 I-287 – 2 Delavan Ave	2 Delavan Ave – 3 Arch St	3 Arch St – 4 Indian Field Rd	4 Indian Field Rd – 5 E Putnam Ave	5 E Putnam Ave – 6 West Ave	6 West Ave – 7 Washington Blvd	7 Washington Blvd – 8 Elm St	8 Elm St – 9 US 1 (Boston Post Rd)
4:00-4:30	13	15	21	33	49	85	79	64
4:30-5:00	22	22	25	23	36	45	34	47
5:00-5:30	18	21	23	41	76	78	50	94
5:30-6:00	20	19	33	49	69	94	112	77
6:00-6:30	23	19	47	73	68	98	131	76
6:30-7:00	18	19	30	49	86	98	98	78

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (I-95)

I-95

(Between US 1/Boston Post Rd & SR 476/Sherwood Connector)

Density

Evening (April, 2013)

SOUTHBOUND ←

Time	9 US 1 (Boston Post Rd)	Density	10 Noroton Ave	Density	11 US 1 (Boston Post Rd)	Density	12 SR 136 (Tokeneke Rd)	Density	13 US 1 (Boston Post Rd)	Density	14 South Norwalk	Density	15 US 7	Density	16 East Ave	Density	17 Saugatuck Ave	Density	18 SR 476 (Sherwood Connector)
4:00-4:30		24		25		25		32		28		55		72		17		20	
4:30-5:00		26		27		28		23		22		53		53		32		19	
5:00-5:30		19		24		24		33		28		32		26		21		19	
5:30-6:00		24		29		21		28		25		39		27		24		30	
6:00-6:30		21		29		25		21		26		25		20		20		18	
6:30-7:00		23		23		22		25		20		27		15		20		19	

I-95

Time	9 US 1 (Boston Post Rd)		10 Noroton Ave		11 US 1 (Boston Post Rd)		12 SR 136 (Tokeneke Rd)		13 US 1 (Boston Post Rd)		14 South Norwalk		15 US 7 US 7		16 East Ave East Ave		17 Saugatuck Ave		18 SR 476 (Sherwood Connector)
4:00-4:30		57		70		75		57		76		33		57		56		51	
4:30-5:00		54		73		84		70		73		52		70		55		70	
5:00-5:30		72		68		85		80		94		71		77		63		64	
5:30-6:00		63		102		107		85		102		88		76		77		63	
6:00-6:30		49		89		888		100		92		92		65		49		74	
6:30-7:00		53		84		85		57		64		26		33		42		36	

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (I-95)

I-95

(Between SR 476 & Connecticut Ave)

Density

Evening (April, 2013)

SOUTHBOUND

Time	Density	Density	Density	Density	Density	Density	Density	Density	Density	Density	Density
	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd)	19 US 1 (Post Rd) – 20 Bronson Rd	20 Bronson Rd – 21 Mill Plan Rd	21 Mill Plan Rd – 22 SR 135 (Benson Rd)	22 SR 135 (Benson Rd) – 23 Meadowbrook Rd	23 Meadowbrook Rd – 24 US 1 (Kings Hwy)	24 US 1 (Kings Hwy) – 25 Fairfield Ave	25 Fairfield Ave – 26 Wordin Ave	26 Wordin Ave – 27 SR 8 / SR 25	27 SR 8 / SR 25 – 28 Stratford Ave	28 Stratford Ave – 29 Connecticut Ave
4:00-4:30	21	18	21	23	24	23	23	33	20	26	30
4:30-5:00	18	19	16	20	18	23	21	21	21	24	29
5:00-5:30	18	26	16	19	29	23	28	30	21	28	28
5:30-6:00	19	20	18	25	22	24	24	21	23	19	22
6:00-6:30	16	20	24	16	24	22	27	26	18	15	34
6:30-7:00	18	14	20	17	18	18	19	19	21	14	22

I-95

NORTHBOUND

Time	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd)	19 US 1 (Post Rd) – 20 Bronson Rd	20 Bronson Rd – 21 Mill Plan Rd	21 Mill Plan Rd – 22 SR 135 (Benson Rd)	22 SR 135 (Benson Rd) – 23 Meadowbrook Rd	23 Meadowbrook Rd – 24 US 1 (Kings Hwy)	24 US 1 (Kings Hwy) – 25 Fairfield Ave	25 Fairfield Ave – 26 Wordin Ave	26 Wordin Ave – 27 SR 8 / SR 25	27 SR 8 / SR 25 – 28 Stratford Ave	28 Stratford Ave – 29 Connecticut Ave
4:00-4:30	57	53	59	59	58	35	34	46	72	18	32
4:30-5:00	60	68	49	57	63	44	41	33	72	21	33
5:00-5:30	58	64	71	65	74	56	44	26	34	24	42
5:30-6:00	60	61	57	58	57	35	35	31	46	16	31
6:00-6:30	51	48	40	47	43	43	26	33	65	22	26
6:30-7:00	51	29	28	38	40	38	20	20	47	16	29

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (I-95)

I-95

(Between Connecticut Ave & Milford Pkwy)

Density

Evening (April, 2013)

SOUTHBOUND ←

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave) Density	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd Density	31 Honeyspot Rd – 32 Broad St Density	32 Broad St – 33 Ferry Blvd Density	33 Ferry Blvd – 34 US 1 (Bridgeport Ave) Density	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd Density	35 Schoolhouse Rd – 36 Plains Rd Density	36 Plains Rd – 38 Milford Pkwy Density
4:00-4:30	21	16	18	29	18	21	19	24
4:30-5:00	18	24	20	24	21	19	26	28
5:00-5:30	23	24	22	22	25	25	24	27
5:30-6:00	18	20	22	26	17	17	24	23
6:00-6:30	22	17	28	26	17	22	14	16
6:30-7:00	10	16	16	17	16	14	16	18

I-95

NORTHBOUND →

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave)	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd	31 Honeyspot Rd – 32 Broad St	32 Broad St – 33 Ferry Blvd	33 Ferry Blvd – 34 US 1 (Bridgeport Ave)	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd	35 Schoolhouse Rd – 36 Plains Rd	36 Plains Rd – 38 Milford Pkwy
4:00-4:30	29	27	28	30	20	12	17	21
4:30-5:00	27	30	30	31	22	23	28	21
5:00-5:30	39	33	35	32	25	33	46	43
5:30-6:00	26	29	22	26	18	15	23	27
6:00-6:30	29	21	16	30	16	22	21	15
6:30-7:00	18	27	21	18	20	19	15	21

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (I-95)

I-95

(Between Milford Pkwy & SR 34)

Density

Evening (April, 2013)

SOUTHBOUND ←

Time	Density (38 Milford Pkwy – 39 US 1 (Boston Post Rd))	Density (39 US 1 (Boston Post Rd) – 40 Woodmont Rd)	Density (40 Woodmont Rd – 41 Marsh Hill Rd)	Density (41 Marsh Hill Rd – 42 Sawmill Rd)	Density (42 Sawmill Rd – 43 1st Ave)	Density (43 1st Ave – 45 SR 10 (Ella T Grasso Blvd))	Density (45 SR 10 (Ella T Grasso Blvd) – 47 SR 34)
4:00-4:30	24	30	29	22	32	38	35
4:30-5:00	29	24	29	27	34	42	51
5:00-5:30	29	23	23	27	36	41	61
5:30-6:00	26	21	25	24	27	35	62
6:00-6:30	17	23	21	23	25	29	32
6:30-7:00	23	16	19	18	23	23	22

I-95 ← I-95

NORTHBOUND →

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd)	39 US 1 (Boston Post Rd) – 40 Woodmont Rd	40 Woodmont Rd – 41 Marsh Hill Rd	41 Marsh Hill Rd – 42 Sawmill Rd	42 Sawmill Rd – 43 1st Ave	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd)	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34
4:00-4:30	27	34	66	44	71	83	35
4:30-5:00	31	23	27	62	78	84	40
5:00-5:30	33	17	23	58	80	81	39
5:30-6:00	24	24	19	31	68	69	43
6:00-6:30	33	22	20	23	21	19	30
6:30-7:00	17	14	18	23	23	16	23

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING LEVEL-OF-SERVICE (I-95)

I-95

(Between I-287 & US 1/Boston Post Rd)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	21 I-287	LOS	2 Delavan Ave	LOS	3 Arch St	LOS	4 Indian Field Rd	LOS	5 E Putnam Ave	LOS	6 West Ave	LOS	7 Washington Blvd	LOS	8 Elm St	LOS	9 US 1 (Boston Post Rd)
4:00-4:30		B		C		C		C		C		D		C		C	
4:30-5:00		C		C		C		C		C		D		B		C	
5:00-5:30		D		D		D		C		D		D		B		D	
5:30-6:00		E		E		F		E		E		F		E		C	
6:00-6:30		D		F		D		D		F		F		E		A	
6:30-7:00		D		E		E		D		D		E		C		C	

I-95 →

Time	21 I-287	LOS	2 Delavan Ave	LOS	3 Arch St	LOS	4 Indian Field Rd	LOS	5 E Putnam Ave	LOS	6 West Ave	LOS	7 Washington Blvd	LOS	8 Elm St	LOS	9 US 1 (Boston Post Rd)
4:00-4:30		B		B		C		D		F		F		F		F	
4:30-5:00		C		C		C		C		E		E		D		F	
5:00-5:30		B		C		C		E		F		F		F		F	
5:30-6:00		C		C		D		F		F		F		F		F	
6:00-6:30		C		C		F		F		F		F		F		F	
6:30-7:00		B		C		D		F		F		F		F		F	

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
yellow	D/E	31-40
orange	E/F	41-62
red	F	> 62

EVENING LEVEL-OF-SERVICE (I-95)

I-95

(Between US 1/Boston Post Rd & SR 476/Sherwood Connector)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	9 US 1 (Boston Post Rd)	LOS	10 Noroton Ave	LOS	11 US 1 (Boston Post Rd)	LOS	12 SR 136 (Tokeneke Rd)	LOS	13 US 1 (Boston Post Rd)	LOS	14 South Norwalk	LOS	15 US 7	LOS	16 East Ave	LOS	17 Saugatuck Ave	LOS
4:00-4:30		C		C		C		D		D		F		F		B		C
4:30-5:00		C		D		D		C		C		F		F		D		C
5:00-5:30		C		C		C		D		D		D		C		C		C
5:30-6:00		C		D		C		D		C		E		D		C		D
6:00-6:30		C		D		C		C		C		C		C		C		B
6:30-7:00		C		C		C		C		C		D		B		C		C

I-95

Time	9 US 1 (Boston Post Rd)		10 Noroton Ave		11 US 1 (Boston Post Rd)		12 SR 136 (Tokeneke Rd)		13 US 1 (Boston Post Rd)		14 South Norwalk		15 US 7 US 7		16 East AEast Ave		17 Saugatuck Ave	
4:00-4:30		F		F		F		F		F		D		F		F		F
4:30-5:00		F		F		F		F		F		F		F		F		F
5:00-5:30		F		F		F		F		F		F		F		F		F
5:30-6:00		F		F		F		F		F		F		F		F		F
6:00-6:30		F		F		F		F		F		F		F		F		F
6:30-7:00		F		F		F		F		F		C		D		E		E

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

EVENING LEVEL-OF-SERVICE (I-95)

I-95

(Between SR 476/Sherwood Connector & Connecticut Ave)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd) LOS	19 – 20 Bronson Rd LOS	20 – 21 Mill Plan Rd LOS	21 – 22 SR 135 (Benson Rd) LOS	22 – 23 Meadowbrook Rd LOS	23 – 24 US 1 (Kings Hwy) LOS	24 – 25 Fairfield Ave LOS	25 – 26 Wordin Ave LOS	26 – 27 SR 8 / SR 25 LOS	27 – 28 Stratford Ave LOS	28 – 29 Connecticut Ave LOS
4:00-4:30	C	B	C	C	C	C	C	D	C	C	D
4:30-5:00	B	C	B	C	B	C	C	C	C	C	D
5:00-5:30	B	C	B	C	D	C	D	D	C	D	D
5:30-6:00	C	C	B	C	C	C	C	C	C	C	C
6:00-6:30	B	C	C	B	C	C	D	C	B	B	D
6:30-7:00	B	B	C	B	B	B	C	C	C	B	C

I-95

NORTHBOUND →

Time	18 SR 476 (Sherwood Connector) – 19 US 1 (Post Rd)	19 – 20 Bronson Rd	20 – 21 Mill Plan Rd	21 – 22 SR 135 (Benson Rd)	22 – 23 Meadowbrook Rd	23 – 24 US 1 (Kings Hwy)	24 – 25 Fairfield Ave	25 – 26 Wordin Ave	26 – 27 SR 8 / SR 25	27 – 28 Stratford Ave	28 – 29 Connecticut Ave
4:00-4:30	F	F	F	F	F	D	D	F	F	B	D
4:30-5:00	F	F	F	F	F	E	E	D	F	C	D
5:00-5:30	F	F	F	F	F	F	E	C	D	C	E
5:30-6:00	F	F	F	F	F	D	D	D	F	B	D
6:00-6:30	F	F	E	F	E	E	C	D	F	C	C
6:30-7:00	F	D	D	E	E	E	C	C	F	B	D

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
	D/E	31-40
	E/F	41-62
	F	> 62

EVENING LEVEL-OF-SERVICE (I-95)

I-95

(Between Connecticut Ave & Milford Pkwy)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave) LOS	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd LOS	31 Honeyspot Rd – 32 Broad St LOS	32 Broad St – 33 Ferry Blvd LOS	33 Ferry Blvd – 34 US 1 (Bridgeport Ave) LOS	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd LOS	35 Schoolhouse Rd – 36 Plains Rd LOS	36 Plains Rd – 38 Milford Pkwy LOS
4:00-4:30	C	B	B	D	B	C	C	C
4:30-5:00	B	C	C	C	C	C	C	D
5:00-5:30	C	C	C	C	C	C	C	D
5:30-6:00	B	C	C	C	B	B	C	C
6:00-6:30	C	B	D	C	B	C	B	B
6:30-7:00	A	B	B	B	B	B	B	B

I-95

Time	29 Connecticut Ave – 30 SR 113 (Hollister Ave)	30 SR 113 (Hollister Ave) – 31 Honeyspot Rd	31 Honeyspot Rd – 32 Broad St	32 Broad St – 33 Ferry Blvd	33 Ferry Blvd – 34 US 1 (Bridgeport Ave)	34 US 1 (Bridgeport Ave) – 35 Schoolhouse Rd	35 Schoolhouse Rd – 36 Plains Rd	36 Plains Rd – 38 Milford Pkwy
4:00-4:30	D	D	D	D	C	B	B	C
4:30-5:00	D	D	D	D	C	C	D	C
5:00-5:30	E	D	D	D	C	D	F	E
5:30-6:00	C	D	C	C	B	B	C	D
6:00-6:30	D	C	B	D	B	C	C	B
6:30-7:00	B	D	C	B	C	C	B	C

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

EVENING LEVEL-OF-SERVICE (I-95)

I-95

(Between Milford Pkwy & SR 34)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd) LOS	39 US 1 (Boston Post Rd) – 40 Woodmont Rd LOS	40 Woodmont Rd – 41 Marsh Hill Rd LOS	41 Marsh Hill Rd – 42 Sawmill Rd LOS	42 Sawmill Rd – 43 1st Ave LOS	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd) LOS	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34 LOS
4:00-4:30	C	D	D	C	D	E	D
4:30-5:00	D	C	D	D	D	E	F
5:00-5:30	D	C	C	D	E	E	F
5:30-6:00	C	C	C	C	D	D	F
6:00-6:30	B	C	C	C	C	D	D
6:30-7:00	C	B	C	B	C	C	C

I-95 ← I-95

NORTHBOUND →

Time	38 Milford Pkwy – 39 US 1 (Boston Post Rd)	39 US 1 (Boston Post Rd) – 40 Woodmont Rd	40 Woodmont Rd – 41 Marsh Hill Rd	41 Marsh Hill Rd – 42 Sawmill Rd	42 Sawmill Rd – 43 1st Ave	43 1st Ave – 45 SR 10 (Ella T Grasso Blvd)	45 SR 10 (Ella T Grasso Blvd) – 47 SR 34
4:00-4:30	D	D	F	E	F	F	D
4:30-5:00	D	C	D	F	F	F	E
5:00-5:30	D	B	C	F	F	F	E
5:30-6:00	C	C	C	D	F	F	E
6:00-6:30	D	C	C	C	C	C	D
6:30-7:00	B	B	B	C	C	B	C

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MAINLINE BOTTLENECKS (I-95 EVENING)

During the evening peak period, a mostly continuous zone of nortbound congestion (approximately 20-25 miles) was found on I-95 between Greenwich and Stratford. Farther north, recurring northbound congestion was found in New Haven between the vicinity of Marsh Hill Rd and SR 10/SR 122.

In the southbound direction, significantly less congestion was found in terms of frequency, severity and duration; however recurring delays were found at the north and south end of the survey limits (vicinity of SR 34 in New Haven to the north, and Stamford and Greenwich to the south). The only other recurring southbound congestion was found early in the evening survey period (4:00-5:00 p.m.) in Norwalk in the vicinity of US 7.

Bottleneck #	Direction	Queue Type	Head of Queue (Lat/Long)	Head of Queue Location	Tail of Queue Location	Time Period	Queue Length	Contributing factors to congestion	Photos
1	NB	Mainline	41 03 09 / 73 31 48	Int. 8 (Elm St)	Int. 3 (Arch St)	4:00-7:00 p.m.	4-6 miles	Traffic entering at the series of interchanges along this section of I-95	I-95_PM_1
2	NB	Mainline	41 06 29 / 73 24 29	Int. 16 (East Ave)	Int. 8 (Elm St)	4:00-7:00 p.m.	7-8 miles	Traffic entering at the series of interchanges along this section of I-95. The lane drop (3 lanes to 2) at East Ave.	I-95_PM_2
3	NB	Mainline	41 08 31 / 73 16 31	Int. 20 (Bronson Rd)	Int. 16 (East Ave)	4:00-6:30 p.m.	6-8 miles	Traffic entering at the series of interchanges along this section of I-95	I-95_PM_3
4	NB	Mainline	41 10 02 / 73 13 46	Int. 24 (Chambers St)	Int. 20 (Bronson Rd)	4:00-6:30 p.m.	2-3 miles	Traffic entering at the series of interchanges along this section of I-95	I-95_PM_4
5	NB	Mainline	41 10 15 / 73 11 34	Int. 27 (SR 8)	Int. 24 (Chambers St)	4:00-7:00 p.m.	1-2 miles	The lane drop (4 lanes to 3) at SR 8. Traffic intermittently exiting at SR 8 (backing into the right lane of I-95).	I-95_PM_5
6	NB	Mainline	41 17 03 / 72 55 59	Int. 45 (SR 10 / Ella T Grasso Blvd)	Int. 41 (Marsh Hill Rd)	4:00-6:00 p.m.	3-5 miles	Traffic entering at the series of interchanges along this section of I-95. Weaving/merging at the closely spaced interchanges at SR 122 and SR 10	I-95_PM_6
7	SB	Mainline	41 00 00 / 73 39 13	Int. 2 (Delavan Ave)	Int. 4 (Indian Field Rd)	5:30-7:00 p.m.	3-4 miles	Weaving/merging at E Putnam Ave and Harvard Ave/West Ave	I-95_PM_7
8	SB	Mainline	41 02 25 / 73 34 54	Int. 5 (E Putnam Ave)	Int. 7 (Washington Blvd)	5:30-7:00 p.m.	2-3 miles	Traffic entering at US 7	I-95_PM_8
9	SB	Mainline	41 06 05 / 73 26 08	Int. 14 (South Norwalk)	Int. 16 (East Ave)	4:00-5:00 p.m.	1-1.5 miles	Traffic entering at Field Point Rd and Arch St	I-95_PM_9
10	SB	Mainline	41 17 02 / 72 56 17	Int. 43 (1st Ave)	Int. 45 (SR 34)	4:30-6:00 p.m.	2-2.5 miles	Lane drop (4 lanes to 3) at SR 10 and merging weaving at SR 10 and SR 122	I-95_PM_10

RAMP AND SIDE ROAD QUEUES (I-95 EVENING)

Highway	AM / PM	Queue #	Interchange	Ramp / Side Road	Direction	Head of Queue (Lat/Long)	Time	Queue Population (vehicles per lane)	Frequency	Notes	Photos
I-95	PM	1	Int. 27 (SR 8 / SR 25)	Exit ramp	NB	41 10 16.4 / 73 11 29.4	4:15-6:45 p.m.	40-60 vpl (1 lane)	Intermittent	Congestion apperared to be caused by the geometrics of the ramp	I-95 Ramps PM-1
I-95	PM	2	Int. 6 (West Ave)	Entrance ramp	NB	41 02 39.0 / 73 33 13.9	5:00-6:00 p.m.	20-25 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto I-95	I-95 Ramps PM-2
I-95	PM	3	Int. 7 (Atlantic St)	Entrance ramp	SB	41 02 49.8 / 73 32 37.4	5:31 p.m.	20-25 vpl (1 lane)	One time	The head of the queue was found where vehicles waited to merge onto I-95	I-95 Ramps PM-3
I-95	PM	4	Int. 14 (South Norwalk)	Entrance ramp	NB	41 06 11.5 / 73 25 53.3	5:00-6:00 p.m.	25-30 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto I-95	I-95 Ramps PM-4
I-95	PM	5	Int. 24 (US 1 / Kings Hwy)	Exit ramp	NB	41 09 52.3 / 73 14 09.6	5:00-7:00 p.m.	25-30 vpl (2 lanes)	Intermittent	The head of the queue was found at the signal at the head of the ramp	I-95 Ramps PM-5
I-95	PM	6	Int. 15 (US 7)	Entrance ramp	NB	41 06 23.3 / 73 25 05.8	5:30-6:30 p.m.	30-60 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto I-95	I-95 Ramps PM-6

Part II: MERRITT PARKWAY

MORNING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between I-287 & North St)
Density
Morning (April, 2013)

SOUTHBOUND ←

Time	26 I-287	Density	27 Purchase St	Density	28 Lincoln Ave	Density	29 N Ridge Rd	Density	30 / 27 SR 120A (King St)	Density	28 Round Hil Rd	Density	29 Old Mill Rd	Density	31 North St
6:30-7:00		8		9		10		10		13		14		19	
7:00-7:30		14		16		17		11		15		24		23	
7:30-8:00		15		27		30		23		18		25		30	
8:00-8:30		23		27		21		16		18		16		24	
8:30-9:00		16		27		25		17		18		23		25	
9:00-9:30		7		10		14		15		15		17		19	

MERRITT PKWY

Time	26 I-287		27 Purchase St		28 Lincoln Ave		29 N Ridge Rd		30 / 27 SR 120A (King St)		28 Round Hil Rd		29 Old Mill Rd		31 North St
6:30-7:00		11		7		8		8		8		9		9	
7:00-7:30		15		13		17		14		12		11		13	
7:30-8:00		29		14		16		17		16		13		19	
8:00-8:30		19		17		21		18		15		17		19	
8:30-9:00		21		15		14		19		13		17		23	
9:00-9:30		13		13		12		15		11		15		14	

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
	31-40
	41-62
	> 62

MORNING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between North St & SR 124/South Ave)
Density
Morning (April, 2013)

SOUTHBOUND ←

Time	31 North St	Density	33 Den Rd	Density	34 SR 104 (Long Ridge Rd)	Density	35 SR 137 (High Bridge Rd)	Density	36 SR 106 (Stamford Rd)	Density	37 SR 124 (South Ave)
6:30-7:00		18		24		19		30		31	
7:00-7:30		23		24		20		32		27	
7:30-8:00		30		28		28		33		34	
8:00-8:30		28		26		25		34		35	
8:30-9:00		24		31		27		36		31	
9:00-9:30		23		22		17		27		29	

MERRITT PKWY

Time	31 North St		33 Den Rd		34 SR 104 (Long Ridge Rd)		35 SR 137 (High Bridge Rd)		36 SR 106 (Stamford Rd)		37 SR 124 (South Ave)
6:30-7:00		6		6		11		9		10	
7:00-7:30		11		12		12		14		23	
7:30-8:00		16		11		20		9		19	
8:00-8:30		20		10		17		19		18	
8:30-9:00		16		22		20		19		31	
9:00-9:30		12		12		17		16		18	

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 124/South Ave & SR 57/Weston Rd)

Density

Morning (April, 2013)

SOUTHBOUND

Time	37 SR 124 (South Ave) – 38 SR 123 (New Canaan Rd) Density	38 SR 123 (New Canaan Rd) – 39 US 7 Density	39 US 7 – 40 Main Ave Density	40 Main Ave – 41 SR 33 (Wilton Rd) Density	41 SR 33 (Wilton Rd) – 42 SR 57 (Weston Rd) Density
6:30-7:00	31	30	22	27	35
7:00-7:30	34	49	39	26	58
7:30-8:00	57	72	87	65	64
8:00-8:30	53	59	61	36	61
8:30-9:00	59	72	81	43	78
9:00-9:30	28	21	11	20	55

MERRITT PKWY

NORTHBOUND

Time	37 SR 124 (South Ave) – 38 SR 123 (New Canaan Rd)	38 SR 123 (New Canaan Rd) – 39 US 7	39 US 7 – 40 Main Ave	40 Main Ave – 41 SR 33 (Wilton Rd)	41 SR 33 (Wilton Rd) – 42 SR 57 (Weston Rd)
6:30-7:00	8	12	8	5	6
7:00-7:30	11	14	13	10	12
7:30-8:00	18	25	16	18	14
8:00-8:30	19	15	4	13	11
8:30-9:00	20	19	16	10	9
9:00-9:30	19	17	12	5	8

Colors	Density
(white)	< 31 pcplpm
Yellow	31-40
Orange	41-62
Red	> 62

MORNING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 57/Weston Rd & SR 8)

Density

Morning (April, 2013)

SOUTHBOUND

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk) Density	44 SR 58 (Black Rock Tnpk) – 46 SR 59 (Easton Tnpk) Density	46 SR 59 (Easton Tnpk) – 47 Park Ave Density	47 Park Ave – 48 SR 111 (Main St) Density	48 SR 111 (Main St) – 49 SR 25 Density	49 SR 25 – 50 SR 127 (White Plain Rd) Density	50 SR 127 (White Plain Rd) – 51 Huntington Pkwy Density	51 Huntington Pkwy – 52 SR 8 Density
6:30-7:00	39	35	70	64	33	19	27	15
7:00-7:30	51	77	87	72	35	19	30	8
7:30-8:00	65	77	81	82	67	39	44	21
8:00-8:30	62	90	79	91	61	32	53	46
8:30-9:00	74	94	85	65	75	78	31	15
9:00-9:30	56	84	67	30	21	18	23	22

MERRITT PKWY

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk)	44 SR 58 (Black Rock Tnpk) – 46 SR 59 (Easton Tnpk)	46 SR 59 (Easton Tnpk) – 47 Park Ave	47 Park Ave – 48 SR 111 (Main St)	48 SR 111 (Main St) – 49 SR 25	49 SR 25 – 50 SR 127 (White Plain Rd)	50 SR 127 (White Plain Rd) – 51 Huntington Pkwy	51 Huntington Pkwy – 52 SR 8
6:30-7:00	5	6	7	7	10	11	9	8
7:00-7:30	10	10	14	11	13	9	18	14
7:30-8:00	14	13	13	19	24	9	35	21
8:00-8:30	16	14	13	15	17	15	25	19
8:30-9:00	13	14	13	20	22	18	30	17
9:00-9:30	19	10	14	13	15	14	21	16

NORTHBOUND

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 8 & SR 34/Derby Ave)

Density

Morning (April, 2013)

SOUTHBOUND ←

Time	52 SR 8	Density	53 SR 110 (Main St)	Density	54 Milford Pkwy	Density	55 Wellington Rd	Density	56 SR 121 (Grassy Hill Rd)	Density	57 SR 34 (Derby Ave)
6:30-7:00		16		13		20		14		15	
7:00-7:30		25		20		18		17		22	
7:30-8:00		30		25		16		21		26	
8:00-8:30		20		21		20		26		21	
8:30-9:00		21		23		15		21		22	
9:00-9:30		24		21		18		16		13	

MERRITT PKWY

Time	52 SR 8		53 SR 110 (Main St)		54 Milford Pkwy		55 Wolf Harbor Rd		56 SR 121 (Grassy Hill Rd)		57 SR 34 (Derby Ave)
6:30-7:00		11		7		11		7		6	
7:00-7:30		15		9		9		10		13	
7:30-8:00		26		16		15		19		22	
8:00-8:30		22		29		20		14		20	
8:30-9:00		21		20		18		13		18	
9:00-9:30		17		13		13		11		11	
	52		53		54		55		56		57

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

MORNING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between I-287 & North St)
Level-of-Service
Morning (April, 2013)

SOUTHBOUND ←

Time	26 I-287	LOS	27 Purchase St	LOS	28 Lincoln Ave	LOS	29 N Ridge Rd	LOS	30 / 27 SR 120A (King St)	LOS	28 Round Hil Rd	LOS	29 Old Mill Rd	LOS	31 North St
6:30-7:00		A		A		A		A		B		B		C	
7:00-7:30		B		B		B		A		B		C		C	
7:30-8:00		B		D		D		C		B		C		D	
8:00-8:30		C		D		C		B		B		B		C	
8:30-9:00		B		D		C		B		B		C		C	
9:00-9:30		A		A		B		B		B		B		C	

MERRITT PKWY

Time	I-287		Purchase St		Lincoln Ave		N Ridge Rd		SR 120A (King St)		Round Hil Rd		Old Mill Rd		North St
6:30-7:00		A		A		A		A		A		A		A	
7:00-7:30		B		B		B		B		B		A		B	
7:30-8:00		D		B		B		B		B		B		C	
8:00-8:30		C		B		C		B		B		B		C	
8:30-9:00		C		B		B		C		B		B		C	
9:00-9:30		B		B		B		B		A		B		B	
	26		27		28		29		30 / 27		28		29		31

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between North St & SR 124/South Ave)
Level-of-Service
Morning (April, 2013)

SOUTHBOUND ←

Time	31 North St	LOS	33 Den Rd	LOS	34 SR 104 (Long Ridge Rd)	LOS	35 SR 137 (High Bridge Rd)	LOS	36 SR 106 (Stamford Rd)	LOS	37 SR 124 (South Ave)
6:30-7:00		B		C		C		D		D	
7:00-7:30		C		C		C		D		D	
7:30-8:00		D		D		D		D		D	
8:00-8:30		D		C		C		D		D	
8:30-9:00		C		D		D		E		D	
9:00-9:30		C		C		B		D		D	

MERRITT PKWY

Time	31 North St		33 Den Rd		34 SR 104 (Long Ridge Rd)		35 SR 137 (High Bridge Rd)		36 SR 106 (Stamford Rd)		37 SR 124 (South Ave)
6:30-7:00		A		A		A		A		A	
7:00-7:30		A		B		B		B		C	
7:30-8:00		B		A		C		A		C	
8:00-8:30		C		A		B		C		B	
8:30-9:00		B		C		C		C		D	
9:00-9:30		B		B		B		B		B	

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 124/South Ave & SR 57/Weston Rd)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND

Time	37 SR 124 (South Ave)	LOS	38 SR 123 (New Canaan Rd)	LOS	39 US 7	LOS	40 Main Ave	LOS	41 SR 33 (Wilton Rd)	LOS	42 SR 57 (Weston Rd)
6:30-7:00		D		D		C		D		D	
7:00-7:30		D		F		E		C		F	
7:30-8:00		F		F		F		F		F	
8:00-8:30		F		F		F		E		F	
8:30-9:00		F		F		F		E		F	
9:00-9:30		D		C		A		C		F	

MERRITT PKWY

Time	37 SR 124 (South Ave)		38 SR 123 (New Canaan Rd)		39 US 7		40 Main Ave		41 SR 33 (Wilton Rd)		42 SR 57 (Weston Rd)
6:30-7:00		A		B		A		A		A	
7:00-7:30		A		B		B		A		B	
7:30-8:00		B		C		B		B		B	
8:00-8:30		C		B		A		B		A	
8:30-9:00		C		C		B		A		A	
9:00-9:30		C		B		B		A		A	

SOUTHBOUND

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between SR 57/Weston Rd & SR 8)
Level-of-Service
Morning (April, 2013)

SOUTHBOUND (←)

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk) LOS	44 – 46 SR 59 (Easton Tnpk) LOS	46 – 47 Park Ave LOS	47 – 48 SR 111 (Main St) LOS	48 – 49 SR 25 LOS	49 – 50 SR 127 (White Plain Rd) LOS	50 – 51 Huntington Pkwy LOS	51 – 52 SR 8 LOS
6:30-7:00	E	D	F	F	D	C	D	B
7:00-7:30	F	F	F	F	D	C	D	A
7:30-8:00	F	F	F	F	F	E	E	C
8:00-8:30	F	F	F	F	F	D	F	F
8:30-9:00	F	F	F	F	F	F	D	B
9:00-9:30	F	F	F	D	C	B	C	C

MERRITT PKWY

NORTHBOUND (→)

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk)	44 – 46 SR 59 (Easton Tnpk)	46 – 47 Park Ave	47 – 48 SR 111 (Main St)	48 – 49 SR 25	49 – 50 SR 127 (White Plain Rd)	50 – 51 Huntington Pkwy	51 – 52 SR 8
6:30-7:00	A	A	A	A	A	A	A	A
7:00-7:30	A	A	B	A	B	A	B	B
7:30-8:00	B	B	B	C	C	A	D	C
8:00-8:30	B	B	B	B	B	B	C	C
8:30-9:00	B	B	B	C	C	B	D	B
9:00-9:30	C	A	B	B	B	B	C	B

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MORNING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 8 & SR 34/Derby Ave)

Level-of-Service

Morning (April, 2013)

SOUTHBOUND ←

Time	52 SR 8	LOS	53 SR 110 (Main St)	LOS	54 Milford Pkwy	LOS	55 Wellington Rd	LOS	56 SR 121 (Grassy Hill Rd)	LOS	57 SR 34 (Derby Ave)
6:30-7:00		B		B		C		B		B	
7:00-7:30		C		C		B		B		C	
7:30-8:00		D		C		B		C		C	
8:00-8:30		C		C		C		C		C	
8:30-9:00		C		C		B		C		C	
9:00-9:30		C		C		B		B		B	

MERRITT PKWY ←

NORTHBOUND →

Time	52 SR 8	LOS	53 SR 110 (Main St)	LOS	54 Milford Pkwy	LOS	55 Wolf Harbor Rd	LOS	56 SR 121 (Grassy Hill Rd)	LOS	57 SR 34 (Derby Ave)
6:30-7:00		A		A		A		A		A	
7:00-7:30		B		A		A		A		B	
7:30-8:00		C		B		B		C		C	
8:00-8:30		C		D		C		B		C	
8:30-9:00		C		C		B		B		B	
9:00-9:30		B		B		B		A		A	

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MAINLINE BOTTLENECKS (MERRITT PKWY MORNING)

During the morning survey period, severe southbound congestion was typically found on the Merritt Parkway between Interchange 52 (SR 8) and Interchange 41 (SR 33 / Wilton Rd). Southbound congestion was also found south of Wilton Rd to the vicinity of Interchange 36 (SR 106 / Old Stamford Rd). The primary bottlenecks are listed below along with associated queue lengths; during the peak period, a mostly continuous zone of congestion (15-20 miles) was often found between Interchanges 52 and 36.

In the northbound direction, users of the Parkway did not encounter any recurring congestion.

Bottleneck #	Direction	Queue Type	Head of Queue (Lat/Long)	Head of Queue Location	Tail of Queue Location	Time Period	Queue Length	Contributing factors to congestion	Photos
1	SB	Mainline	41 09 49 / 73 22 56	Int. 41 (SR 33 / Wilton Rd)	Int. 52 (SR 8)	7:00-9:30 a.m.	10-13 miles	Weaving/merging at the series of interchanges along this section of Merritt Pkwy	Merritt_AM_1
2	SB	Mainline	41 07 02 / 73 30 03	Int. 36 (SR 106 / Old Stamford Rd)	Int. 41 (SR 33 / Wilton Rd)	7:30-9:00 a.m.	4-7 miles	Weaving/merging at the series of interchanges along this section of Merritt Pkwy	Merritt_AM_2

RAMP AND SIDE ROAD QUEUES (MERRITT PKWY MORNING)

Highway	AM / PM	Queue #	Interchange	Ramp / Side Road	Direction	Head of Queue (Lat/Long)	Time	Queue Population (vehicles per lane)	Frequency	Notes	Photos
Merritt Pkwy	AM	1	Int. 35 (SR 137 / High Ridge Rd)	Exit ramp	SB	41 06 45.2 / 73 32 47.2	8:45 a.m.	30-35 vpl (2 lanes)	One time	The head of the queue was found at the signal at High Ridge Rd	Merritt Ramps AM_1
Merritt Pkwy	AM	2	Int. 35 (SR 137 / High Ridge Rd)	High Ridge Rd	WB	41 06 45.0 / 73 32 46.6	8:00-8:30 a.m.	50-60 vpl (2 lanes)	Intermittent	During one observation, congestion extended back through several upstream signals	Merritt Ramps AM_2
Merritt Pkwy	AM	3	Int. 34 (SR 104 / Long Ridge Rd)	Entrance ramp	SB	41 06 12.4 / 73 33 55.6	7:45-8:15 a.m.	20-25 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto the Parkway	Merritt Ramps AM_3
Merritt Pkwy	AM	4	Int. 36 (Old Stamford Rd)	Old Stamford Rd	WB	41 07 07.3 / 73 29 56.1	7:30-8:30 a.m.	50-60 vpl (1 lane)	Intermittent	The head of the queue was found west of the Parkway interchange at the signal at Jelliff Mill Rd	Merritt Ramps AM_4
Merritt Pkwy	AM	5	Int. 44 (Black Rock Turnpike)	Entrance ramp	SB	41 12 04.2 / 73 16 18.9	7:00-8:00 a.m.	50-100 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto the Parkway; congestion extended back through the signal at Black Rock Pkwy	Merritt Ramps AM_5
Merritt Pkwy	AM	6	Int. 44 (Black Rock Turnpike)	Black Rock Tnpk	WB	41 12 08.2 / 73 16 08.7	7:30-8:30 a.m.	25-30 vpl (1 lane)	Intermittent	The head of the queue was found at the signal at the northbound ramp	Merritt Ramps AM_6
Merritt Pkwy	AM	7	Int. 54 (Milford Parkway)	Entrance ramp	SB	41 14 56.0 / 73 04 48.2	7:30-8:00 a.m.	50-70 vpl (1 lane)	Intermittent	Congestion apperared to be caused by the geometrics of the ramp	Merritt Ramps AM_7

EVENING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between I-287 & North St)
Density
Evening (April, 2013)

SOUTHBOUND ←

Time	26 I-287	Density	27 Purchase St	Density	28 Lincoln Ave	Density	29 N Ridge Rd	Density	30 / 27 SR 120A (King St)	Density	28 Round Hil Rd	Density	29 Old Mill Rd	Density	31 North St
4:00-4:30		17		13		15		16		15		15		15	
4:30-5:00		10		19		21		19		16		14		16	
5:00-5:30		13		19		13		15		16		18		19	
5:30-6:00		7		13		12		16		17		8		12	
6:00-6:30		12		15		16		13		13		15		15	
6:30-7:00		7		8		13		10		12		14		11	

MERRITT PKWY

Time	26 I-287	Density	27 Purchase St	Density	28 Lincoln Ave	Density	29 N Ridge Rd	Density	30 / 27 SR 120A (King St)	Density	28 Round Hil Rd	Density	29 Old Mill Rd	Density	31 North St
4:00-4:30		23		18		15		17		16		14		20	
4:30-5:00		16		20		30		13		15		21		19	
5:00-5:30		24		22		24		21		18		21		23	
5:30-6:00		29		15		17		13		19		26		21	
6:00-6:30		19		18		18		14		15		21		16	
6:30-7:00		20		15		17		13		14		16		19	

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between North St & SR 124/South Ave)
Density
Evening (April, 2013)

SOUTHBOUND (←)

Time	31 North St	Density	33 Den Rd	Density	34 SR 104 (Long Ridge Rd)	Density	35 SR 137 (High Bridge Rd)	Density	36 SR 106 (Stamford Rd)	Density	37 SR 124 (South Ave)
4:00-4:30		14		16		19		19		18	
4:30-5:00		12		23		20		32		20	
5:00-5:30		18		26		27		24		28	
5:30-6:00		22		24		18		18		25	
6:00-6:30		16		25		15		21		24	
6:30-7:00		14		13		10		12		11	

MERRITT PKWY

Time	31 North St		33 Den Rd		34 SR 104 (Long Ridge Rd)		35 SR 137 (High Bridge Rd)		36 SR 106 (Stamford Rd)		37 SR 124 (South Ave)
4:00-4:30		24		26		37		40		41	
4:30-5:00		22		128		74		62		53	
5:00-5:30		29		22		44		71		80	
5:30-6:00		25		67		69		70		56	
6:00-6:30		26		51		65		62		77	
6:30-7:00		22		54		50		35		36	

NORTHBOUND (→)

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 124/South Ave & SR 57/Weston Rd)

Density

Evening (April, 2013)

← **SOUTHBOUND**

Time	37 SR 124 (South Ave)	Density	38 SR 123 (New Canaan Rd)	Density	39 US 7	Density	40 Main Ave	Density	41 SR 33 (Wilton Rd)	Density	42 SR 57 (Weston Rd)
4:00-4:30		17		17		11		12		15	
4:30-5:00		20		15		10		16		17	
5:00-5:30		25		30		23		17		14	
5:30-6:00		23		29		15		13		16	
6:00-6:30		21		24		16		10		13	
6:30-7:00		16		29		7		11		13	

MERRITT PKWY

Time	37 SR 124 (South Ave)		38 SR 123 (New Canaan Rd)		39 US 7		40 Main Ave		41 SR 33 (Wilton Rd)		42 SR 57 (Weston Rd)
4:00-4:30		41		42		37		70		72	
4:30-5:00		61		48		53		81		88	
5:00-5:30		49		76		75		77		81	
5:30-6:00		41		52		48		77		71	
6:00-6:30		55		65		83		78		77	
6:30-7:00		39		35		48		42		42	

SOUTHBOUND →

Colors	Density
(white)	< 31 pcplpm
yellow	31-40
orange	41-62
red	> 62

EVENING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between SR 57/Weston Rd & SR 8)
Density
Evening (April, 2013)

SOUTHBOUND ←

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk) Density	44 SR 58 (Black Rock Tnpk) – 46 SR 59 (Easton Tnpk) Density	46 SR 59 (Easton Tnpk) – 47 Park Ave Density	47 Park Ave – 48 SR 111 (Main St) Density	48 SR 111 (Main St) – 49 SR 25 Density	49 SR 25 – 50 SR 127 (White Plain Rd) Density	50 SR 127 (White Plain Rd) – 51 Huntington Pkwy Density	51 Huntington Pkwy – 52 SR 8 Density
4:00-4:30	13	16	15	20	23	16	30	17
4:30-5:00	10	20	17	15	24	19	29	18
5:00-5:30	13	16	23	19	24	15	25	21
5:30-6:00	18	17	15	15	20	22	32	24
6:00-6:30	12	14	14	18	21	18	29	16
6:30-7:00	11	15	16	15	18	15	28	17

MERRITT PKWY

Time	42 SR 57 (Weston Rd) – 44 SR 58 (Black Rock Tnpk)	44 SR 58 (Black Rock Tnpk) – 46 SR 59 (Easton Tnpk)	46 SR 59 (Easton Tnpk) – 47 Park Ave	47 Park Ave – 48 SR 111 (Main St)	48 SR 111 (Main St) – 49 SR 25	49 SR 25 – 50 SR 127 (White Plain Rd)	50 SR 127 (White Plain Rd) – 51 Huntington Pkwy	51 Huntington Pkwy – 52 SR 8
4:00-4:30	39	64	40	37	38	35	49	23
4:30-5:00	Note 1: Incident-Related Data - Interpolated	Note 1	Note 1	20	25	48	45	20
5:00-5:30	44	58	61	46	40	47	45	18
5:30-6:00	40	51	52	37	29	43	51	24
6:00-6:30	37	45	28	30	36	33	39	19
6:30-7:00	31	37	23	23	22	21	27	17

NORTHBOUND →

Colors	Density
(white)	< 31 pcplpm
(yellow)	31-40
(orange)	41-62
(red)	> 62

EVENING DENSITY (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between SR 8 & SR 34/Derby Ave)
Density
Evening (April, 2013)

SOUTHBOUND (←)

Time	52 SR 8	Density	53 SR 110 (Main St)	Density	54 Milford Pkwy	Density	55 Wellington Rd	Density	56 SR 121 (Grassy Hill Rd)	Density	57 SR 34 (Derby Ave)
4:00-4:30		17		18		19		15		14	
4:30-5:00		20		23		7		15		18	
5:00-5:30		27		16		14		17		21	
5:30-6:00		29		19		10		21		17	
6:00-6:30		25		21		12		14		13	
6:30-7:00		21		9		10		18		15	

MERRITT PKWY ←

Time	52 SR 8		53 SR 110 (Main St)		54 Milford Pkwy		55 Wolf Harbor Rd		56 SR 121 (Grassy Hill Rd)		57 SR 34 (Derby Ave)
4:00-4:30		23		21		20		19		21	
4:30-5:00		31		24		25		21		20	
5:00-5:30		22		24		25		22		21	
5:30-6:00		25		28		27		26		29	
6:00-6:30		21		16		18		18		16	
6:30-7:00		16		18		11		13		15	

NORTHBOUND (→)

Colors	Density
(white)	< 31 pcplpm
Yellow	31-40
Orange	41-62
Red	> 62

EVENING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between I-287 & North St)
Level-of-Service
Evening (April, 2013)

SOUTHBOUND ←

Time	26 I-287	LOS	27 Purchase St	LOS	28 Lincoln Ave	LOS	29 N Ridge Rd	LOS	30 / 27 SR 120A (King St)	LOS	28 Round Hil Rd	LOS	29 Old Mill Rd	LOS	31 North St
4:00-4:30		B		B		B		B		B		B		B	
4:30-5:00		A		C		C		C		B		B		B	
5:00-5:30		B		C		B		B		B		B		C	
5:30-6:00		A		B		B		B		B		A		B	
6:00-6:30		B		B		B		B		B		B		B	
6:30-7:00		A		A		B		A		B		B		A	

MERRITT PKWY

Time	26 I-287	LOS	27 Purchase St	LOS	28 Lincoln Ave	LOS	29 N Ridge Rd	LOS	30 / 27 SR 120A (King St)	LOS	28 Round Hil Rd	LOS	29 Old Mill Rd	LOS	31 North St
4:00-4:30		C		B		B		B		B		B		C	
4:30-5:00		B		C		D		B		B		C		C	
5:00-5:30		C		C		C		C		B		C		C	
5:30-6:00		D		B		B		B		C		C		C	
6:00-6:30		C		B		B		B		B		C		B	
6:30-7:00		C		B		B		B		B		B		C	

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

EVENING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between North St & SR 124/South Ave)
Level-of-Service
Evening (April, 2013)

SOUTHBOUND

Time	31 North St – 33 Den Rd (LOS)	33 Den Rd – 34 SR 104 (Long Ridge Rd) (LOS)	34 SR 104 (Long Ridge Rd) – 35 SR 137 (High Bridge Rd) (LOS)	35 SR 137 (High Bridge Rd) – 36 SR 106 (Stamford Rd) (LOS)	36 SR 106 (Stamford Rd) – 37 SR 124 (South Ave) (LOS)
4:00-4:30	B	B	C	C	B
4:30-5:00	B	C	C	D	C
5:00-5:30	B	C	D	C	D
5:30-6:00	C	C	B	B	C
6:00-6:30	B	C	B	C	C
6:30-7:00	B	B	A	B	A

MERRITT PKWY

NORTHBOUND

Time	31 North St – 33 Den Rd	33 Den Rd – 34 SR 104 (Long Ridge Rd)	34 SR 104 (Long Ridge Rd) – 35 SR 137 (High Bridge Rd)	35 SR 137 (High Bridge Rd) – 36 SR 106 (Stamford Rd)	36 SR 106 (Stamford Rd) – 37 SR 124 (South Ave)
4:00-4:30	C	C	E	E	E
4:30-5:00	C	F	F	F	F
5:00-5:30	D	C	E	F	F
5:30-6:00	C	F	F	F	F
6:00-6:30	C	F	F	F	F
6:30-7:00	C	F	F	D	E

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

EVENING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 124/South Ave & SR 57/Weston Rd)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND ←

Time	37 SR 124 (South Ave)	LOS	38 SR 123 (New Canaan Rd)	LOS	39 US 7	LOS	40 Main Ave	LOS	41 SR 33 (Wilton Rd)	LOS	42 SR 57 (Weston Rd)
4:00-4:30		B		B		A		B		B	
4:30-5:00		C		B		A		B		B	
5:00-5:30		C		D		C		B		B	
5:30-6:00		C		D		B		B		B	
6:00-6:30		C		C		B		A		B	
6:30-7:00		B		D		A		A		B	

MERRITT PKWY

Time	37 SR 124 (South Ave)		38 SR 123 (New Canaan Rd)		39 US 7		40 Main Ave		41 SR 33 (Wilton Rd)		42 SR 57 (Weston Rd)
4:00-4:30		E		E		E		F		F	
4:30-5:00		F		F		F		F		F	
5:00-5:30		F		F		F		F		F	
5:30-6:00		E		F		F		F		F	
6:00-6:30		F		F		F		F		F	
6:30-7:00		E		D		F		E		E	

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
	D/E	31-40
	E/F	41-62
	F	> 62

EVENING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)

(Between SR 57/Weston Rd & SR 8)

Level-of-Service

Evening (April, 2013)

SOUTHBOUND

Time	42 SR 57 (Weston Rd)	LOS	44 SR 58 (Black Rock Tnpk)	LOS	46 SR 59 (Easton Tnpk)	LOS	47 Park Ave	LOS	48 SR 111 (Main St)	LOS	49 SR 25	LOS	50 SR 127 (White Plain Rd)	LOS	51 Huntington Pkwy	LOS	52 SR 8
4:00-4:30		B		B		B		C		C		B		D		B	
4:30-5:00		A		C		B		B		C		C		D		B	
5:00-5:30		B		B		C		C		C		B		C		C	
5:30-6:00		B		B		B		B		C		C		D		C	
6:00-6:30		B		B		B		B		C		B		D		B	
6:30-7:00		A		B		B		B		B		B		D		B	

MERRITT PKWY

Time	42 SR 57 (Weston Rd)		44 SR 58 (Black Rock Tnpk)		46 SR 59 (Easton Tnpk)		47 Park Ave		48 SR 111 (Main St)		49 SR 25		50 SR 127 (White Plain Rd)		51 Huntington Pkwy		52 SR 8
4:00-4:30		E		F		E		E		E		D		F		C	
4:30-5:00		Note 1: Incident-Related Data - Interpolated		Note 1		Note 1		C		C		F		E		C	
5:00-5:30		E		F		F		F		E		F		E		B	
5:30-6:00		E		F		F		E		D		E		F		C	
6:00-6:30		E		E		D		D		E		D		E		C	
6:30-7:00		D		E		C		C		C		C		D		B	

NORTHBOUND

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

EVENING LEVEL-OF-SERVICE (MERRITT PKWY)

Merritt Parkway (SR 15)
(Between SR 8 & SR 34/Derby Ave)
Level-of-Service
Evening (April, 2013)

SOUTHBOUND ←

Time	52 SR 8	LOS	53 SR 110 (Main St)	LOS	54 Milford Pkwy	LOS	55 Wellington Rd	LOS	56 SR 121 (Grassy Hill Rd)	LOS	57 SR 34 (Derby Ave)
4:00-4:30		B		B		C		B		B	
4:30-5:00		C		C		A		B		B	
5:00-5:30		D		B		B		B		C	
5:30-6:00		D		C		A		C		B	
6:00-6:30		C		C		B		B		B	
6:30-7:00		C		A		A		B		B	

MERRITT PKWY

Time	SR 8		SR 110 (Main St)		Milford Pkwy		Wolf Harbor Rd		SR 121 (Grassy Hill Rd)		SR 34 (Derby Ave)
4:00-4:30		C		C		C		C		C	
4:30-5:00		D		C		C		C		C	
5:00-5:30		C		C		C		C		C	
5:30-6:00		C		D		D		C		D	
6:00-6:30		C		B		B		B		B	
6:30-7:00		B		B		A		B		B	
	52		53		54		55		56		57

NORTHBOUND →

Colors	LOS	Density
(white)	A/B/C/D	< 31 pcplpm
(yellow)	D/E	31-40
(orange)	E/F	41-62
(red)	F	> 62

MAINLINE BOTTLENECKS (MERRITT PKWY EVENING)

During the evening survey period, severe northbound congestion was typically found on the Merritt Parkway between Interchange 33 (Den Rd) and Interchange 42 (SR 57 / Weston Rd). Recurring northbound congestion was also found north of Weston Rd up to Interchange 50 (SR 127 / White Plains Rd). The primary bottlenecks are listed below along with associated queue lengths; during the peak period, a mostly continuous zone of congestion (15-20 miles) was often found between Interchanges 33 and 50.

In the southbound direction, users of the Parkway did not encounter any recurring congestion.

Bottleneck #	Direction	Queue Type	Head of Queue (Lat/Long)	Head of Queue Location	Tail of Queue Location	Time Period	Queue Length	Contributing factors to congestion	Photos
1	NB	Mainline	41 14 12 / 73 10 18	Int. 50 (SR 127 (White Plains Rd)	Int. 47 (Park Ave)	4:00-6:30 p.m.	2-3 miles	Weaving/merging at SR 25 and traffic entering at SR 127 (White Plains Rd)	Merritt_PM_1
2	NB	Mainline	41 13 47 / 73 14 22	Int. 47 (Park Ave)	Int. 42 (SR 57 / Weston Rd)	4:00-6:30 p.m.	1-2 miles	Traffic entering at ramps from Easton Turnpike and Park Ave	Merritt_PM_2
3	NB	Mainline	41 10 00 / 73 21 03	Int. 42 (SR 57 / Weston Rd)	Int. 37 (SR 124 / South Ave)	4:00-7:00 p.m.	6-8 miles	Weaving/merging at the series of interchanges along this section of Merritt Pkwy	Merritt_PM_3
4	NB	Mainline	41 07 08 / 73 29 00	Int. 37 (SR 124 / South Ave)	Int. 33 (Den Rd)	4:00-7:00 p.m.	4-5 miles	Weaving/merging at the series of interchanges along this section of Merritt Pkwy	Merritt_PM_4

RAMP AND SIDE ROAD QUEUES (MERRITT PKWY EVENING)

Highway	AM / PM	Queue #	Interchange	Ramp / Side Road	Direction	Head of Queue (Lat/Long)	Time	Queue Population (vehicles per lane)	Frequency	Notes	Photos
Merritt Pkwy	PM	1	Int. 35 (SR 137 / High Ridge Rd)	Entrance ramp	NB	41 06 50.0 / 73 32 28.5	5:00-6:00 p.m.	20-30 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto the Parkway	Merritt Ramps PM_1
Merritt Pkwy	PM	2	Int. 36 (SR 106 / Old Stamford Rd)	Old Stamford Rd	WB	41 07 00.2 / 73 29 58.1	5:00-6:00 p.m.	30-50 vpl (1 lane)	Intermittent	The head of the queue was found at the Parkway ramps (no signal)	Merritt Ramps PM_2
Merritt Pkwy	PM	3	Int. 38 (SR 123 / New Canaan Ave)	New Canaan Ave	EB	41 08 02.6 / 73 27 31.9	5:00-6:00 p.m.	20-30 vpl (1 lane)	Intermittent	The head of the queue was found at the signal at the Parkway ramps	Merritt Ramps PM_3
Merritt Pkwy	PM	4	Int. 41 (SR 33 / Willow Rd)	Willow Rd	WB	41 09 53.5 / 73 22 39.3	4:00-6:00 p.m.	20-40 vpl (1 lane)	Intermittent	The head of the queue was found at the signal at the Parkway ramps	Merritt Ramps PM_4
Merritt Pkwy	PM	5	Int. 41 (SR 33 / Willow Rd)	Entrance ramp	NB	41 09 49.5 / 73 22 54.3	4:00-5:00 p.m.	20-30 vpl (1 lane)	Intermittent	The head of the queue was found where vehicles waited to merge onto the Parkway	Merritt Ramps PM_5
Merritt Pkwy	PM	6	Int. 42 (SR 57 / Weston Rd)	Weston Rd	WB	41 09 46.0 / 73 21 25.6	5:41 p.m.	25-30 vpl (1 lane)	One time	The head of the queue was found at the signal at the Parkway ramps	Merritt Ramps PM_6
Merritt Pkwy	PM	7	Int. 52 (SR 8)	Entrance ramp	NB	41 14 16.3 / 73 09 35.8	4:33 p.m.	70-75 vpl (1 lane)	One time	The head of the queue was found where vehicles waited to merge onto the Parkway (congestion may have been atypical)	Merritt Ramps PM_7

Connecticut I-95 Corridor Congestion Relief Study

Appendix B

CONNECTICUT I-95 CORRIDOR CONGESTION RELIEF STATED PREFERENCE SURVEY REPORT

RSG
the science of insight

10.2.2015

PREPARED FOR:
CONNECTICUT DOT

SUBMITTED BY:
RSG

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IN COOPERATION WITH:
CDM SMITH

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1.0 INTRODUCTION

The I-95 corridor between New York and New Haven, CT is a high volume transportation corridor that carries much of the traffic between New York and Connecticut and other parts of New England. The corridor, which includes I-95 and Connecticut Route 15 (the Merritt Parkway), is severely congested. The Connecticut Department of Transportation (CTDOT) is conducting a study under the Federal Highway Administration (FHWA) Value Pricing Pilot Program to evaluate the use of congestion pricing strategies in the I-95 corridor from the New York State border to New Haven, CT (Figure 1-1). Congestion pricing strategies could be used to manage congestion through the more efficient use of the existing highway infrastructure. The revenue generated from the implementation of congestion pricing should be used to help finance improvements to the corridor—including I-95, Route 15, and the Metro North Railroad New Haven Line—that can provide additional congestion relief.

Two congestion pricing strategies were evaluated under this study:

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

FIGURE 1-1: I-95 STUDY CORRIDOR

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

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

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

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 behavioral choice models for both proposed congestion pricing strategies in the study corridor:

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

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

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

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

2.1 | PASSENGER VEHICLE QUESTIONNAIRE

INTRODUCTION AND TRIP QUALIFICATION QUESTIONS

At the beginning of the passenger vehicle survey questionnaire, respondents were presented with an introduction to the purpose of the study, 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.

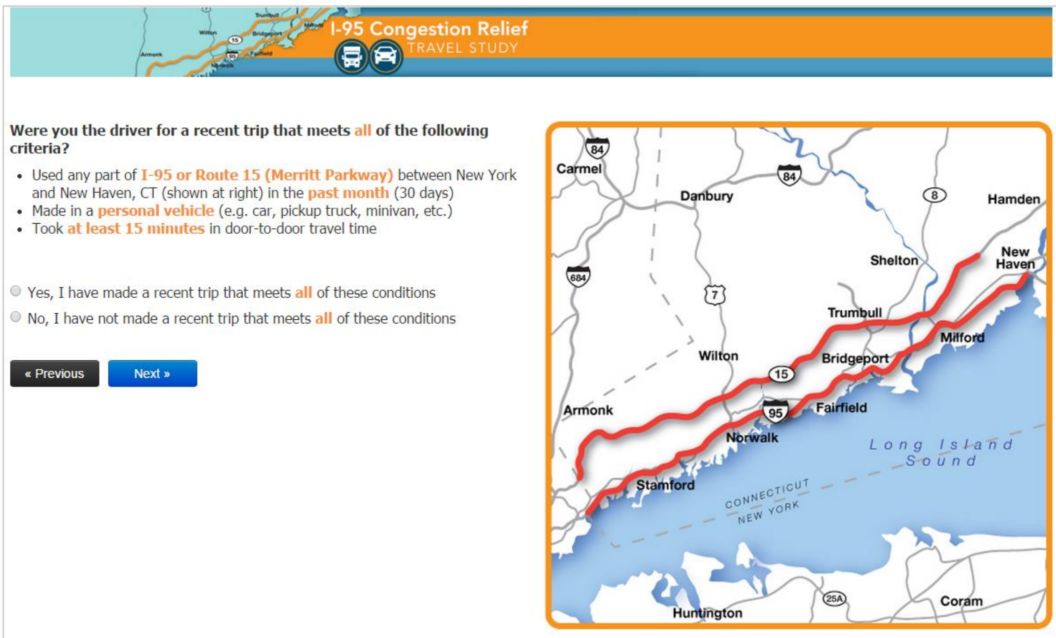
Following the introduction, respondents were asked if they had made a qualifying trip in the study corridor. In order to construct credible stated preference scenarios, it is necessary for respondents to have recent and personal experience using the study portion of I-95 or Route 15. To participate in the survey, respondents must have made a recent trip that met the following conditions:

- **The trip traveled on any part of I-95 and/or Route 15 between New Haven, CT and the New York State border.** This ensured that the sample only included trips that were made within the study corridor and could be affected by the proposed congestion pricing strategies.

- **The trip took at least 15 minutes in door-to-door travel time.** The 15-minute minimum travel time is a reasonable minimum for trips that would use I-95 and/or Route 15 and allows enough travel-time variation to be shown in the SP experiments for the corridor.
- **The trip was made in a personal vehicle (e.g., car, pickup truck, or minivan).** This questionnaire focused primarily on passenger-vehicle travel.

For reference, respondents were shown a map highlighting the study corridor (Figure 2-1). Respondents who indicated that they had not made a trip that met any of the stated criteria were disqualified from completing the survey.

FIGURE 2-1: PASSENGER VEHICLE SURVEY SCREEN—TRIP QUALIFICATION



TRIP DETAIL QUESTIONS

Qualifying respondents were asked to focus on their most recent trip that met the necessary qualification criteria as they continued through the survey. 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 asked to think about their most recent trip (and not a typical trip or average trip that they might make) to ensure that the sample included a diverse range of trip types and travel characteristics. This most recent trip also provided a frame of reference for respondents when completing the stated preference experiments in the next 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:

- Use of I-95 and/or Route 15

- Day of week
- Trip purpose
- Origin and destination locations
- Entrance and exit interchanges
- Departure time
- Preferred departure time
- Travel time
- Travel delay due to traffic congestion
- Perceived amount of congestion in the study corridor
- Vehicle occupancy
- Trip frequency
- Metro North Railroad ridership, frequency, and fare amount
- Use of I-84 or other alternate routes
- Ownership of electronic toll collection (ETC) transponders

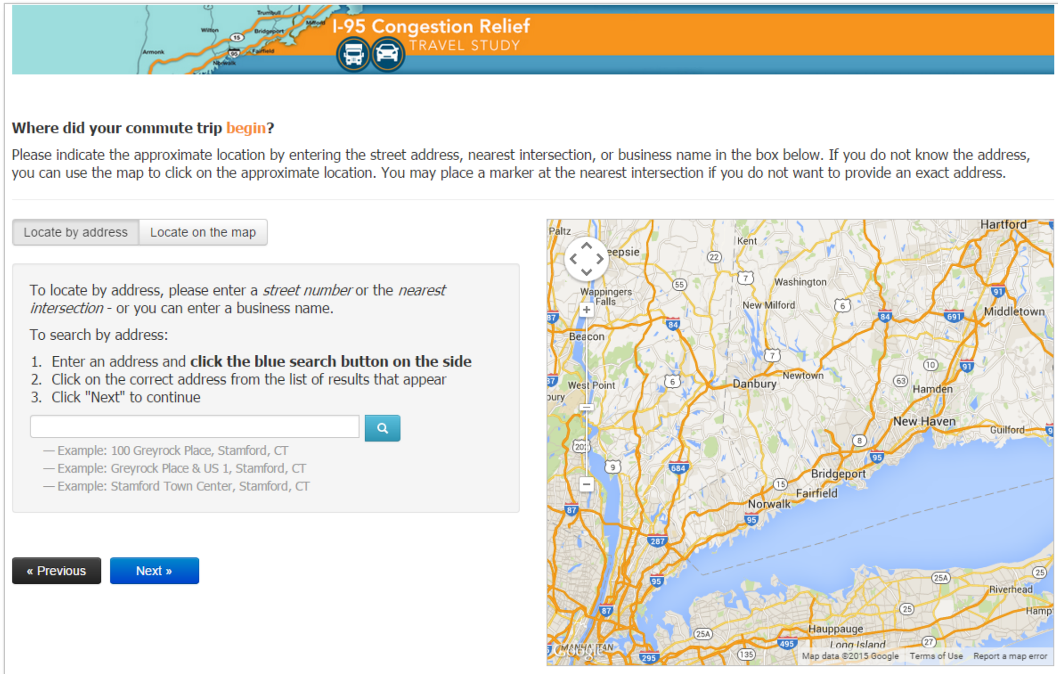
These questions were asked before the stated preference experiments in order to focus respondents on a specific, recent trip that they made in the corridor and to collect detailed information about that trip to use for constructing the experiments.

The study corridor includes two major roads—I-95 and Route 15—and trips in the corridor could use one, the other, or both roads depending on the type of trip and origin and destination locations. Respondents were first asked which of the two roads they used on their most recent trip and whether they could have used the other road (if they only used one).

Next, the survey asked respondents to report the day of the week their trip took place and the primary purpose for making their trip.

Focusing on their trip in one direction only, respondents were asked to report whether their trip began or ended at home, work, or another place, and then to identify the specific trip origin and destination using a Google Maps-based geocoder developed by RSG (Figure 2-2). Respondents identified the location of their origin and destination by entering a business name, a street intersection, a full address, or by using an interactive map. The origin and destination locations were geocoded using a Google Maps application programming interface to provide a latitude and longitude for both the trip origin and destination. The coordinates were then used to verify that the trip began and ended in two different locations (i.e., was not a round-trip) and that the trip could have reasonably traveled through the study corridor.

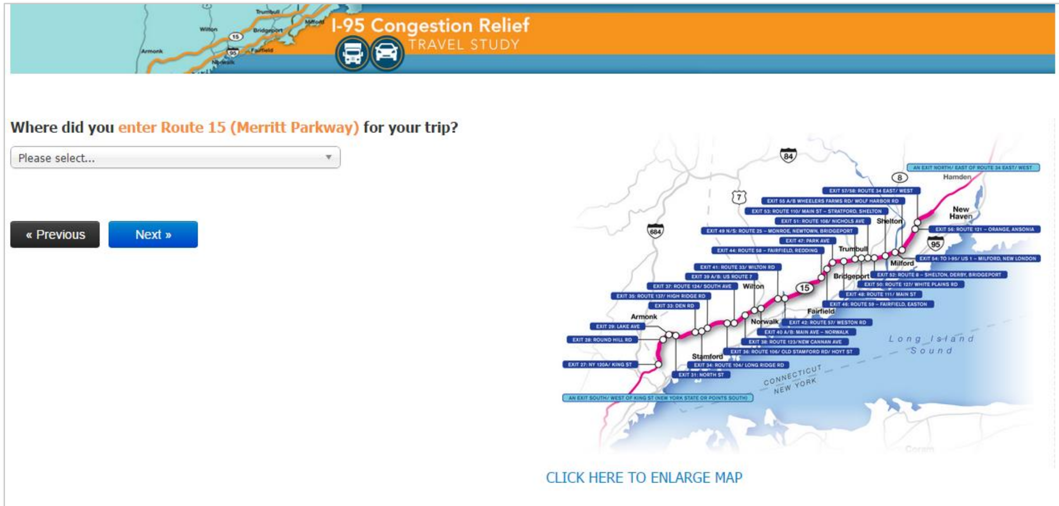
FIGURE 2-2: PASSENGER VEHICLE SURVEY SCREEN—ORIGIN LOCATION



The geocoding application was also used to estimate the total trip distance and travel time that could be compared to respondents' reported travel times. If the location of the trip origin and destination suggested an invalid trip, respondents were reminded to describe a one-way portion of the trip and asked if they needed to change the beginning or ending location of their trip. Respondents who did not change their origin or destination were disqualified from the survey.

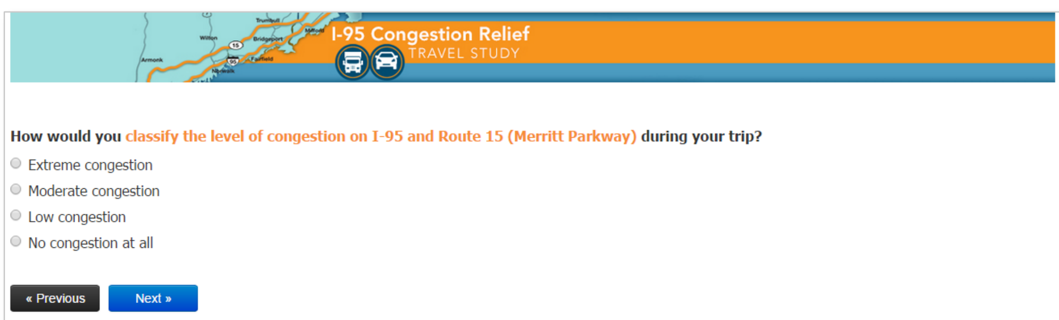
In addition to the origin and destination locations, respondents were asked where they entered and exited I-95 and/or Route 15. Maps of the interchanges were provided for each road to assist respondents who may not be familiar with the exit numbers or cross streets.

FIGURE 2-3: PASSENGER VEHICLE SURVEY SCREEN—ROUTE 15 ENTRANCE INTERCHANGE



Next, respondents entered their trip departure time and, if they would have preferred to depart at a different time but could not because of traffic congestion. Subsequent questions collected information about door-to-door travel time, delay due to traffic congestion, and their perceived classification of the level of congestion on the study corridors (Figure 2-4). Reported travel times were compared to travel times obtained from the Google Maps route-planning algorithm. Respondents who reported excessively long (2.5 times longer) or unrealistically short (0.75 times shorter) times compared to the Google-estimated travel time were asked to confirm or correct their travel time. Additional questions related to the recent trip included vehicle occupancy and trip frequency.

FIGURE 2-4: PASSENGER VEHICLE SURVEY SCREEN—PERCEIVED LEVEL OF CONGESTION



To understand the potential of automobile travelers to shift I-95 and/or Route 15 trips to rail, respondents were asked if they ever used Metro North Railroad (MNR) to make their reference trip. Those who do use MNR were asked to provide additional details, including how frequently they use it, how much they pay for the fare, and how they pay for the fare.

To understand the potential of corridor trips to shift to alternate routes, respondents were asked if they ever avoid I-95 and/or Route 15 by using alternate routes, including local roads and I-84.

The final question in this section of the survey asked if respondents own a transponder (such as E-ZPass) for electronic toll collection.

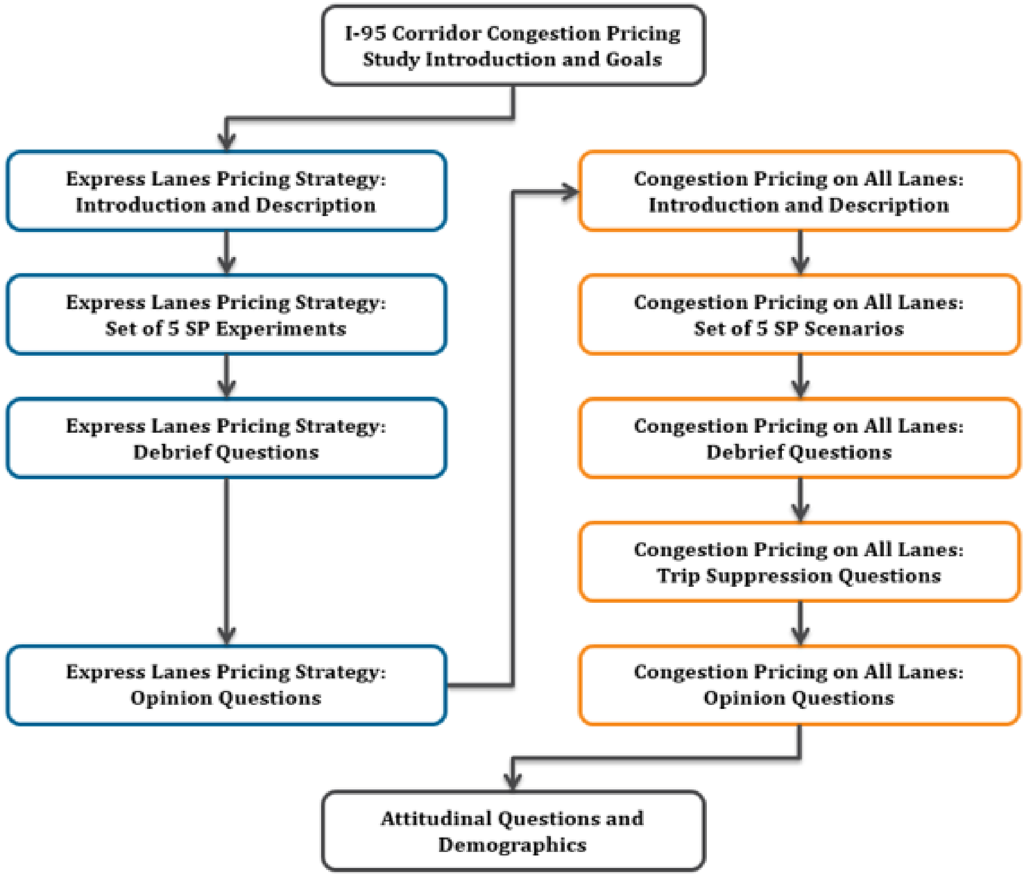
STATED PREFERENCE QUESTIONS

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

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

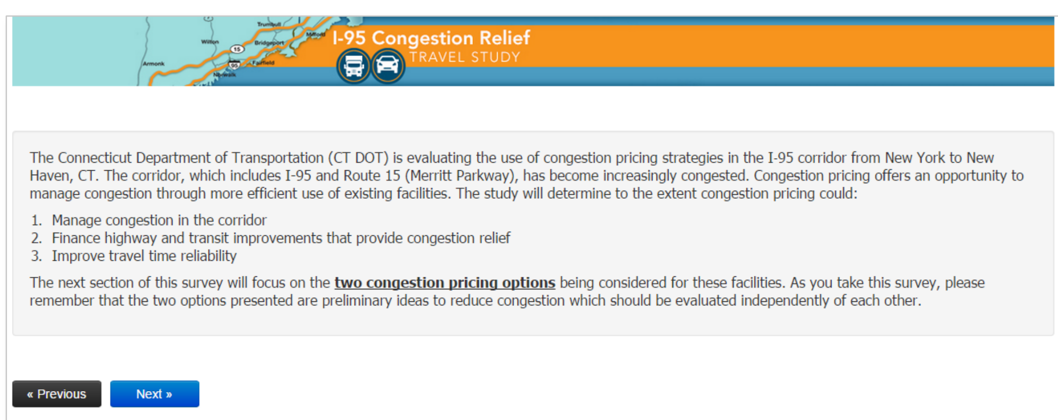
The stated preference section was structured so that respondents answered a set of five tradeoff scenarios, a set of debrief questions, and a set of opinion questions for both pricing strategies. Respondents answered all of the tradeoff, debrief and opinion questions for the express lanes pricing strategy before proceeding to the congestion pricing on all lanes strategy, as shown in Figure 2-5. The debrief, trip suppression, and opinion questions are described in more detail below.

FIGURE 2-5: STATED PREFERENCE AND DEBRIEF QUESTION STRUCTURE



At the start of the stated preference questions, respondents were presented with background information about the corridor and introduced to the concept of congestion pricing (Figure 2-6).

FIGURE 2-6: PASSENGER VEHICLE SURVEY SCREEN—INTRODUCTION TO CONGESTION PRICING



Stated Preference Experiments—Express Lanes on I-95

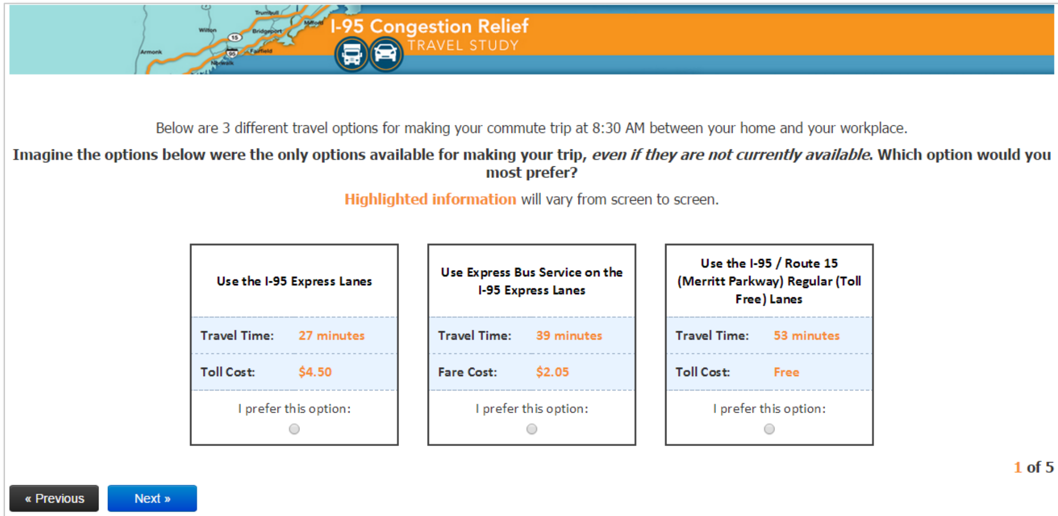
After this general introduction, respondents were introduced to the first pricing strategy—implementing new express lanes on I-95. Because the I-95 express lanes are only a reasonable travel alternative for respondents who either used I-95 for their reference trip or could have reasonably used I-95 for their trip, those respondents who reported a trip that used Route 15 only and could not have reasonably used I-95 were not presented with this set of stated preference experiments.

Each pricing strategy has a set of potential behavioral responses associated with it. The behavioral response options for any given pricing strategy depend on the type of pricing and the specific details of the pricing implementation (for example, differential pricing by time of day or route). Under priced conditions, travelers may make a number of changes to reduce the amount of the toll or they have to pay or avoid the toll altogether. The potential behavioral responses were presented to respondents as different travel alternatives in the stated preference experiments. For the express lanes strategy, three alternatives were evaluated:

- **Alternative 1: Use the I-95 and/or Route 15 regular lanes.** This alternative was presented to all respondents and was labeled to reflect the respondent's current route (either I-95, Route 15, or both). The travel time presented for this alternative was based on each respondent's reported travel time from his or her reference trip and varied to reflect increasing congestion in the future.
- **Alternative 2: Use the I-95 express lanes.** This alternative was presented to all respondents and featured a faster travel time than Alternative 1 to reflect free-flow travel conditions in the express lanes.
- **Alternative 3: Use express bus service in the I-95 express lanes.** This alternative was presented to all respondents and featured times slightly longer than the express lanes time in Alternative 2 to reflect access and egress time, headway time, and stops along the way.

Each of the alternatives was described by attributes of travel time and travel cost. The values of the attributes varied across the five questions and respondents were asked to select the alternative they preferred the most under the conditions presented in each scenario. Figure 2-7 presents an example express lanes stated preference experiment. 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 experiments are presented in Appendix A.

FIGURE 2-7: PASSENGER VEHICLE SURVEY SCREEN—EXPRESS LANES SP EXPERIMENT



Stated Preference Experiments—Congestion Pricing on All Travel Lanes

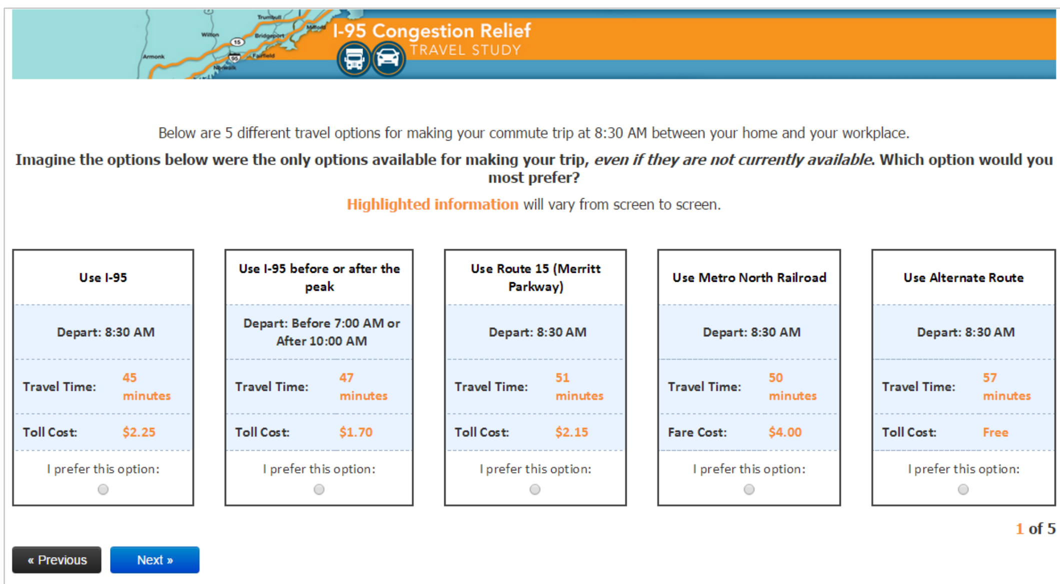
A different set of behavioral responses are possible under the strategy of tolling all travel lanes on I-95 and Route 15. For the experiments that evaluated congestion pricing on all lanes in the corridor, up to five alternatives were presented to respondents:

- **Alternative 1: Use your current route (I-95 and/or Route 15) and pay the toll.** This alternative was presented to all respondents and was labeled to reflect the respondent's current route (either I-95, Route 15, or both). The travel time presented in Alternative 1 were faster than the respondent's reported travel time to reflect improved travel speeds as a result of the congestion pricing strategy.
- **Alternative 2: Use Route 15 and pay a lower toll.** This alternative was presented to respondents who used I-95 only for their trip and represented potential differential pricing between I-95 and Route 15. The travel times presented in Alternative 2 were longer than the travel times in Alternative 1, while the toll rates were lower.
- **Alternative 3: Change departure time and pay a lower toll.** This alternative was presented to respondents who made a trip during the peak period and represented potential differential pricing by time-of-day. The travel times presented in Alternative 3 were shorter than Alternative 1 to reflect faster off-peak or shoulder travel conditions, and the toll rates were lower than Alternative 1 to reflect toll discounts to encourage peak spreading.
- **Alternative 4: Use an alternate route to avoid the toll.** This alternative was presented to all respondents and labeled to reflect local roads for short-distance trips or I-84 for long distance trips where I-84 is a viable alternative. Travel times for Alternative 4 were generally much longer than Alternative 1 and this alternative was always presented as toll-free.

- **Alternative 5: Use Metro North Railroad to avoid the toll.** This alternative was presented to respondents who reported a trip that could have reasonably used Metro North Railroad and was less than 100 miles in total distance.

Each travel alternative was described by attributes for travel time, travel cost, and departure time. The values of the attributes varied across the five questions and respondents were asked to select the alternative they preferred the most under the conditions presented in each scenario. Figure 2-8 shows an example stated preference experiment for the congestion pricing on all lanes strategy.

FIGURE 2-8: PASSENGER VEHICLE SURVEY SCREEN—TOLLING ALL LANES SP EXPERIMENT



There is another potential behavioral response to implementing congestion pricing on all lanes of I-95 and Route 15, which is to stop making the trip or make the trip less frequently to reduce the impact of the toll. This trip reduction or trip suppression response option was not presented as an alternative in the sated preference experiments due to the potential overstatement of the response. Instead, trip suppression was addressed after the stated preference experiments in a series of follow-up questions.

Stated Preference Experimental Design

The attribute values presented in each set of stated preference experiments 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 set of experiments.

With the exception of departure time in the tolling all lanes experiments, the values of the attributes varied independently across the five 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.

The amount of variation for each attribute depended on two trip characteristics: the distance traveled on the study portion of I-95 and/or Route 15, and the amount of reported delay experienced on the study portion of each facility. Table 2-1 to Table 2-3 show the attribute levels used to generate the express lanes experiments for respondents who reported a low amount of delay (15 minutes or less), a medium amount of delay (16-30 minutes of delay) and a long amount of delay (31 minutes of delay or more). Within each delay-based design, the attribute levels also varied depending on respondent's calculated travel distance in the study corridor. Table 2-4 to Table 2-6 detail the formulas that were used to calculate the attribute values for the congestion pricing on all lanes stated preference experiments.

TABLE 2-1: PASSENGER VEHICLE EXPRESS LANES SP ATTRIBUTE LEVELS—LOW DELAY

Attribute	Level	Alternative 1: Use I-95 and/or Route 15 Regular Lanes				Alternative 2: Use I-95 Express Lanes				Alternative 3: Use Express Bus Service	
			I-95 Highway Distance				I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi		<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	1	3	5	Current Travel Time + Level	-3	-5	-7	Alt 2 Travel Time + Level	6
	2		3	5	7		-5	-7	-9		9
	3		5	7	9		-7	-9	-11		12
	4		7	9	11		-9	-11	-13		15
	5		9	11	13		-11	-13	-15		18
Toll Cost	1	None				Level	$0.50	$0.75	$1.50	Alt 2 Cost * Level	45%
	2						$1.50	$2.25	$4.50		55%
	3						$2.50	$3.75	$7.50		65%
	4						$3.50	$5.25	$10.50		75%
	5						$4.50	$6.75	$13.50		85%

TABLE 2-2: PASSENGER VEHICLE EXPRESS LANES SP ATTRIBUTE LEVES—MEDIUM DELAY

Attribute	Level	Alternative 1: Use I-95 and/or Route 15 Regular Lanes				Alternative 2: Use I-95 Express Lanes				Alternative 3: Use Express Bus Service	
			I-95 Highway Distance				I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi		<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	1	3	5	Current Travel Time + Level	-5	-7	-13	Alt 2 Travel Time + Level	6
	2		3	5	7		-7	-9	-15		9
	3		5	7	9		-9	-11	-17		12
	4		7	9	11		-11	-13	-19		15
	5		9	11	13		-13	-15	-21		18
Toll Cost	1	None				Level	$1.00	$1.50	$3.00	Alt 2 Cost * Level	45%
	2						$2.00	$3.00	$6.00		55%
	3						$3.00	$4.50	$9.00		65%
	4						$4.00	$6.00	$12.00		75%
	5						$5.00	$7.50	$15.00		85%

TABLE 2-3: PASSENGER VEHICLE EXPRESS LANES SP ATTRIBUTE LEVELS—HIGH DELAY

Attribute	Level	Alternative 1: Use I-95 and/or Route 15 Regular Lanes				Alternative 2: Use I-95 Express Lanes				Alternative 3: Use Express Bus Service	
			I-95 Highway Distance				I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi		<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	1	3	5	Current Travel Time + Level	-7	-13	-23	Alt 2 Travel Time + Level	6
	2		3	5	7		-9	-15	-25		9
	3		5	7	9		-11	-17	-27		12
	4		7	9	11		-13	-19	-29		15
	5		9	11	13		-15	-21	-31		18
Toll Cost	1	None				Level	$1.50	$2.25	$4.50	Alt 2 Cost * Level	45%
	2						$2.50	$3.75	$7.50		55%
	3						$3.50	$5.25	$10.50		65%
	4						$4.50	$6.75	$13.50		75%
	5						$5.50	$8.25	$16.50		85%

TABLE 2-4: PASSENGER VEHICLE TOLLING ALL LANES SP ATTRIBUTE LEVELS—LOW DELAY

Attribute	Level	Alternative 1: Use Current Route				Alternative 2: Use Alternate Toll Route*		Alternative 3: Use Current Route Before/After Peak		Alternative 4: Use Alternate Toll Free Route				Alternative 5: Use Metro North	
			I-95 Highway Distance								I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi						<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	-3	-5	-7	Alt 1 Travel Time + Level	10	Alt 1 Travel Time + Level	-10	Current Travel Time + Level	3	5	9	Alt 2 Travel Time + Level	0
	2		-5	-7	-9		8		-6		5	7	11		3
	3		-7	-9	-11		6		-4		7	9	15		6
	4		-9	-11	-13		4		0		9	11	19		9
	5		-11	-13	-15		2		2		11	13	21		12
Toll Cost	1	Level	$0.50	$0.75	$1.50	Alt 1 Cost * Level	80%	Alt 1 Cost * Level	45%	Toll Free				Actual Fare	
	2		$1.50	$2.25	$4.50		85%		55%						
	3		$2.50	$3.75	$7.50		90%		65%						
	4		$3.50	$5.25	$10.50		95%		75%						
	5		$4.50	$6.75	$13.50		100%		85%						

**Alternative 2 was shown only to respondents who could have used the alternate road for their reference trip. For example, if the respondent used the I-95 (or Route 15) and could have also used the Route 15 (or I-95) for the reference trip, alternative 2 was included in the choice experiments.*

TABLE 2-5: PASSENGER VEHICLE TOLLING ALL LANES SP ATTRIBUTE LEVELS—MEDIUM DELAY

Attribute	Level	Alternative 1: Use Current Route				Alternative 2: Use Alternate Toll Route*		Alternative 3: Use Current Route Before/After Peak		Alternative 4: Use Alternate Toll Free Route				Alternative 5: Use Metro North	
			I-95 Highway Distance								I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi						<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	-5	-7	-9	Alt 1 Travel Time + Level	10	Alt 1 Travel Time + Level	-10	Current Travel Time + Level	7	9	15	Alt 2 Travel Time + Level	0
	2		-7	-9	-11		8		-6		9	11	17		3
	3		-9	-11	-13		6		-4		11	13	21		6
	4		-11	-13	-15		4		0		13	15	25		9
	5		-13	-15	-17		2		2		15	17	27		12
Toll Cost	1	Level	$1.00	$1.50	$3.00	Alt 1 Cost * Level	80%	Alt 1 Cost * Level	45%	Toll Free				Actual Fare	
	2		$2.00	$3.00	$6.00		85%		55%						
	3		$3.00	$4.50	$9.00		90%		65%						
	4		$4.00	$6.00	$12.00		95%		75%						
	5		$5.00	$7.50	$15.00		100%		85%						

**Alternative 2 was shown only to respondents who could have used the alternate road for their reference trip. For example, if the respondent used the I-95 (or Route 15) and could have also used the Route 15 (or I-95) for the reference trip, alternative 2 was included in the choice experiments.*

TABLE 2-6: PASSENGER VEHICLE TOLLING ALL LANES SP ATTRIBUTE LEVELS—HIGH DELAY

Attribute	Level	Alternative 1: Use Current Route				Alternative 2: Use Alternate Toll Route*		Alternative 3: Use Current Route Before/After Peak		Alternative 4: Use Alternate Toll Free Route				Alternative 5: Use Metro North	
			I-95 Highway Distance								I-95 Highway Distance				
			<= 10 mi	11-20 mi	> 20 mi						<= 10 mi	11-20 mi	> 20 mi		
Travel Time	1	Current Travel Time + Level	-7	-9	-15	Alt 1 Travel Time + Level	10	Alt 1 Travel Time + Level	-10	Current Travel Time + Level	9	15	25	Alt 2 Travel Time + Level	0
	2		-9	-11	-17		8		-6		11	17	27		3
	3		-11	-13	-19		6		-4		15	21	31		6
	4		-13	-15	-21		4		0		19	25	35		9
	5		-15	-17	-23		2		2		21	27	37		12
Toll Cost	1	Level	$2.50	$5.00	$7.50	Alt 1 Cost * Level	80%	Alt 1 Cost * Level	45%	Toll Free				Actual Fare	
	2		$3.50	$7.00	$10.50		85%		55%						
	3		$4.50	$9.00	$13.50		90%		65%						
	4		$5.50	$11.00	$16.50		95%		75%						
	5		$6.50	$13.00	$19.50		100%		85%						

**Alternative 2 was shown only to respondents who could have used the alternate road for their reference trip. For example, if the respondent used the I-95 (or Route 15) and could have also used the Route 15 (or I-95) for the reference trip, alternative 2 was included in the choice experiments.*

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 50 total experiments divided into 10 blocks of five experiments each. 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.

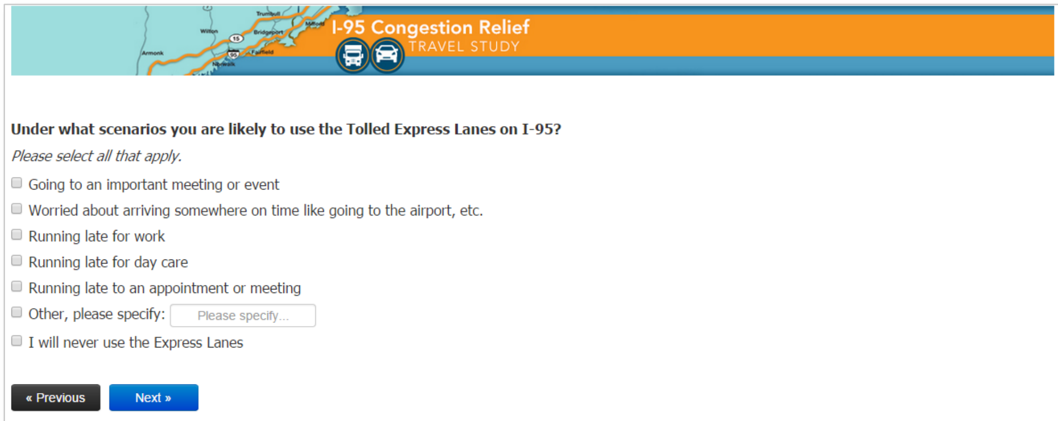
DEBRIEF AND OPINION QUESTIONS

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

Debrief and Opinion Questions—Express Lanes on I-95

Respondents who never selected a tolled express lanes alternative in the SP section were asked to indicate the primary reason for their choices. All respondents were asked under what scenarios they would be likely to use the proposed express lanes on I-95 (Figure 2-9) and their opinion of the proposed express lanes strategy. If respondents were somewhat or strongly in favor of the congestion pricing strategy, they were asked in a follow-up question to understand why they were in favor. Similarly, respondents who were somewhat or strongly opposed to the tolling of the project were asked to indicate their primary reason for opposing the strategy.

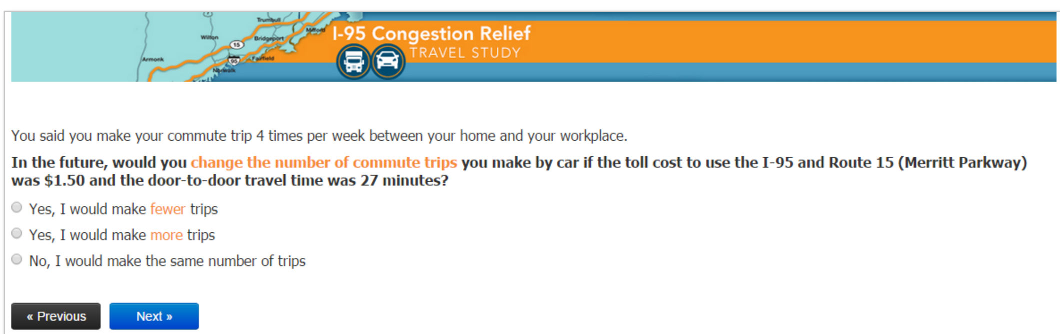
FIGURE 2-9: PASSENGER VEHICLE SURVEY SCREEN—EXPRESS LANES USE



Debrief and Opinion Questions—Congestion Pricing on All Travel Lanes

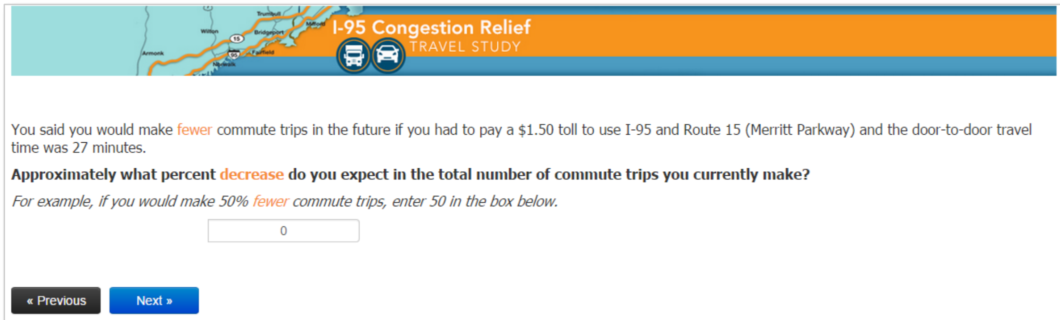
To understand how respondents could change their travel in the future once congestion pricing is implemented on all travel lanes of I-95 and/or Route 15, follow-up questions were asked to understand if, given a certain travel time and toll cost, respondents would change the frequency of their reference trip and, if so, how they would change their trips. All respondents were asked if they would make more trips, fewer trips, or would not make any changes to their travel in the future, given the hypothetical time and cost conditions for the I-95 and/or Route 15 from their fifth stated preference scenario (Figure 2-10).

FIGURE 2-10: PASSENGER VEHICLE SURVEY SCREEN—TRIP REDUCTION



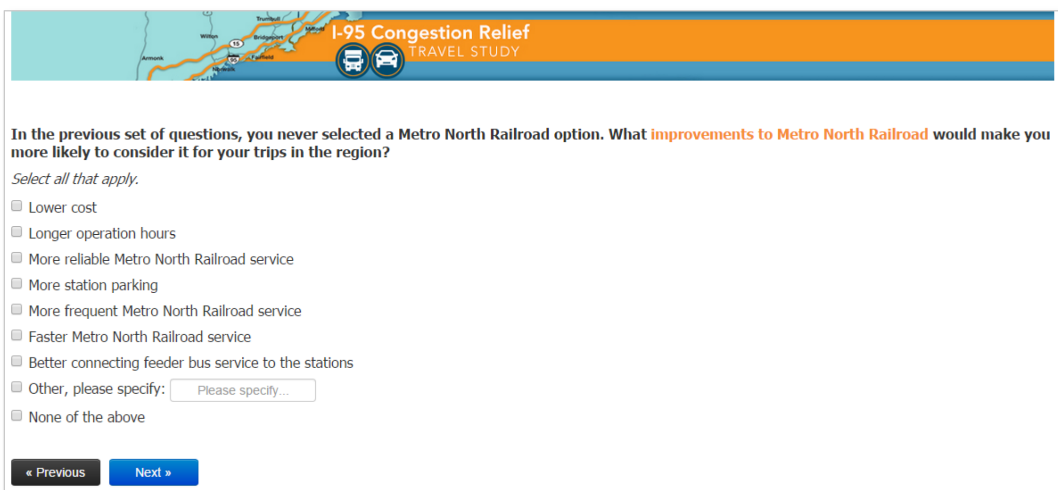
If respondents indicated that, given the conditions, they would change the number of trips they make, they were prompted to report by what percentage they would reduce/increase their current number of trips (Figure 2-11).

FIGURE 2-11: PASSENGER VEHICLE SURVEY SCREEN—AMOUNT OF REDUCTION



Next, respondents were asked a series of debrief questions related to the congestion pricing on all lanes strategy. Respondents who never selected a tolled alternative in the SP section were asked to indicate the primary reason for their choices. If respondents selected at least one time-shift alternative in the SP section, they were prompted to indicate the direction they would prefer to shift their trip, either before or after the peak period. On the other hand, if respondents saw a time-shift alternative in the SP section and never selected it, they were asked to indicate the primary reason why they never chose to shift to the off-peak period. Finally, respondents who never chose the Metro North Railroad alternative in the stated preference section were asked to indicate conditions that would make them more likely to use the rail service for their reference trip (Figure 2-12).

FIGURE 2-12: PASSENGER VEHICLE SURVEY SCREEN— FACTORS TO INCREASE METRO NORTH RAILROAD USE

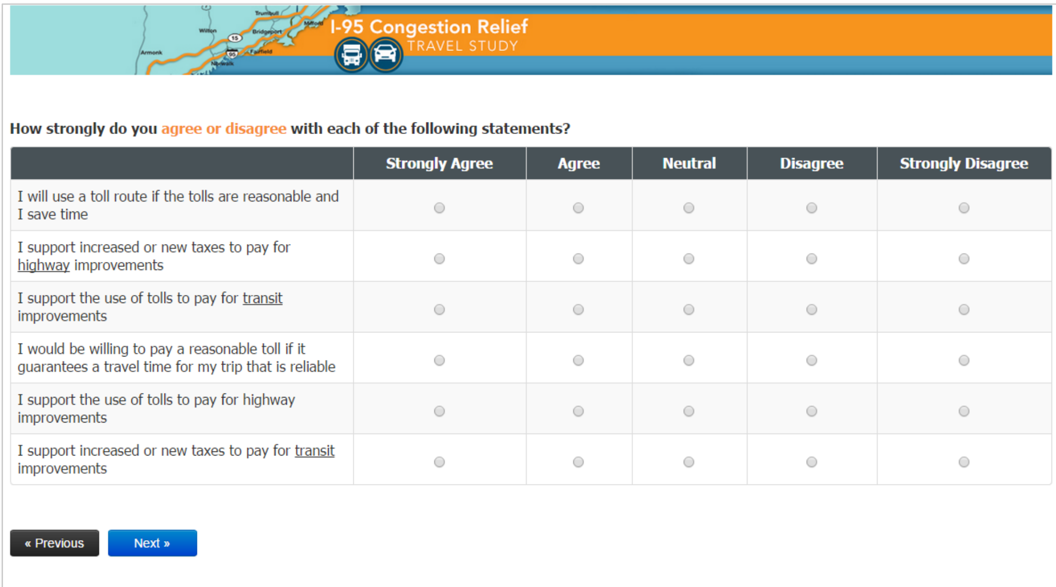


As with the express lanes strategy, respondents were asked to indicate, based on the information provided in the survey, their opinion of the proposal to implement congestion pricing on all lanes in the project corridor. If respondents were somewhat or strongly in favor of the proposal, they were asked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

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

Finally, respondents were asked the extent to which they agreed or disagreed with a series of attitude statements related to tolling and congestion pricing, and the use of the toll revenue to support different transportation initiatives (Figure 2-13 and Figure 2-14).

FIGURE 2-13: PASSENGER VEHICLE SURVEY SCREEN—TOLL ATTITUDE STATEMENTS



How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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 support the use of tolls to pay for transit improvements					
I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable					
I support the use of tolls to pay for highway improvements					
I support increased or new taxes to pay for transit improvements					

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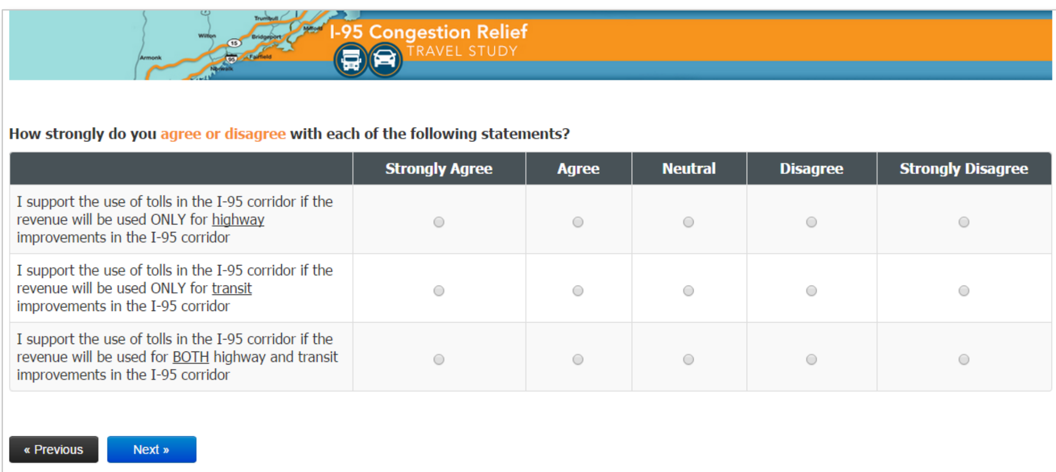
FIGURE 2-14: PASSENGER VEHICLE SURVEY SCREEN—USE OF TOLL REVENUE



How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for highway improvements in the I-95 corridor					
I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for transit improvements in the I-95 corridor					
I support the use of tolls in the I-95 corridor if the revenue will be used for BOTH highway and transit improvements in the I-95 corridor					

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DEMOGRAPHIC QUESTIONS

The final section of the survey included demographic questions related to the following topics:

- Home zip code

- Gender
- Age
- Employment status
- Household size
- Vehicle ownership
- 2014 household income, before taxes

Responses to these questions were used to classify respondents, identify possible behavioral differences among demographic characteristics, and to confirm that the sample contained a diverse representation from drivers that travel in the study region. Finally, respondents were asked about their willingness to participate in future studies and given the opportunity to leave comments about the survey or the project. These open-end comments are provided in Appendix C.

2.2 | COMMERCIAL VEHICLE QUESTIONNAIRE

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

The commercial vehicle survey questions were grouped into five main sections:

1. Introduction and trip qualification questions
2. Trip detail questions
3. Stated preference questions
4. Debrief and opinion questions
5. Company information questions

INTRODUCTION AND TRIP QUALIFICATION 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 recent trip in a commercial vehicle that traveled on I-95 between New Haven, CT and the New York State border as shown in Figure 2-15. Qualifying respondents were instructed to think of their most recent commercial trip that used I-95. For the purposes of this study, a commercial trip was defined as travel from the last commercial stop (for pickup or delivery) before using the study portion of I-95 to the first commercial stop after using the study portion of I-95 in one direction only (Figure 2-16). This trip, referred to as the respondent's reference trip, formed the basis for the next set of questions in the survey.

FIGURE 2-15: COMMERCIAL VEHICLE SURVEY SCREEN—TRIP QUALIFICATION

FIGURE 2-16: COMMERCIAL VEHICLE SURVEY SCREEN—TRIP DEFINITION

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:

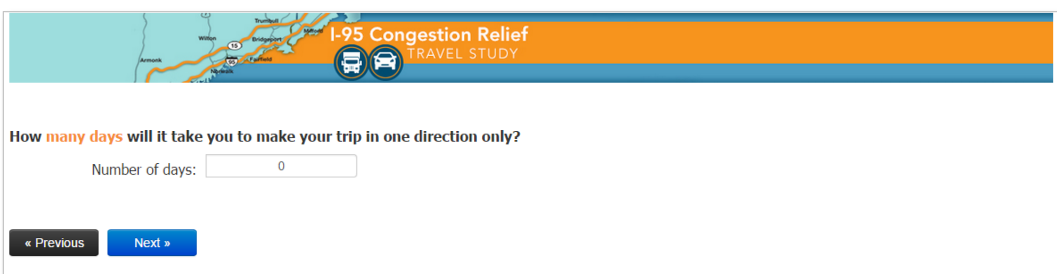
- Single or multi-day trip
- Day of week
- Origin and destination (city and state)

- Trip distance
- Departure time
- Travel time
- Travel delay due to traffic congestion on I-95
- Tolls paid and toll amount
- Vehicle size (number of axles)
- Trip frequency
- Use of I-84 or other alternate routes
- Ownership of electronic toll collection (ETC) transponders

Because all commercial vehicle respondents were intercepted on I-95 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-95 between New Haven and New York. The first question in this section of the survey confirmed 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 day of the week they made their most recent commercial trip that used I-95.

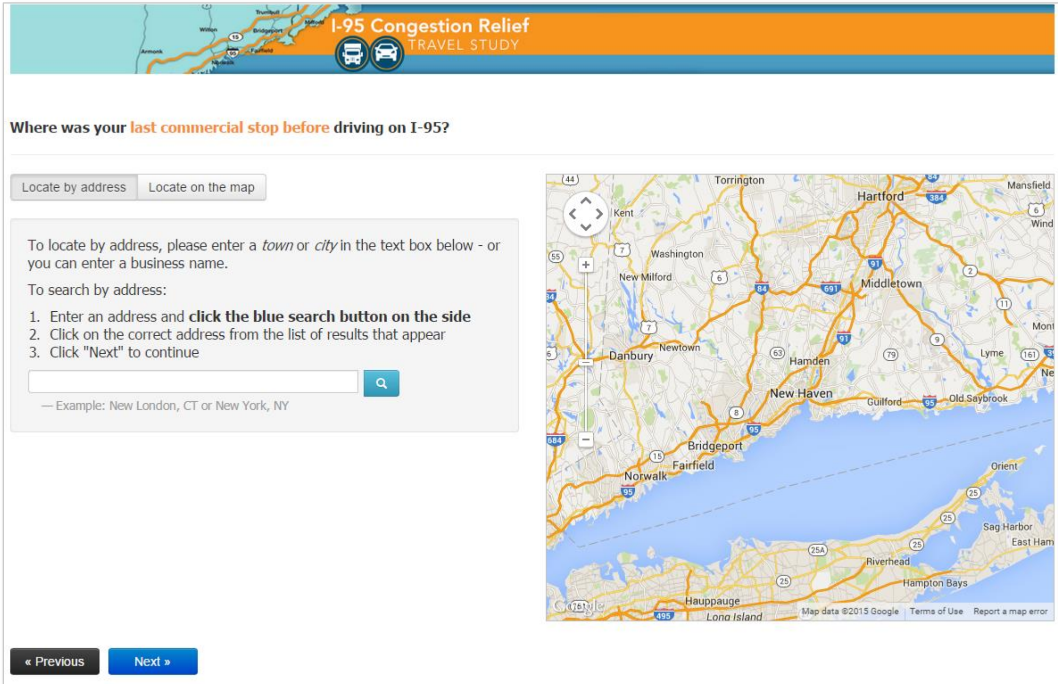
Next, because commercial vehicle trips vary greatly in distance and travel time, respondents were asked whether they completed or will complete their reference trip in one day or multiple days. Respondents who were describing a multi-day trip reported the total number of days it would take to make that trip (Figure 2-17). 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 2-17: COMMERCIAL VEHICLE SURVEY SCREEN—TRIP DURATION



Using a Google Maps interface, respondents entered the city and state of their last commercial stop before traveling on the study portion of I-95 between New Haven and New York and the city and state of their next commercial stop after traveling on the study portion of I-95. 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 2-18: COMMERCIAL VEHICLE SURVEY SCREEN—TRIP ORIGIN



Next, respondents were asked to report the travel time and distance details of their trip, including the time they began their trip, the total duration of their trip, and the approximate distance of their trip. As in the passenger vehicle survey, respondents were asked if they experienced any delays because of traffic congestion on I-95 and how long the trip would take if there were no delays.

Respondents then reported whether they paid 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-84 or other alternate routes to avoid using I-95 to make this same trip.

STATED PREFERENCE QUESTIONS

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

At the start of the stated preference questions, respondents were introduced to the concept of congestion pricing (Figure 2-19) and the proposed implementation of congestion pricing on I-95 (Figure 2-20). These descriptions were similar to those presented to the passenger vehicle respondents, but did not mention Route 15 or the possible implementation of express lanes on I-95.

FIGURE 2-19: COMMERCIAL VEHICLE SURVEY SCREEN—INTRODUCTION TO CONGESTION PRICING

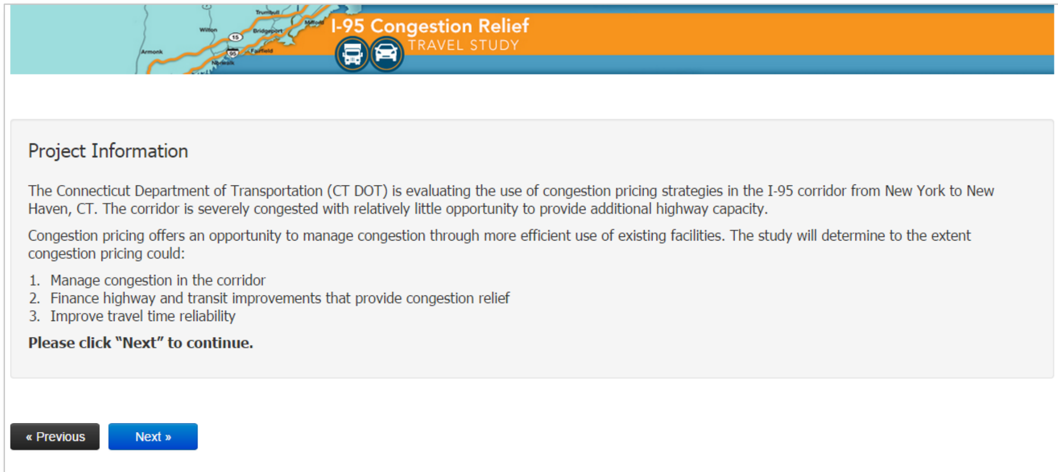
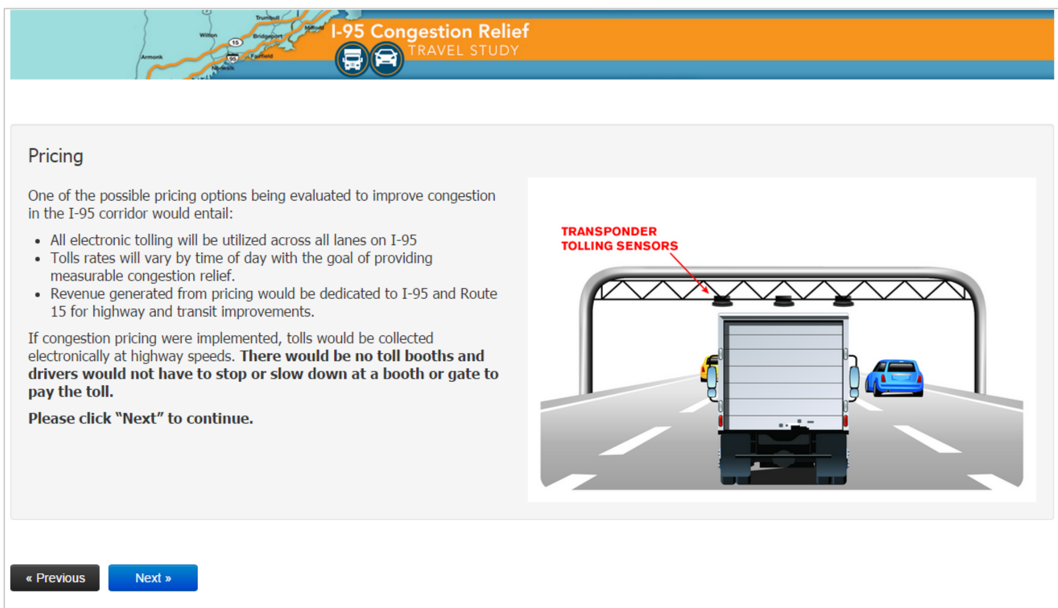


FIGURE 2-20: COMMERCIAL VEHICLE SURVEY SCREEN—TOLLING ALL TRAVEL LANES OF I-95



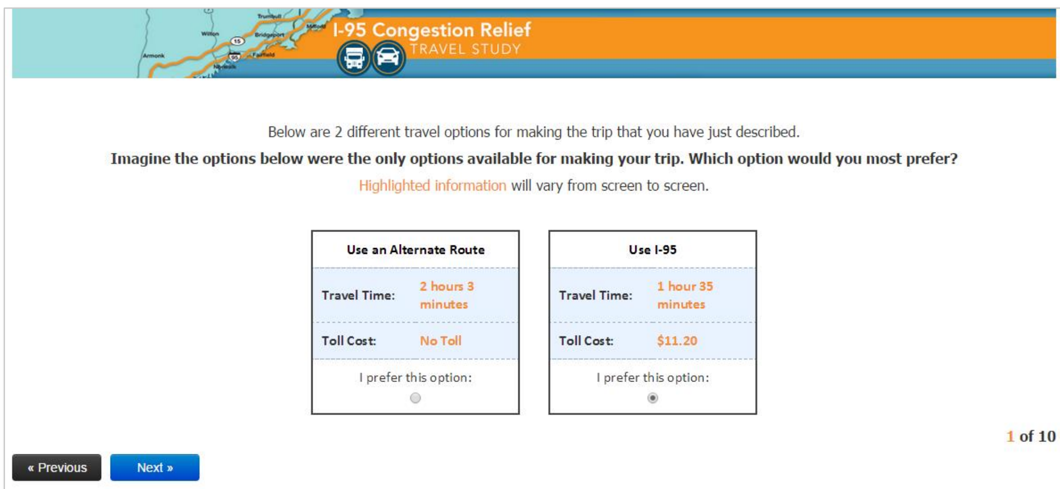
Next, the respondent's reported travel time from their reference trip was used to generate a custom set of ten hypothetical stated preference experiments that included two travel alternatives:

- **Alternative 1: Use I-95 and pay the toll.** This alternative was shown to all respondents and was described by two attributes: travel time and toll cost. The travel time presented in Alternative 1 was faster than the respondent's reported travel time to reflect faster travel speeds as a result of the congestion pricing strategy.

- **Alternative 2: Use an alternate route.** This alternative was shown to all respondents and was described by a single attribute of travel time. The travel time presented in Alternative 2 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 or longer in distance.

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 2-21 presents an example stated preference experiment from the commercial vehicle survey for a four-axle vehicle.

FIGURE 2-21: COMMERCIAL VEHICLE SURVEY SCREEN—SP 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-95 toll cost was generated by multiplying the number of axles by one of the 10 levels in the experimental design. Table 2-7 provides the specific equations and levels used to generate the attribute values for commercial vehicle respondents.

TABLE 2-7: COMMERCIAL VEHICLE STATED PREFERENCE ATTRIBUTE LEVELS

Attribute	Level	Alternative 1: Use I-95				Alternative 2: Use an Alternate Route			
			I-95 Delay				I-95 Delay		
			<= 15 min	16-30 min	> 30 min		<= 15 min	16-30 min	> 30 min
Travel Time	1	Current Travel Time + Level	1	1	1	Current Travel Time + Level	-3	-5	-7
	2		3	3	3		-5	-7	-11
	3		5	5	5		-7	-9	-15
	4		7	7	7		-9	-11	-21
	5		9	9	9		-11	-13	-25
Toll Cost	1	None				(Axles – 1) * Level * (Alt 1 Time - Alt 2 Time)/60	$4.00/hr.	$4.00/hr.	$4.00/hr.
	2						$6.00/hr.	$6.00/hr.	$6.00/hr.
	3						$8.00/hr.	$8.00/hr.	$8.00/hr.
	4						$10.00/hr.	$10.00/hr.	$10.00/hr.
	5						$12.00/hr.	$12.00/hr.	$12.00/hr.
	6						$14.00/hr.	$14.00/hr.	$14.00/hr.
	7						$16.00/hr.	$16.00/hr.	$16.00/hr.
	8						$18.00/hr.	$18.00/hr.	$18.00/hr.
	9						$20.00/hr.	$20.00/hr.	$20.00/hr.
	10						$24.00/hr.	$24.00/hr.	$24.00/hr.

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.

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-95 option were asked to provide their primary reason for doing so. Respondents were then asked whether they favor or oppose congestion pricing on I-95 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 2-13).

COMPANY INFORMATION 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 cost responsibility
- Toll charging mechanism

The survey concluded with an opportunity to leave comments about the survey and/or the proposed congestion pricing plan for I-95. 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 capture key travel market segments in the study corridor, including local and long-distance trips, work and non-work trips, peak and off-peak trips, and representation from different demographic and company characteristics for both passenger and commercial vehicle travelers. By collecting data from a range of travelers and trip types, it is possible to identify the ways in which different characteristics affect choice behavior. These differences can then be reflected in the structure and coefficients of the resulting choice models that are estimated using the stated preference survey data.

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

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

Commercial vehicle travelers were recruited exclusively through in-person intercepts at travel centers and service plazas along the I-95 corridor. RSG began administration on November 14, 2014 and concluded on December 11, 2014. A total of 1,511 passenger vehicle surveys and 291 commercial vehicle surveys were completed during this time. The administration methods and number of complete surveys are presented in **Table 3-1**.

TABLE 3-1: NUMBER OF RESPONSES BY ADMINISTRATION METHOD

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

Each recruitment method is described in detail below.

3.1 | IN-PERSON INTERCEPT

RSG assembled a team that traveled to Connecticut to intercept passenger and commercial vehicle drivers to take the stated preference survey at a variety of sites such as libraries, community centers, service plazas, and DMV locations. Sites were chosen along I-95 and Route 15 where both inter-city and intra-city travelers could be intercepted. Locations were selected not only for their viability to obtain completed surveys, but also to offer a diverse sample of corridor's population the opportunity to participate in the survey, including low income residents or those without internet access. RSG administered the passenger vehicle survey in-person over six days, from Friday, November 14 through Wednesday, November 20, 2014, during which time 540 responses were collected. Respondents were offered a $5 gift card for completing the survey as an incentive.

Commercial vehicle drivers were recruited at two service plazas on I-95—the service plaza near Darien, CT and the service plaza in Milford, CT—as well as a large TA Travel Center just outside of New Haven, CT. RSG administered the commercial vehicle driver survey over seven days, from Friday, November 14 through Thursday, November 20, 2014. Commercial vehicle respondents who qualified for and completed the survey were offered a $10 gas card as an incentive. A total of 291 respondents completed the commercial vehicle stated preference survey during the intercept effort.

The in-person survey administration consisted of 20 laptop computers distributed across four activity sites per day. Each site was staffed by one experienced field site manager and assisted by one or two trained intercept staff. All staff members were responsible for approaching and screening potential respondents, escorting respondents to interview stations, and assisting them as needed in completing the survey. A framed poster mounted on an easel was positioned near the interview stations to help attract respondents to the survey (Figure 3-2). Great care was taken by the attendants to represent the project team in a polite and courteous manner at all times. Figure 3-1 shows a map where both the passenger and commercial field intercept sites were located, while Table 3-2 shows detailed information about the intercept sites.

FIGURE 3-1: PASENGER AND COMMERCIAL VEHICLE SURVEY INTERCEPT LOCATIONS

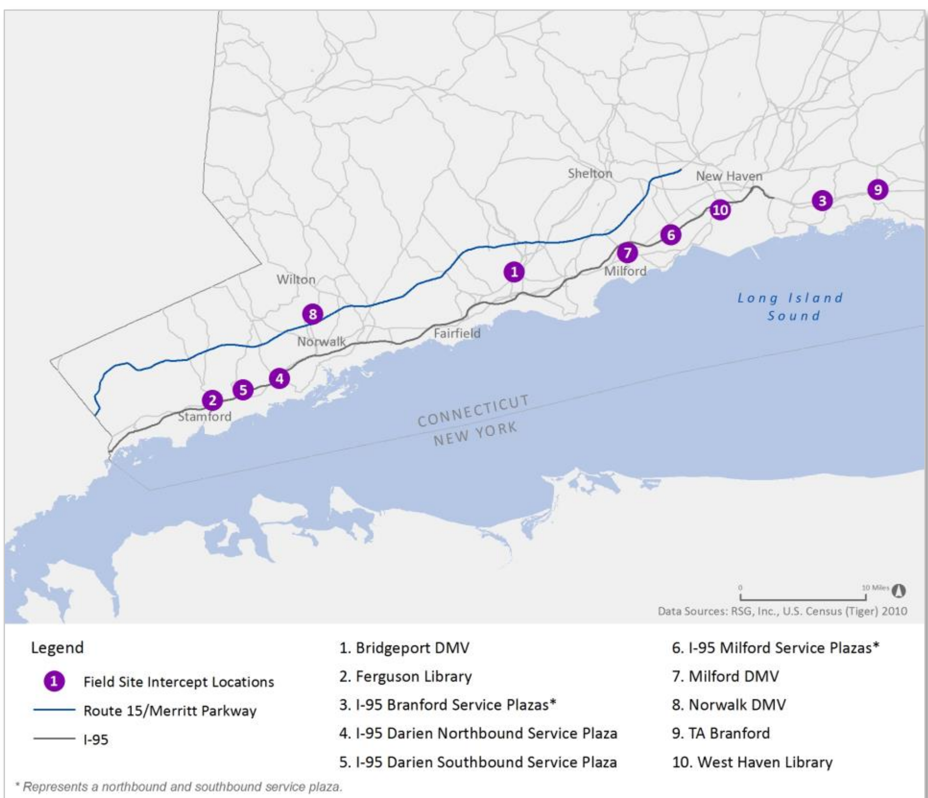


TABLE 3-2: PASSENGER AND COMMERCIAL VEHICLE COMPLETE SURVEYS BY LOCATION

Survey Type	Intercept Site	Number of Days in Field	Completed Surveys
Passenger	Service plaza (I-95 Darian Northbound)	3	85
	Norwalk DMV	2	73
	Service plaza (I-95 Darian Southbound)	4	72
	Service plaza (I-95 Milford Northbound)	4	68
	Bridgeport DMV	1	53
	Service plaza (I-95 Milford Southbound)	3	36
	Service plaza (I-95 Branford Northbound)	1	28
	Ferguson Library	1	27
	Service plaza (I-95 Branford Southbound)	1	26
	West Haven Library	1	25
	Milford DMV	1	24
	TA Branford	5	23
Total Passenger Vehicle Intercept Completes			**540**
Commercial	TA Branford	5	118
	Service plaza (I-95 Darian Southbound)	4	93
	Service plaza (I-95 Milford Southbound)	3	40
	Service plaza (I-95 Milford Northbound)	4	25
	Service plaza (I-95 Darian Northbound)	3	11
	Service plaza (I-95 Branford Northbound)	1	4
Total Commercial Vehicle Intercept Completes			**291**

FIGURE 3-2: INTERCEPT POSTER

3.2 | OUTREACH TO LOCAL EMPLOYERS

Additional passenger vehicle responses were obtained through the cooperation of local businesses, chambers of commerce, community groups, and other Connecticut-based organizations. RSG worked closely with the project team to reach out to a variety of businesses and institutions situated in various towns and cities along the I-95 corridor to ask their employees to participate in the stated preference survey. RSG provided each organization with a unique survey link and email invitation text, which was then distributed to the employees and/or organization members. Twenty-four separate employers or organizations recorded at least one complete travel survey for a total of 567 completed surveys as detailed in Table 3-3.

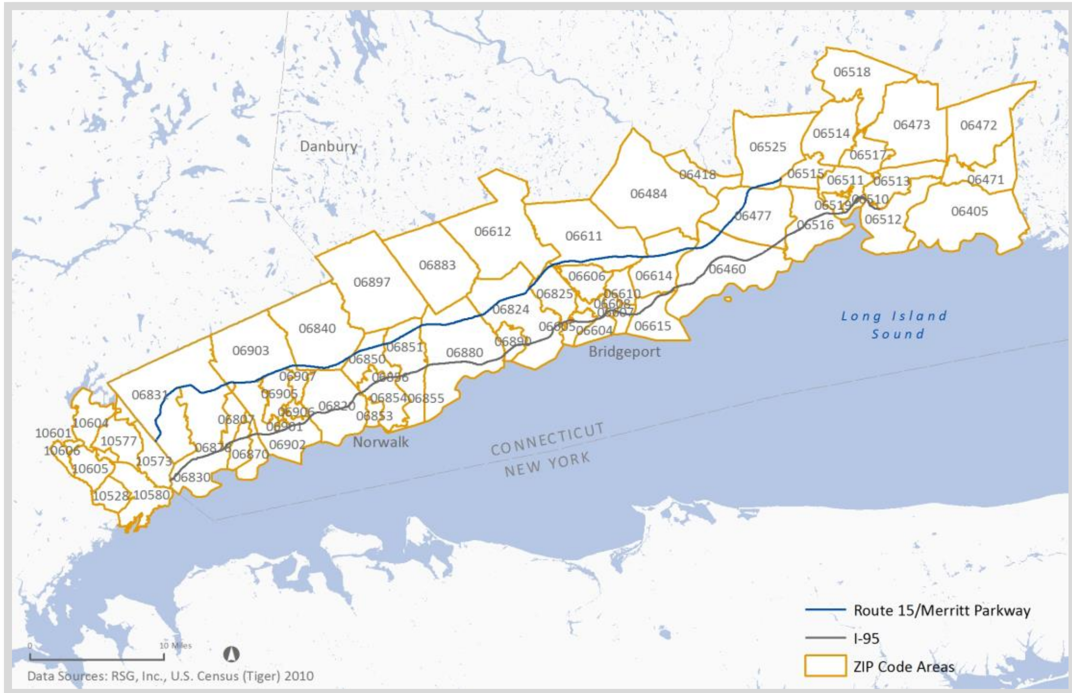
TABLE 3-3: COMPLETE SURVEYS FROM EMPLOYER OUTREACH

Business or Organization	Completed Surveys
Greenwich Town Hall	459
Bridgeport City Hall	45
Westport Town Hall	19
Bridgeport Police Department	18
The Business Council of Fairfield County	7
Greater New Haven Chamber of Commerce, Inc.	6
State Police Troop G	5
Norwalk City Hall	4
Port Chester Police Department	2
West Haven City Hall	1
Greenwich Chamber of Commerce	1
Total	**567**

3.3 | 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 and New York 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 ZIP codes within a five-mile radius of the I-95 study corridor. A total of 61 ZIP codes were targeted as shown in Figure 3-3. Qualifying panel 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 404 completed surveys were collected through coordination with Research Now.

FIGURE 3-3: RESEARCH PANEL ZIP CODES



4.0 SURVEY RESULTS

The analysis presented in this section summarizes the characteristics of the passenger and commercial vehicle survey samples, including trip characteristics, debrief and opinion responses, and demographics and company information collected from both surveys. A complete set of tabulations for both surveys can be found in **Appendix B**. Before finalizing data analysis and beginning model estimation work, the data was screened for outliers. This process is outlined below for each survey effort.

4.1 | IDENTIFICATION OF OUTLIERS

The data were screened to ensure that all observations included in the data analysis and model estimation represented realistic trips and reasonable trade-offs in the stated preference exercises. Several variables were used for screening purposes, including an examination of total survey duration, stated preference duration, and inconsistent or irrational choice behavior.

After reviewing these variables and the effects that extreme values had on the model results, it was determined that respondents who met the following conditions should be excluded from the final analysis. Please note that the categories listed are not mutually exclusive.

PASSENGER VEHICLE SURVEY OUTLIERS

One-thousand and five-hundred eleven (1,511) respondents completed the passenger vehicle survey during the data collection phase of the project. The number of records was reduced after completing the data checks and outlier analysis described below. Based on this analysis, 1,437 respondents were included in the final passenger vehicle dataset and used to estimate the models presented in this report in Section 5.

- Respondents who completed the entire survey in less than eight minutes (13 responses)
- Respondents whose calculated distance for their trip was less than 2 miles (18 responses)
- Respondents whose reported amount of delay during their trip was 90% or more of their entire trip time (three responses).
- Respondents whose origin and destination coordinates implied their trip could not make reasonable use of the I-95 corridor for their reference trip (32 responses)
- Respondents whose implied speed for their trip was greater than 100 mph or less than 3 mph (39 responses)
- Respondents who reported comments that implied that they were not paying attention to the survey (two responses).

COMMERCIAL VEHICLE SURVEY OUTLIERS

Two-hundred and ninety one (291) respondents completed the commercial vehicle survey during the data collection phase of the project. The number of records was reduced after completing the data checks and outlier analysis described below. Based on this analysis, 235 respondents (2,350 observations) were included in the final commercial vehicle dataset and used to estimate the models presented in this report in Section 5.

- Respondents whose implied speed for their trip was greater than 150 mph (11 responses)
- Respondents demonstrating inconsistent or irrational choice behavior in the stated preference exercises. For example, respondents who established a certain dollar amount for willingness to pay for time savings and then rejected paying less money for equal or more time savings (47 responses)

4.2 | PASSENGER VEHICLE SURVEY RESULTS

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

Table 4-1 presents the number of trips by three market segments, which are defined by trip purpose and beginning or ending location. For the purposes of this report, work trips include both commute and business-related trips, while non-work trips include all other purposes. A trip was classified as home-based if it originated at home or ended at home, whereas a trip was classified as non-home-based if it originated and ended at a place other than home.

TABLE 4-1: SAMPLE SIZE BY SEGMENT

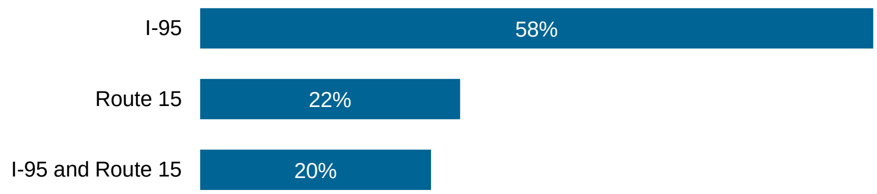
Segment	Respondents	Origin/Destination Location	Trip purpose
Home-Based Work Trips (HBW)	678	Originated or ended at home	- Go to/from work - Business related travel
Home-Based Non-Work Trips (HBNW)	646	Originated or ended at home	- School related - Airport - Shop - Social/Recreational - Other personal business
Non-Home-Based Trips (NHB)	113	Originated and ended at a place other than home	- All purposes

Many of the passenger vehicle tabulations presented in the remainder of this report and in the appendices are segmented by these trip types.

TRIP DETAIL QUESTIONS

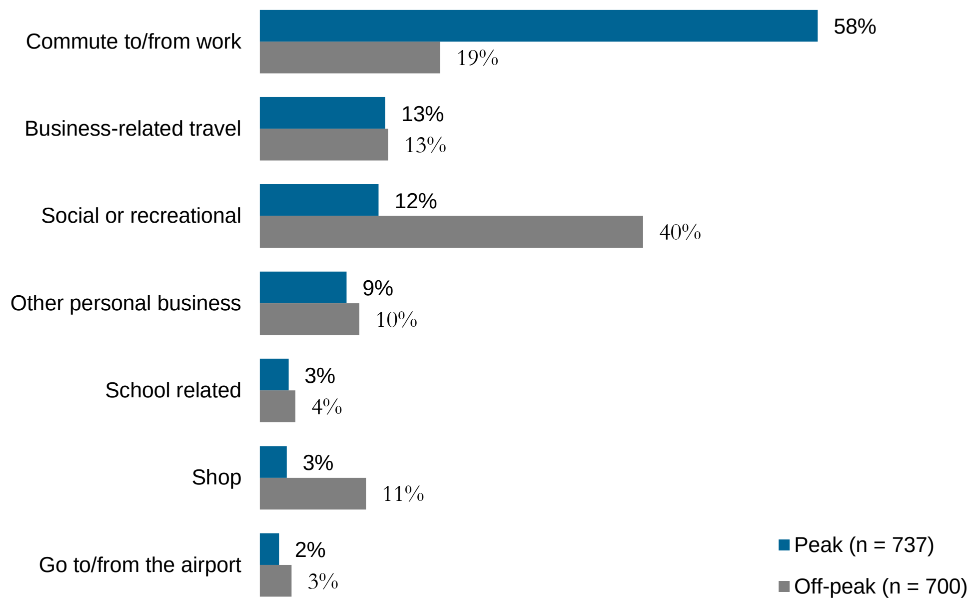
At the beginning of the trip detail section, respondents were asked about the road(s) they used for their most recent trip in the study area. Fifty-eight percent of respondents reported using I-95 only on their most recent trip, 22% reported using Route 15 only, and approximately 20% of respondents used both I-95 and Route 15 on their most recent trip (Figure 4-1). Sixty percent of respondents who used I-95 indicated that they could have reasonably used Route 15 for their trip, while 84% of respondents who used Route 15 indicated that they could have reasonably used I-95 for their trip, implying a high potential rate of substitution between I-95 and Route 15.

FIGURE 4-1: ROAD(S) USED



The distribution of trip purposes by time of day is shown in Figure 4-2. The peak trip segment contains travelers who indicated their trip began on a weekday either during the AM peak period (6:00-9:59 AM) or in the PM peak period (3:00-6:59 PM), while off-peak trips occurred at all other times, including weekends. The sample contains almost an even split between peak and off-peak trips. About 58% of trips in the peak period were commute or work related, while another 13% were business-related trips. The most-commonly reported trip purpose in the off-peak was social or recreational (40%).

FIGURE 4-2: TRIP PURPOSE BY TIME OF DAY



A significant majority (77%) of all trips began at home. The most commonly reported trip originated at home and ended at a location other than home or work. This particular trip type categorized 43% of all responses (Table 4-2). Over half (55%) of off-peak trips began at home and ended at a location other than home or work, whereas slightly less than half (42%) of peak trips began at home and ended at work.

TABLE 4-2: ORIGIN AND DESTINATION LOCATION TYPE

		Origin			Total
		Home	Work	Another Place	
Destination	Home	4.8%	28.7%	43.5%	77.0%
	Work	9.1%	0.8%	4.4%	14.3%
	Another Place	6.1%	0.6%	2.2%	8.8%
Total		20.0%	30.0%	50.0%	100.0%

The latitude and longitude coordinates for each respondent's origin-destination pair were used to calculate the total trip distance using a Google Maps route planning algorithm. Mean and median trip distances, as well as respondent-reported travel times, are displayed in Table 4-3 by market segment. Home-based work trips tended to be shorter in both median time and median distance compared to other segments. There are only slight differences between home-based non-work and non-home-based trips, both in terms of trip distance and reported travel time. Overall, the median trip time for the entire sample was 55 minutes and median trip distance was 25 miles.

TABLE 4-3: TRAVEL TIME AND DISTANCE BY SEGMENT

Segment	Reported travel time (minutes)		Calculated Travel distance (miles)	
	Mean	Median	Mean	Median
Home Based Work	69	45	36	21
Home Based Non-Work	99	70	65	36
Non-Home Based	99	65	66	30

Trip origins and destinations, stratified by distance traveled, are displayed in Figure 4-3 and Figure 4-4. Figure 4-3 shows that respondents' trip origins are scattered along the length of the study corridor, with many short-distance trips originating in cities along I-95, including New Haven, Fairfield, Norwalk, and Stamford. This distribution reflects the fact that many respondents were traveling to and from surrounding communities to their regular jobs or for other non-work trips along the corridor. The trip destinations presented in Figure 4-4 show a similar distribution of trips, with a greater proportion ending in Manhattan and other parts of New York City.

FIGURE 4-3: TRIP ORIGINS BY DISTANCE TRAVELED

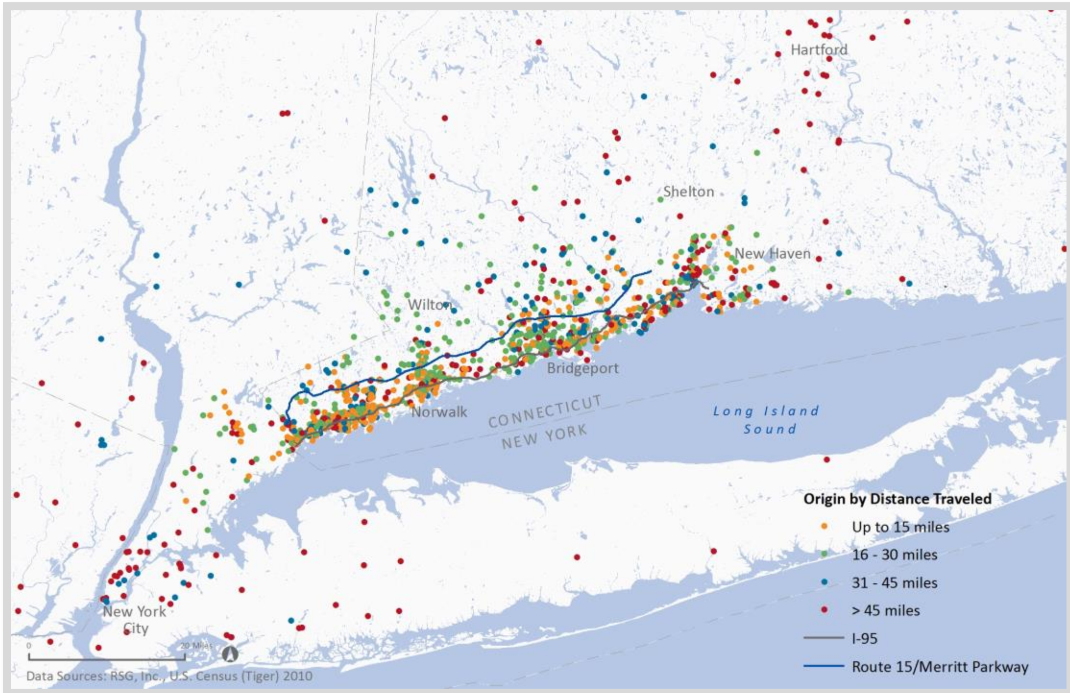
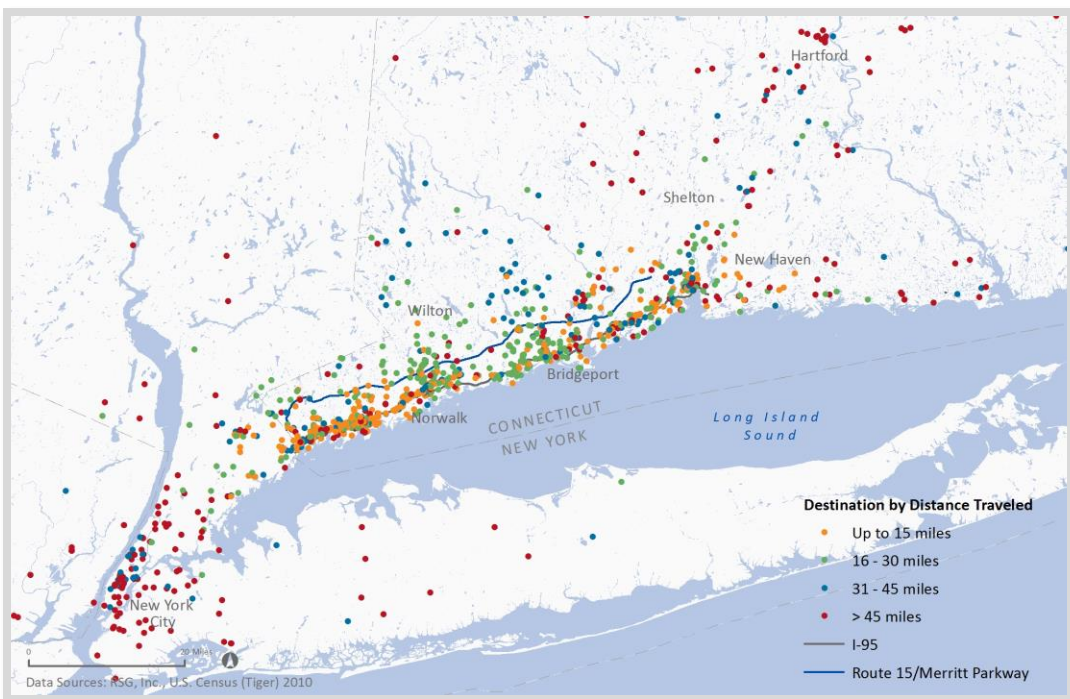
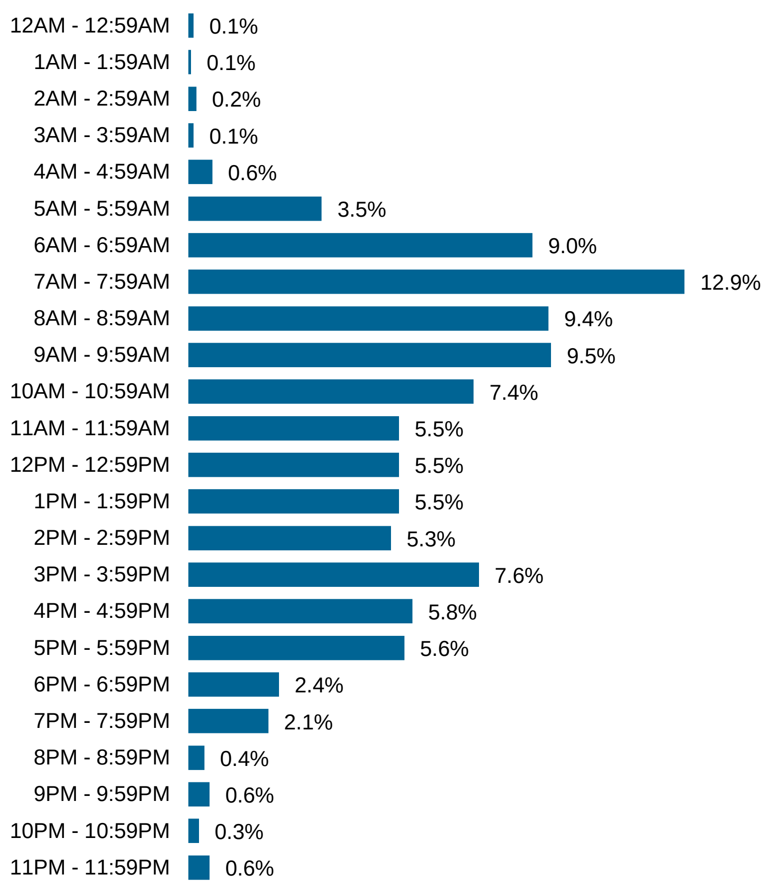


FIGURE 4-4: TRIP DESTINATIONS BY DISTANCE TRAVELED



After reporting the time their trip began (Figure 4-5), respondents were asked if they started their trip at a certain time to minimize the impact of congestion. About one-half of respondents indicated they change their departure time to avoid delays on the road.

FIGURE 4-5: DEPARTURE TIME



The distribution of entrance and exit interchanges for both I-95 and Route 15 are illustrated in Figure 4-6. Eleven percent and 8% of I-95 respondents reported entering the corridor on the south end from New York State, and the north end, respectively. The most commonly reported exit points were also the south and north ends of the corridor. The other commonly cited entry and exit interchanges were Exit 2: Delavan Avenue, Exit 3: Arch St, Exit 4: Indian Field Rd, Exit 8: Atlantic Street, and Exit 16: East Ave. As shown in Figure 4-7, the most commonly used entry and exit interchange for the Route 15 users was Exit 54 (I-95/US 1 – Milford, New London), followed by the beginning and end of the corridor.

FIGURE 4-6: I-95 ENTRANCE AND EXIT INTERCHANGES

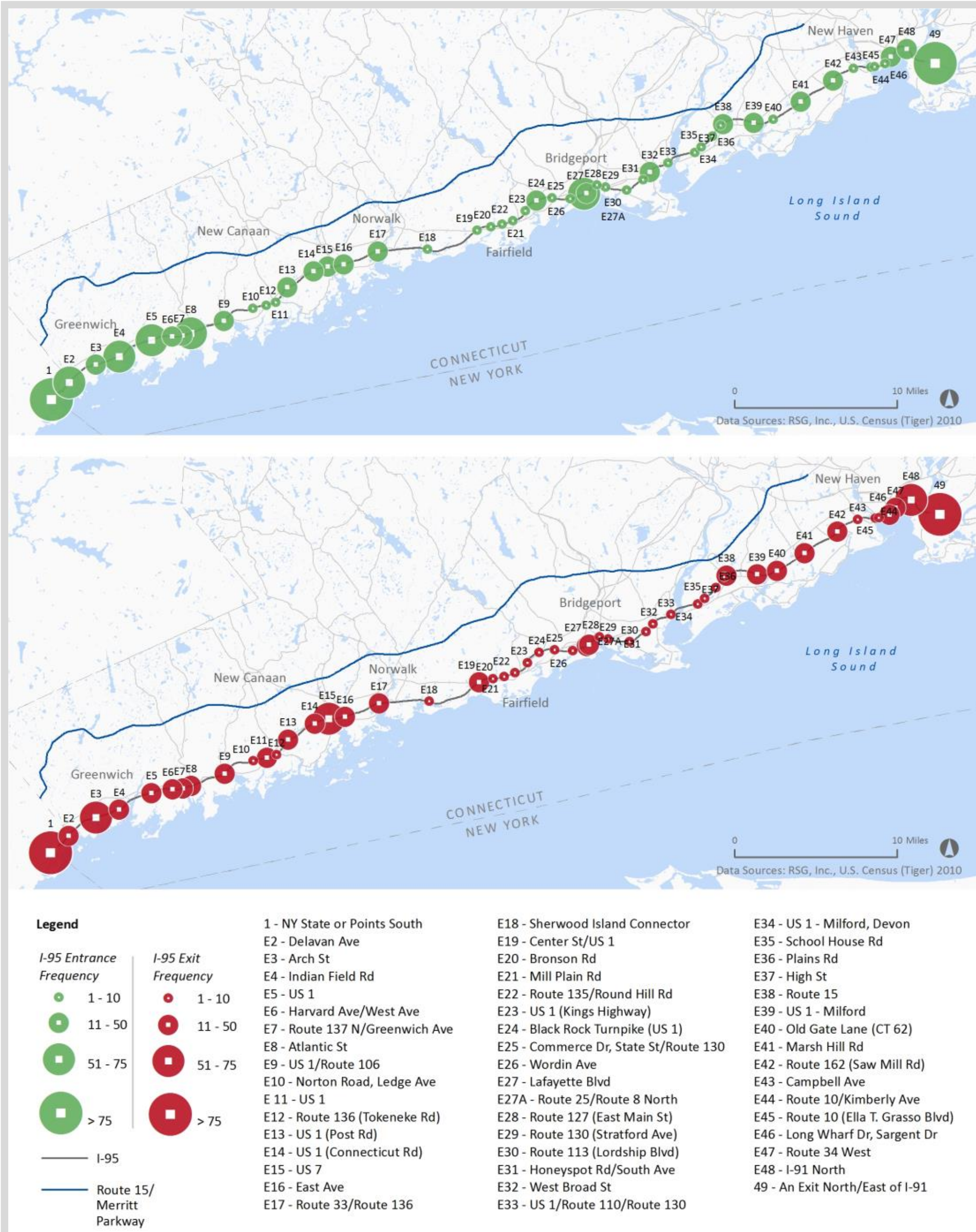
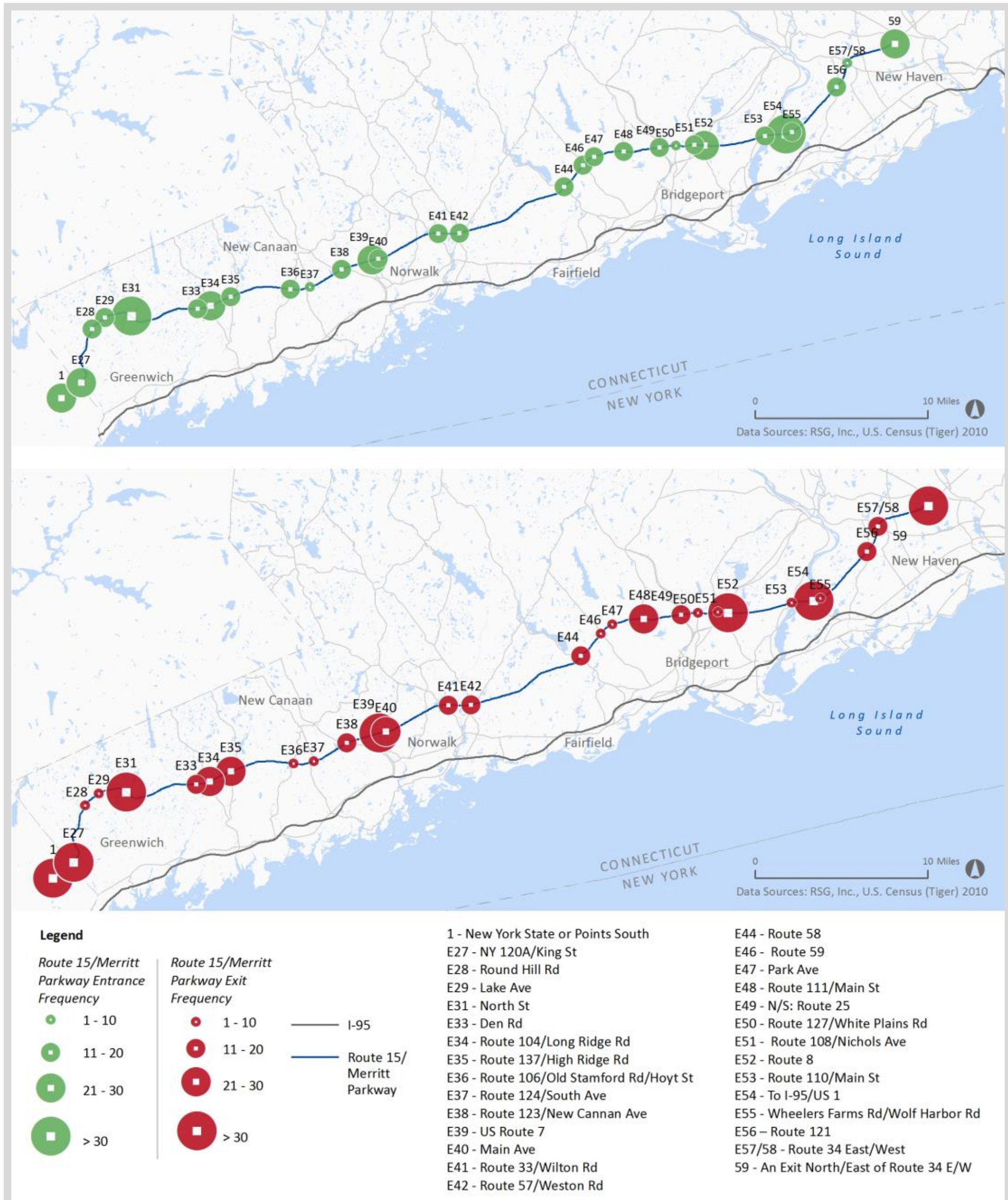
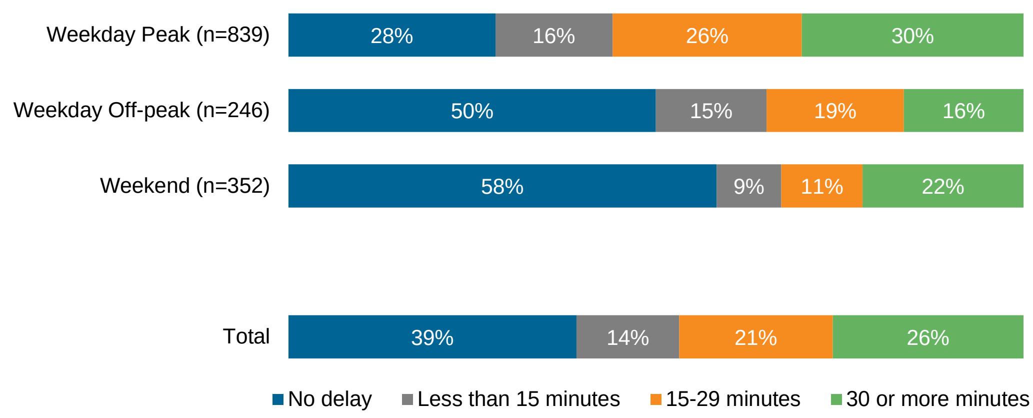


FIGURE 4-7: ROUTE 15 ENTRANCE AND EXIT INTERCHANGES



Respondents were asked to report the amount of traffic congestion they experienced on I-95 and/or Route 15 during their reference trip. The amount of delay due to traffic congestion is presented by day of week and time of day in Figure 4-8. Overall, about 39% of respondents did not experience any delay during their trip; however, a majority of respondents (72%) who traveled during weekday peak periods reported at least some delay. Twenty-six percent of peak trips reported 15 to 29 minutes of delay and as many as 30% reported more than 30 minutes of delay caused by congestion. Off-peak and weekend travelers experienced lower amounts of delay than peak period travelers did.

FIGURE 4-8: AMOUNT OF DELAY BY DAY OF WEEK AND TIME OF DAY



Next, respondents were asked about their perception toward the level of congestion in the study corridor during their trip (Figure 4-9). Overall, respondents indicated high levels of perceived congestion in the corridor, with about 89% indicating they experienced some level of congestion. The levels of congestion are worse during the weekday peak periods where as many as 93% of respondents reported some level of congestion and about one-fifth (21%) reported extreme congestion in the corridor.

FIGURE 4-9: PERCEIVED CONGESTION LEVELS BY SEGMENT

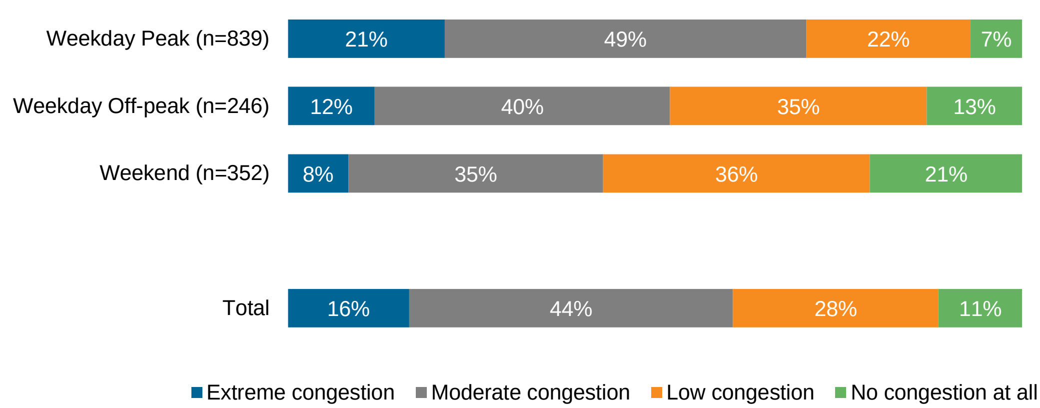
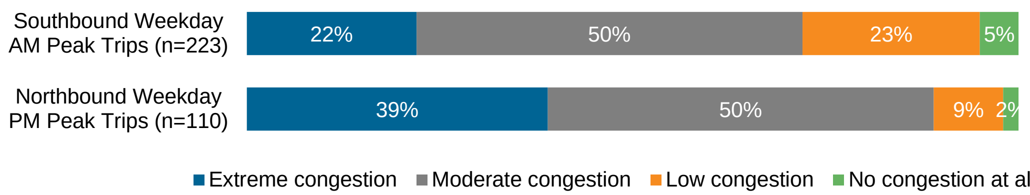


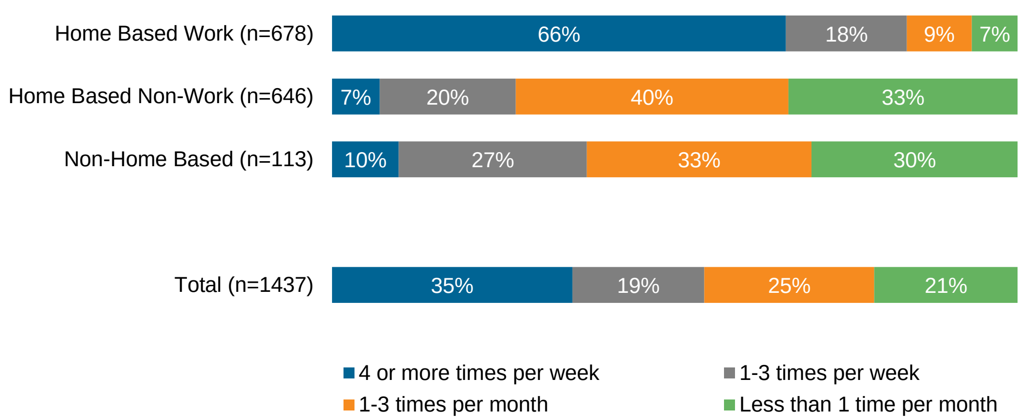
Figure 4-10 shows the directional congestion, as perceived by the travelers who used I-95 during the AM and PM peak period. As evident in the figure, approximately 89% of the northbound weekday PM peak trips perceived moderate to extreme congestion on I-95. For the southbound weekday AM peak trips, perceived congestion levels are less severe with about 72% of these travelers reporting moderate to extreme congestion levels on I-95.

FIGURE 4-10: PERCEIVED CONGESTION ON I-95 FOR PEAK PERIOD TRAVELERS



The frequency of trips is illustrated in Figure 4-11. Thirty-five percent of all reported trips are made four or more times per week, although there are significant variations across the different trip purposes. As expected, home-based work trips were the most frequent with 66% percent travelers in this segment indicating they make the same trip at least four times per week.

FIGURE 4-11: TRIP FREQUENCY BY SEGMENT



Only about 16% of respondents reported that they use Metro North Railroad to make their reference trip, if ever. Of the 227 respondents who reported using Metro North Railroad, only 13% were frequent users (three or more times per week) of the Metro North Railroad. A majority (56%) of Metro North Railroad users reported using the service less than once per month. Moreover, about 70% of respondents who reported using the Metro North Railroad pay per trip rather than buying monthly or weekly passes.

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

STATED PREFERENCE QUESTIONS—EXPRESS LANES ON I-95

After completing the trip details portion of the survey, respondents were shown two sets of stated preference exercises, one for each of the congestion pricing strategies being evaluated in the I-95 corridor. The first alternative involved building additional tolled express lanes along I-95. Since the express lanes are proposed to be built only on I-95, this pricing alternative was only seen by respondents who used or could have used I-95 for their reference trip (n=1,385). Respondents then answered five stated preference tradeoff exercises, each tailored to their reported trip. Overall, respondents were more likely to choose the toll-free general purpose lanes alternative, which consisted of 73% of the total 6,925 choices made. Forty-six percent of respondents (n=635) always chose the toll free general-purpose lanes while only five percent (n=75) always chose to use the express lanes. The express bus option on the I-95 express lanes was only chosen in five percent of scenarios. 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.

TABLE 4-4: STATED PREFERENCE CHOICES BY ALTERNATIVE—EXPRESS LANES ON I-95

Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1: Use I-95/Route 15 Regular Lanes	6,925	5,078	73%
Alternative 2: Use the I-95 Express Lanes	6,925	1,497	22%
Alternative 3: Use Express Bus Service on the I-95 Express Lanes	6,925	350	5%

DEBRIEF AND OPINION QUESTIONS—EXPRESS LANES ON I-95

Upon completing the stated preference experiments, respondents were asked to answer a series of debrief questions to better understand the underlying reasons for their choices in the five stated preference questions.

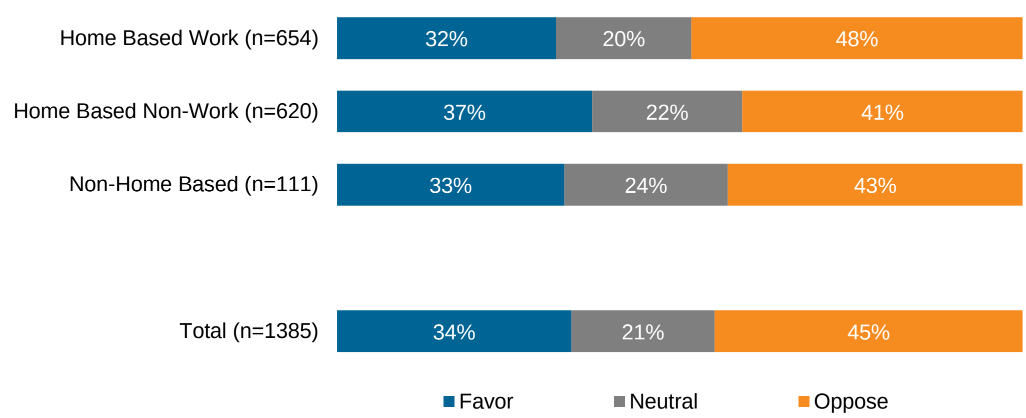
The 46% of respondents who never chose the express lanes alternative were asked to provide the primary reason for their choices. Of these respondents, over half (54%) said the time savings presented were not worth the toll cost and 19% said the toll cost on the express lanes was too high. Next, respondents were asked under what scenario(s) they would be likely to use the tolled express lanes on I-95. Nearly half of the respondents said they will use the express lanes if they are worried about arriving somewhere on time, such as going to airport, etc. The other frequently cited reasons include, "going to an important meeting or event," "running late for work," and "running late to an appointment or meeting." As shown in Table 4-5, 19% said they would never use the express lanes.

TABLE 4-5: REASONS FOR USING THE EXPRESS LANES (SELECT ALL THAT APPLY)

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

Next, respondents provided their opinion of the proposed express lanes on I-95. More respondents were opposed to the project than in favor of it, with 45% overall opposing the project and 34% indicating support. Twenty-one percent indicated a neutral opinion. Support was highest (but still modest) among the home-based non-work segment and lowest for home-based work respondents (Figure 4-12). Of those travelers who favored the Express Lanes on I-95, the most frequently cited reason for favoring the project was faster travel times in the proposed Express Lanes (73% of 478 respondents). Of the travelers who opposed the project, the most frequently cited reason for opposing the project was "opposed to paying tolls on I-95 in general" (56% of 619 respondents).

FIGURE 4-12: PROJECT OPINION BY SEGMENT—EXPRESS LANES ON I-95



STATED PREFERENCE QUESTIONS—CONGESTION PRICING ON ALL LANES

All respondents were shown stated preference experiments related to the second congestion pricing option that involved all electronic tolling across all lanes on I-95 and/or Route 15. Similar to the express lanes experiments, respondents answered five stated preference tradeoff exercises, each tailored to their reported trip. Respondents saw up to five alternatives based on the road(s) used, trip departure time, and whether they could use the Metro North Railroad for their reported trip. Overall, respondents were more likely to choose the toll free alternative, which consisted of 59% of the total 7,185 choices made. Thirty-four percent of respondents (n=483) always chose the toll free alternative while only ten percent (n=141) always chose to use tolled I-95/Route 15. The Metro North Railroad alternative was only chosen in six percent of experiments where it was available. Table 4-6 shows the number of times each alternative was presented in the stated preference experiments and the number of times each alternative was selected.

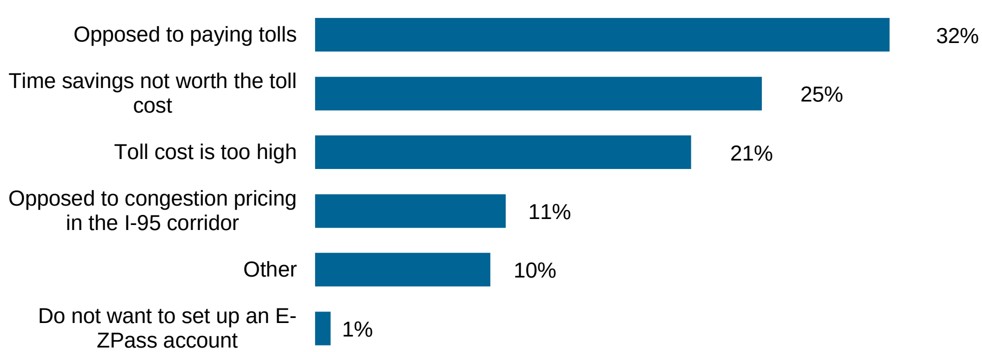
TABLE 4-6: STATED PREFERENCE CHOICES BY ALTERNATIVE—CONGESTION PRICING ON ALL LANES

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

DEBRIEF AND OPINION QUESTIONS—CONGESTION PRICING ON ALL LANES

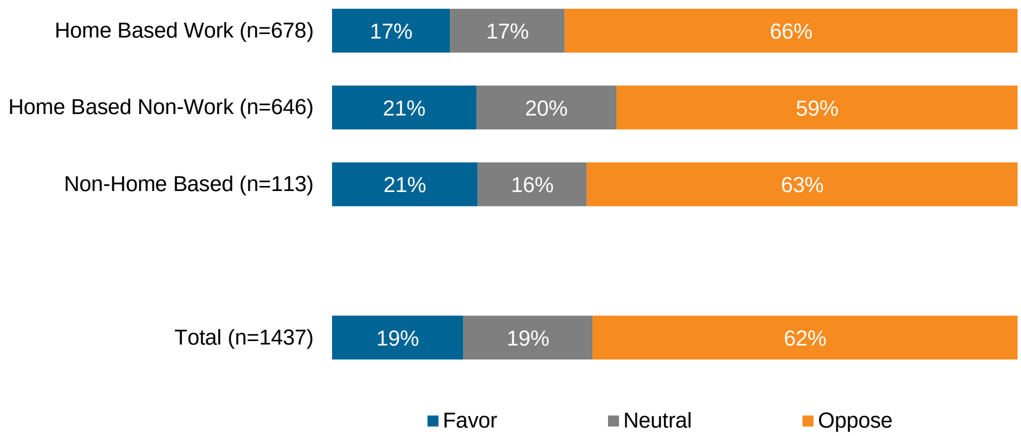
If a respondent never chose the tolled I-95 or Route 15 alternative in the stated preference scenarios, they were asked to indicate the primary reason for not selecting it. The option most frequently cited (32% of 694 respondents who never selected the tolled I-95 or Route 15 alternative) was "Opposed to paying tolls" (Figure 4-13).

FIGURE 4-13: PRIMARY REASON FOR NOT SELECTING TOLLED ROUTE ALTERNATIVE



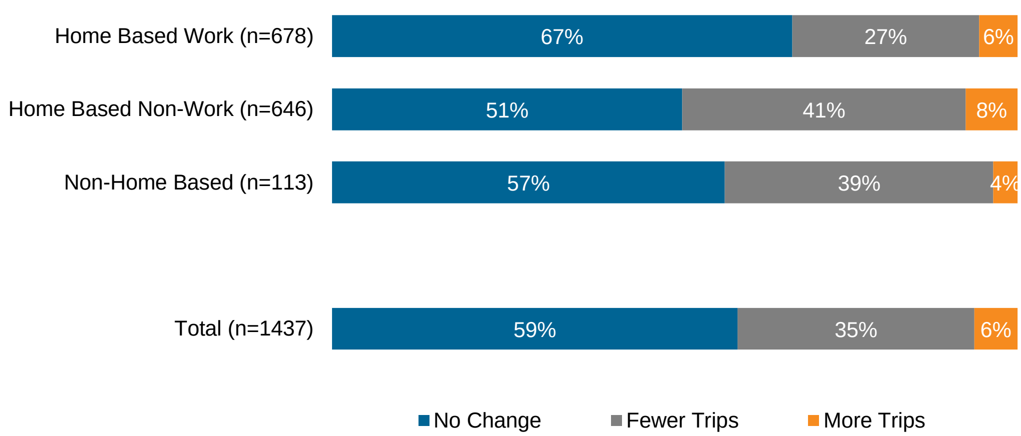
Next, respondents provided their opinion about implementing congestion pricing on all lanes in the I-95 corridor. Opposition to this pricing strategy was comparatively higher (62%) than the opposition for the express lanes strategy, with only 19% of respondents indicating support for the tolling all lanes alternative. Figure 4-14 shows the project opinion for the different market segments.

FIGURE 4-14: PROJECT OPINION BY SEGMENT—CONGESTION PRICING ON ALL LANES



Respondents reported how they would change the number of trips they make in the future if pricing were implemented in the I-95 corridor given a certain travel time and toll cost. Overall, 35% of respondents indicated that they would reduce the number of trips they make in the future and 59% indicated that they would not change their current number of trips (Figure 4-15). Home-based work trips were less likely to be reduced than trips for home-based non-work and non-home-based trips. A regression analysis was conducted using the trip suppression data to identify trip reduction rates under different travel time and toll cost conditions. The methodology and results of this analysis are presented in Section 5 below.

FIGURE 4-15: TRIP SUPPRESSION/INDUCTION BY SEGMENT



DEBRIEF AND OPINION QUESTIONS—GENERAL

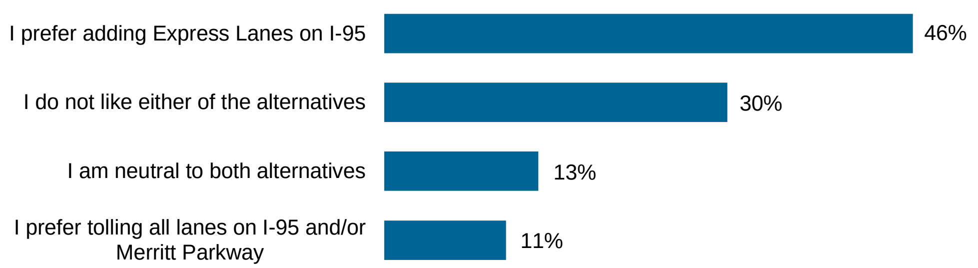
All respondents were asked what type of improvements they would like to see from the toll revenue generated from the I-95 corridor if congestion pricing were implemented. As presented in Table 4-7, a majority of the respondents (64%) preferred improvements to I-95, 35% preferred improvements to Route 15, and 32% preferred improvements to Metro North Railroad.

TABLE 4-7: PREFERRED TYPE(S) OF IMPROVEMENTS FROM TOLL REVENUE (SELECT ALL THAT APPLY)

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

After respondents had completed both sets of exercises, they were asked which of the two alternatives they would prefer to relieve congestion in the I-95 corridor. Forty-six percent of respondents who saw both pricing alternatives indicated that they would prefer adding express lanes to I-95, whereas only 11% were in favor of tolling all lanes on I-95 and/or Route 15. An additional, 30% indicated that they do not like either of the two pricing alternatives (Figure 4-16).

FIGURE 4-16: PREFERRED CONGESTION PRICING ALTERNATIVE



The debrief section concluded with a series of statements related to respondents' attitudes toward highway tolling in general, and toward the use of toll revenue in particular. Respondents were asked to indicate the level with which they agree or disagree with the statements on a five-point scale. Figure 4-17 shows their attitudes related to highway tolling. Fifty-six percent of respondents indicated they would use a toll route if the tolls were reasonable and they saved time, while 27% disagreed with the statement. Fifty-three percent indicated that they would be willing to pay a reasonable toll if it guarantees a travel time and 46% indicated they support the use of tolls to pay for highway improvements. Respondents' attitudes were less favorable towards increased or new taxes to pay for highway or transit improvements. A minority (26%) agreed that they would support increased or new taxes to pay for highway and/or transit improvements.

FIGURE 4-17: ATTITUDES TOWARD TOLLS AND TAXES

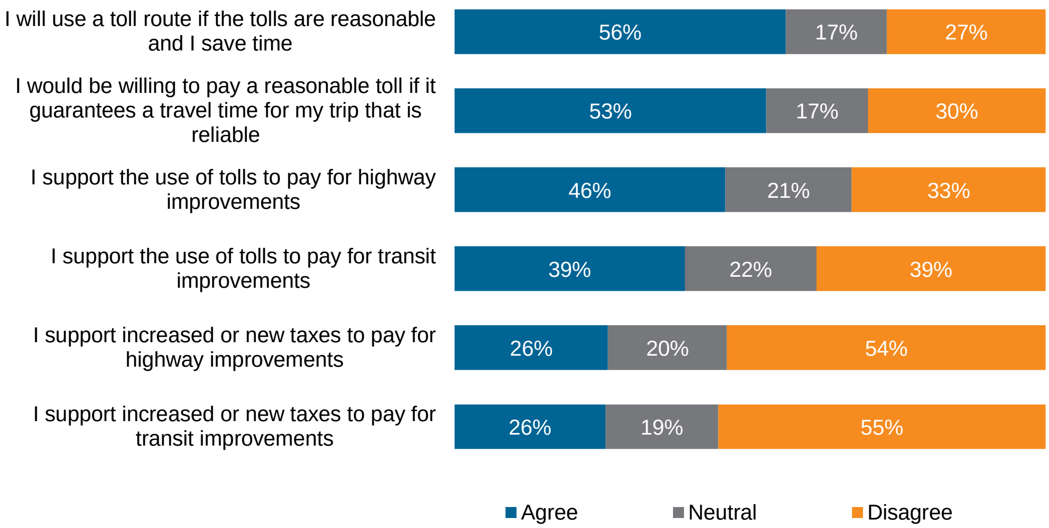
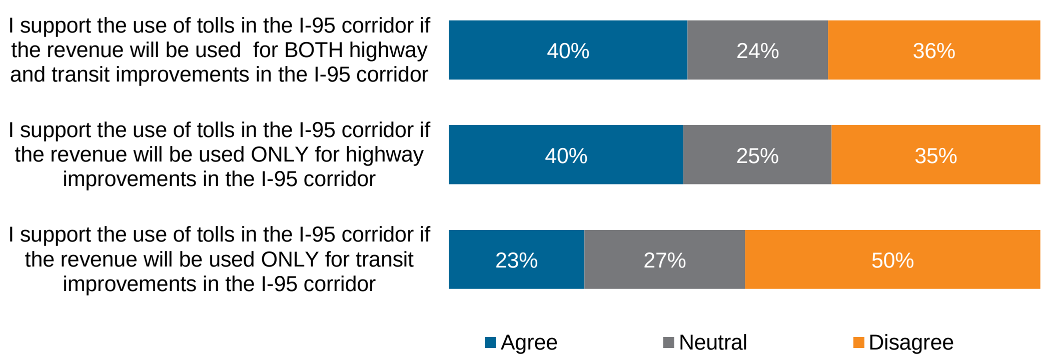


Figure 4-18 shows the attitudes toward use of toll revenue in the I-95 corridor. Respondents agreed more (40%) with the statement related to the use of toll related revenue from the I-95 corridor for both highway and transit improvements in the corridor as opposed to using the revenue only for highway or transit improvements.

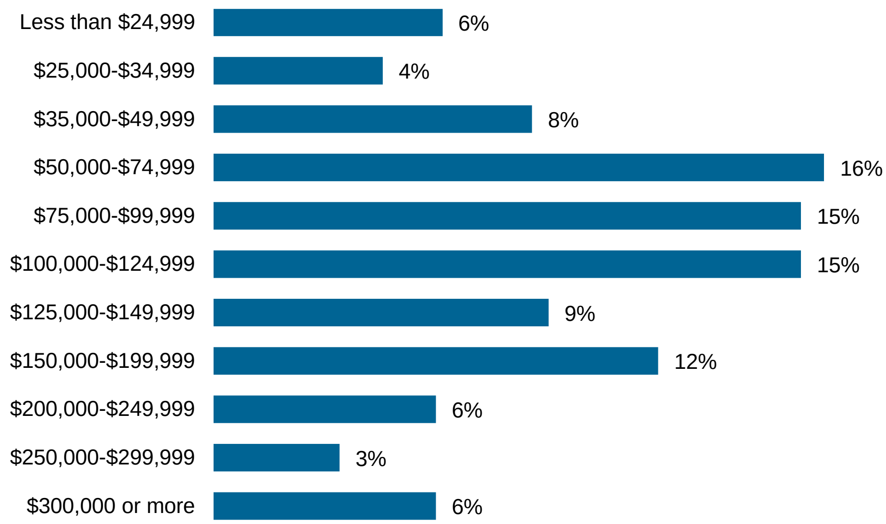
FIGURE 4-18: ATTITUDES TOWARD USE OF TOLL REVENUE



DEMOGRAPHIC QUESTIONS

The last section of the survey collected traveler demographics such as home ZIP code, gender, age, employment status, and household income. The dataset covers a wide range of ages, with most respondents in the 45-54 year-old group. There was an even split between male and female respondents. Thirty-seven percent of respondents live in a two-person household (the most commonly-selected category) and 48% of all respondents have two household vehicles. About 64% of respondents were employed full time while another 9% were employed part time. Figure 4-19 shows the distribution of annual household income for respondents who reported it; the median household income falls into the $100,000-124,999 range.

FIGURE 4-19: ANNUAL HOUSEHOLD INCOME



4.3 | COMMERCIAL VEHICLE SURVEY RESULTS

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

TRIP DETAIL QUESTIONS

Fifty-two percent of all commercial vehicle respondents were fleet drivers and a further 27% were owner-operators. A majority (60%) made their own routing decisions, while about 26% made some, but not all routing decisions.

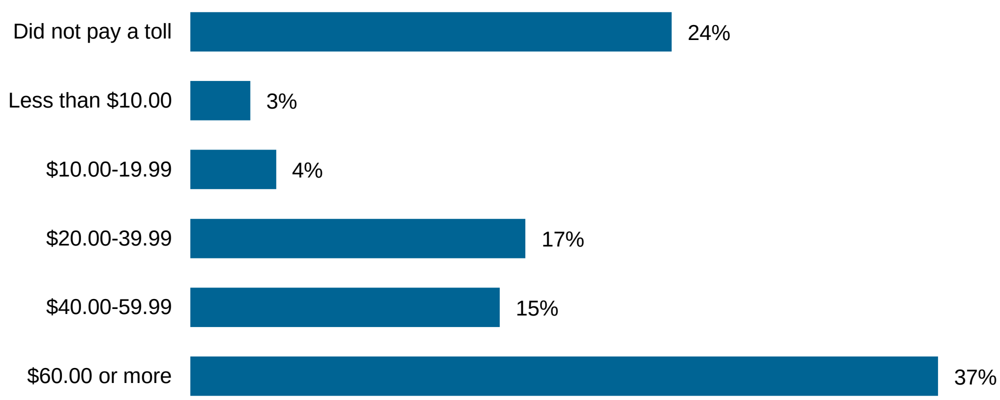
Eighty-five percent of trips were single-day trips and 83% of all trips were less than 500 miles in total length. Over half (59%) of all trips were at least six hours in total travel time.

Respondents were asked what time of day their trip originated (Figure 4-20). Approximately 38% of respondents reported a peak period trip i.e., a trip in the AM peak period (6:00-9:59 AM) or in the PM peak period (3:00-6:59 PM), while a majority (62%) trips originated during off-peak periods or during weekends. When asked about whether commercial respondents experienced any delay due to traffic congestion on I-95 during their reference trip, nearly three-fourth (73%) of respondents said yes, indicating a considerable amount of congestion in the corridor.

FIGURE 4-20: DEPARTURE DAY AND TIME

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

FIGURE 4-21: TOLL AMOUNT PAID



The large majority of respondents reported driving a 5-axle vehicle (72%). Respondents were asked how often they make this particular trip; 61% of drivers reported they make the same trip as their reference trip one or more times per week. When asked if they use any alternate routes to I-95 when making the same trip, 65% reported using I-84, but a much small number (6%) indicated using local city streets instead of I-84 or I-684 (Table 4-8). Most drivers indicated that they have an electronic transponder to pay for tolls (73%).

TABLE 4-8: USE OF ALTERNATE ROUTES TO I-95 (SELECT ALL THAT APPLY)

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

STATED PREFERENCE QUESTIONS

After completing the trip information portion of the survey, respondents answered ten stated preference tradeoff exercises, each tailored to their reported trip. Overall, respondents were more likely to choose the toll free alternative, comprising approximately 65 percent of the 2,350 choices made (Table 4-9). Thirty-nine percent of respondents chose both the toll free and the tolled option at least once during the ten exercises. Thirty-nine percent always chose the toll free route and the final twenty-two percent always chose the tolled option.

TABLE 4-9: STATED PREFERENCE CHOICES BY ALTERNATIVE

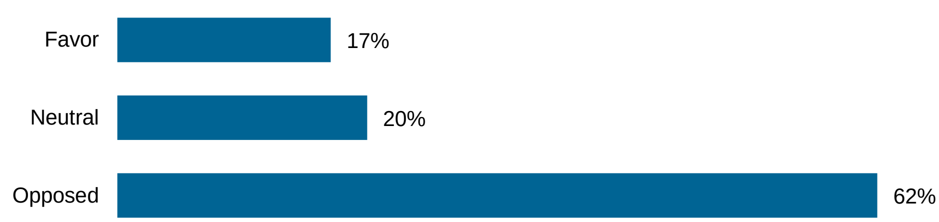
Alternative	Number of Experiments Shown	Number of Experiments Selected	Percent Selected
Alternative 1: Use I-95	2,350	833	35%
Alternative 2: Use an Alternate Route	2,350	1,517	65%

DEBRIEF AND OPINION QUESTIONS

After completing the stated preference tradeoff exercises, respondents were asked to answer a set of debrief questions aimed at better understanding the reasoning behind their choices. First, the 92 respondents (39% of the sample) who never chose the I-95 alternative were asked to provide the primary reason for never selecting it and 28% indicated that the toll cost is too high as their primary reason. A further 22% indicated that time savings are not worth the toll cost as their primary reason.

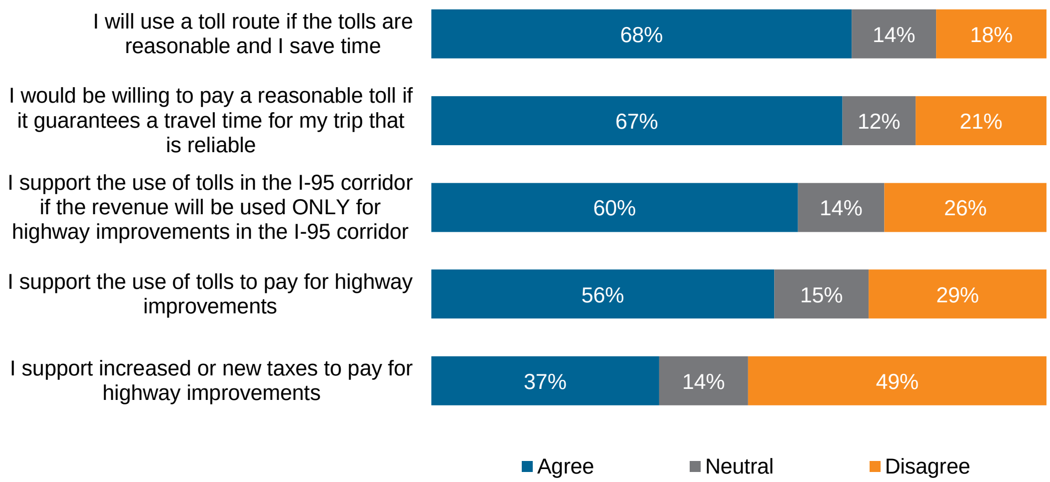
Next, respondents provided their opinion of the tolling of I-95. Nearly two-third (62%) of respondents were somewhat or strongly opposed, while about one-fifth (18%) were somewhat or strongly in favor (Figure 4-22).

FIGURE 4-22: OPINION OF TOLLING ALL LANES ON I-95



The most common reason for favoring the I-95 project was 'less congestion' and 'shorter travel time' (56% and 44%, respectively). Almost 45% who opposed the tolling cited that they are fine with the current traffic situation as the primary reason. Finally, when presented with a series of questions regarding their attitudes concerning tolls, respondents were most likely to indicate that they would use a toll route if the tolls are reasonable and they will save time. Conversely, respondents were most likely to disagree to supporting increased or new taxes to pay for highway improvements (Figure 4-23).

FIGURE 4-23: ATTITUDES TOWARD TOLLS AND TAXES



COMPANY INFORMATION QUESTIONS

The last section of the commercial vehicle survey collected company information. Fifty-four percent of travelers indicated that their company's base of operations is located outside Connecticut, but within the U.S. Respondents were asked to provide an estimate of average trip length. Typical trip length for their trips was at least 500 miles for 56% of the sample. Drivers were employed by companies which varied in size; 29% of respondents worked for trucking companies that were large in scale with 500 or more vehicles, while 20% worked for companies operating fleets of 19 or less vehicles.

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

5.0 DISCRETE CHOICE MODEL ESTIMATION

The primary objective of the SP survey was to estimate the values of time (VOT) for passenger and commercial vehicle travelers who make trips in the I-95 corridor between New Haven, CT and New York. These VOT estimates will support estimates of traffic and revenue for both of the proposed congestion pricing strategies in the corridor: implementing express lanes on I-95 and implementing congestion pricing on all lanes of I-95 and/or Route 15. The choice observations for each respondent were compiled into datasets to support the estimations of VOT for the different vehicle classifications and tolling scenarios.

5.1 | MODEL SPECIFICATION TESTING

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

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:

$U_1 = \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n$

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.

PASSENGER VEHICLE MODEL SPECIFICATION—EXPRESS LANES ON I-95

In each of the five express lanes stated preference experiments, passenger vehicle respondents were presented with three hypothetical alternatives for making their future trip:

- **Alternative 1: Use the I-95 and/or Route 15 regular lanes.** This alternative was presented to all respondents and was labeled to reflect the respondent's current route (either I-95, Route 15, or both). The travel time presented for this alternative was

[1] The multinomial logit model has the general form $(i) = \frac{e^{U_i}}{\sum e^{U_j}}$, where $p(i)$ is the probability that mode i will be chosen and Ui 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.

based on each respondent's reported travel time from his or her reference trip and varied to reflect increasing congestion in the future.

- **Alternative 2: Use the I-95 express lanes.** This alternative was presented to all respondents and featured a faster travel time than Alternative 1 to reflect free-flow travel conditions in the express lanes.
- **Alternative 3: Use express bus service in the I-95 express lanes.** This alternative was presented to all respondents and featured times slightly longer than the express lanes time in Alternative 2 to reflect access and egress time, headway time, and stops along the way.

The alternatives were described by attributes of travel time and travel cost. A complete description of the stated preference attributes and levels can be found above in Section 2.

Several utility equation structures were tested using different variables from the survey data. In addition to the travel times and toll costs presented in the SP experiments, tested variables included trip characteristics, attitudinal indicators, and demographic variables. These variables were introduced, one at a time, to test potential interactions with the toll cost and travel time coefficients and to determine whether respondents' trip or personal characteristics significantly influenced their choices in the stated preference scenarios. Variables that were tested for interaction included:

- Facility used (I-95 vs. Route 15)
- Time of day (peak or off-peak period)
- Trip purpose
- Opinion of project
- Income
- Trip distance
- Delay
- Recruitment method
- ETC ownership

After reviewing the significance of each variable, 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 the forecasting model. The final model specification includes variables for travel time and travel cost. These variables are segmented by trip type to allow separate values of time to be applied in the forecasting model:

- Home-based work trips
- Home-based non-work trips
- Non-home-based trips

In addition to travel time and toll cost, binary (1,0) variables were included on the express lanes alternative for respondents who own an ETC device such as E-ZPass, respondents who are somewhat or strongly in favor of the proposed pricing, and respondents who are somewhat or strongly opposed to the proposed pricing. The binary variables capture the additional utility or disutility for the express lanes alternative for respondents with these characteristics compared to other respondents. Finally, alternative-specific constants were specified for all alternatives except for the I-95 express lanes. These constants capture utility or disutility for each alternative relative to the express lanes alternative that cannot be attributed to the other variables in the model.

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 and household income, the toll cost coefficient was divided by the natural log of household income in the utility equation. To capture the relationship between cost sensitivity and trip distance, the elasticity of the cost coefficient relative to trip distance was estimated by taking the ratio of the reported trip distance to the average trip distance in the sample and raising it to a power λ. The full transformation included in the utility equation is presented below in Equation 5-1.

EQUATION 5-1: TOLL COST INTERACTION WITH DISTANCE AND INCOME

$$V_i = \cdots + \beta Cost * TC_i * \left(\frac{1}{LN(income)}\right) * \left(\frac{distance}{\overline{distance}}\right)^{\lambda_{c,dist}}$$

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 $\overline{distance}$ giving the average trip distance for the sample

The remaining terms are estimated in the model:

- The term $\beta Cost$ is the cost sensitivity (in units of 1/$)
- The interaction term $\lambda_{c,dist}$ gives the cost elasticity in relation to trip distance

The sign of the estimated elasticity coefficient indicates whether cost sensitivity decreases or increases with increasing trip distance and income, while the magnitude of the coefficient indicates the strength of the relationship. Table 5-1 presents the variables included in the passenger vehicle express lanes model specification and the alternatives to which each variable applies.

TABLE 5-1: PASSENGER VEHICLE MODEL SPECIFICATION—EXPRESS LANES ON I-95

Coefficient	Units	Alternative 1: I-95 Regular Lanes	Alternative 2: I-95 Express Lanes	Alternative 3: Express Bus Service
Travel Time				
Home-based Work	Minutes	X	X	X
Home-based Non-work	Minutes	X	X	X
Non-home-based	Minutes	X	X	X
Travel Cost				
Home-based Work	$		X	X
Home-based Non-work	$		X	X
Non-home-based	$		X	X
Dummy Variables				
Electronic Toll Collection Transponder Ownership	1,0		X	
Favor the Project	1,0		X	
Oppose the Project	1,0		X	
Alternative Specific Constants				
Alternative 2: Express Lanes	1,0		X	
Alternative 3: Express Bus	1,0			X
Distance and Income Interactions with Travel Cost				
Distance Elasticity Coefficient	-		X	X

PASSENGER VEHICLE MODEL SPECIFICATION—CONGESTION PRICING ON ALL LANES

In each of the five stated preference experiments to evaluate congestion pricing on all travel lanes, passenger vehicle respondents were presented with up to five hypothetical alternatives for making their future trip:

- **Alternative 1: Use your current route (I-95 and/or Route 15) and pay the toll.** This alternative was presented to all respondents and was labeled to reflect the respondent's current route (either I-95, Route 15, or both). The travel time presented in Alternative 1 were faster than the respondent's reported travel time to reflect improved travel speeds as a result of the congestion pricing strategy.
- **Alternative 2: Use Route 15 and pay a lower toll.** This alternative was presented to respondents who used I-95 only for their trip and represented potential differential pricing between I-95 and Route 15. The travel times presented in Alternative 2 were always longer than the travel times in Alternative 1, while the toll rates were always lower.
- **Alternative 3: Change departure time and pay a lower toll.** This alternative was presented to respondents who made a trip during the peak period and represented potential differential pricing by time-of-day. The travel times presented in Alternative 3 were shorter than Alternative 1 to reflect faster off-peak or shoulder travel conditions, and the toll rates were lower than Alternative 1 to reflect toll discounts to encourage peak spreading.
- **Alternative 4: Use an alternate route to avoid the toll.** This alternative was presented to all respondents and labeled to reflect local roads for short-distance trips or I-84 for long distance trips where I-84 is a viable alternative. Travel times for

Alternative 4 were generally much longer than Alternative 1 and this alternative was always presented as toll-free.

- **Alternative 5: Use Metro North Railroad to avoid the toll.** This alternative was presented to respondents who reported a trip that could have reasonably used Metro North Railroad and was less than 100 miles in total distance.

In a similar manner as the express lanes specification testing, several utility equation structures were tested using different variables from the stated preference experiments related to congestion pricing on all travel lanes in the corridor. In addition to the travel times and toll costs presented in the stated preference experiments, trip characteristics, attitudinal indicators, and demographic variables were tested, including:

- Facility used (I-95 vs. Route 15)
- Time of day (peak or off-peak period)
- Trip purpose
- Opinion of project
- Income
- Trip distance
- Delay
- Recruitment method
- ETC ownership

The final model specification includes variables for travel time, travel cost, and the amount of departure time shift. The travel time and travel cost variables are segmented by trip type to allow separate values of time to be applied in the forecasting model:

- Home-based work trips
- Home-based non-work trips
- Non-home-based trips

As with the express lanes models, 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:

EQUATION 5-2: TOLL COST INTERACTION WITH DISTANCE AND INCOME

$$V_i = \cdots + \beta Cost * TC_i * \left(\frac{income}{\overline{income}}\right)^{\lambda_{c,inc}} * \left(\frac{distance}{\overline{distance}}\right)^{\lambda_{c,dist}}$$

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 $\beta Cost$ 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

Table 5-2 presents the variables included in the passenger vehicle express lanes model specification and the alternatives to which each variable applies.

TABLE 5-2: PASSENGER VEHICLE MODEL SPECIFICATION—CONGESTION PRICING ON ALL LANES

Coefficient	Units	Alt 1: Current Route	Alt 2: Alternate Toll Route	Alt 3: Departure Time Shift	Alt 4: Toll-free Route	Alt 5: Metro North
Travel Time						
Home-based Work	Minutes	X	X	X	X	X
Home-based Non-work	Minutes	X	X	X	X	X
Non-home-based	Minutes	X	X	X	X	X
Travel Cost						
Home-based Work	$	X	X	X		X
Home-based Non-work	$	X	X	X		X
Non-home-based	$	X	X	X		X
Departure Time Shift						
Shift Early	Minutes			X		
Shift Late	Minutes			X		
Dummy Variables						
Electronic Toll Collection Transponder Ownership	1,0	X				
Favor the Project	1,0	X				
Oppose the Project	1,0	X				
Alternative Specific Constants						
Alternative 1: Current Route	1,0	X				
Alternative 2: Alternative Toll Route	1,0		X			
Alternative 3: Shift Departure Time Early	1,0			X		
Alternative 3: Shift Departure Time Late	1,0			X		
Alternative 5: Metro North Railroad	1,0					X
Distance and Income Interactions with Travel Cost						
Distance Elasticity Coefficient	-	X	X	X		X
Income Elasticity Coefficient	-	X	X	X		X

COMMERCIAL VEHICLE MODEL SPECIFICATION—CONGESTION PRICING ON ALL LANES

In each of the ten stated preference experiments related to congestion pricing on all travel lanes on I-95, commercial vehicle respondents were presented with up two hypothetical alternatives for making their future trip:

- **Alternative 1: Use I-95 and pay the toll.** This alternative was shown to all respondents and was described by two attributes: travel time and toll cost. The travel time presented in Alternative 1 was faster than the respondent's reported travel time to reflect faster travel speeds as a result of the congestion pricing strategy.
- **Alternative 2: Use an alternate route.** This alternative was shown to all respondents and was described by a single attribute of travel time. The travel time presented in Alternative 2 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 or longer in distance.

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 variables for travel time and toll cost. An alternative-specific constant is included on the tolled I-95 alternative to capture utility for that alternative that cannot be attributed to the other variables in the model. To identify the relationship between cost sensitivity and vehicle size, the toll cost coefficient was transformed by the number of vehicle axles using the formula presented in Equation 5-3.

EQUATION 5-3: TOLL COST INTERACTION WITH VEHICLE AXLES

$$V_i = \cdots + \beta Cost * \frac{TC_i}{LN(Axles - 1) + 1}$$

Table 5-3 presents the variables included in the commercial vehicle model specification and the alternatives to which each variable applies.

TABLE 5-3: COMMERCIAL VEHICLE MODEL SPECIFICATION—CONGESTION PRICING ON ALL LANES

Coefficient	Units	Alternative 1: I-95	Alternative 2: Alternate Route
Travel Time			
Travel Time	Minutes	X	X
Travel Cost			
Toll Cost	$	X	
Alternative Specific Constants			
Alternative 1: I-95	1,0	X	

5.2 | COEFFICIENT ESTIMATES

The results of the final model specifications are presented below. The tables include coefficients for the passenger vehicle travelers by congestion pricing strategy and market segment, and the coefficients for the aggregate commercial vehicle sample. The coefficient values, robust standard errors, robust t-statistics, and general model statistics are presented in Table 5-4 through Table 5-6.

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 zero (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 initial 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 5-4: PASSENGER VEHICLE MODEL COEFFICIENTS—EXPRESS LANES ON I-95

Coefficient	Units	Value	Rob. Std. Error	Rob. T-stat
Travel Time				
Home-based Work	Minutes	-0.0783	0.00633	-12.37
Home-based Non-work	Minutes	-0.0851	0.00674	-12.62
Non-home-based	Minutes	-0.0622	0.0111	-5.59
Travel Cost*				
Home-based Work	$	-2.70	0.275	-9.82
Home-based Non-work	$	-2.76	0.229	-12.09
Non-home-based	$	-1.82	0.447	-4.08
Dummy Variables				
Electronic Toll Collection Transponder Ownership	1,0	0.156	0.105	1.48
Favor the Project	1,0	0.895	0.129	6.95
Oppose the Project	1,0	-1.060	0.14	-7.56
Alternative Specific Constants				
Alternative 1: Regular Lanes	1,0	0	--	--
Alternative 2: Express Lanes	1,0	-1.70	0.156	-10.91
Alternative 3: Express Bus	1,0	-2.53	0.108	-23.55
Distance and Income Interactions with Travel Cost				
Distance Elasticity Coefficient	-	-0.145	0.0436	-3.32

** Toll cost enters the model in the form:* $V_i = \cdots + \beta Cost * TC_i * \left(\frac{1}{LN(income)}\right) * \left(\frac{distance}{\overline{\overline{distance}}}\right)^{\lambda_{c,dist}}$

Model Statistics	
Number of parameters	12
Number of observations	6925
Number of individuals	1385
Initial log-likelihood	-7607.9
Final log-likelihood	-4203.1
Rho-square	0.448
Adjusted rho-square	0.446

TABLE 5-5: PASSENGER VEHICLE MODEL COEFFICIENTS—CONGESTION PRICING ON ALL LANES

Coefficient	Units	Value	Rob. Std. Error	Rob. T-stat
Travel Time				
Home-based Work	Minutes	-0.0462	0.00476	-9.70
Home-based Non-work	Minutes	-0.0594	0.00635	-9.35
Non-home-based	Minutes	-0.0467	0.00892	-5.24
Travel Cost*				
Home-based Work	$	-0.168	0.0184	-9.16
Home-based Non-work	$	-0.202	0.0213	-9.49
Non-home-based	$	-0.153	0.0329	-4.65
Departure Time Shift				
Shift Early	Minutes	-0.00796	0.00292	-2.73
Shift Late	Minutes	-0.00839	0.00211	-3.98
Dummy Variables				
Electronic Toll Collection Transponder Ownership	1,0	0.203	0.0968	2.09
Favor the Project	1,0	0.445	0.139	3.20
Oppose the Project	1,0	-0.944	0.123	-7.71
Alternative Specific Constants				
Alternative 1: Current Route	1,0	-0.776	0.152	-5.10
Alternative 2: Alternative Toll Route	1,0	-2.29	0.159	-14.39
Alternative 3: Shift Departure Time Early	1,0	-1.76	0.262	-6.75
Alternative 3: Shift Departure Time Late	1,0	-1.33	0.228	-5.83
Alternative 4: Alternative Toll-free Route (fixed)	1,0	0	--	--
Alternative 5: Metro North Railroad	1,0	-1.72	0.121	-14.16
Distance and Income Interactions with Travel Cost				
Distance Elasticity Coefficient	-	-0.23	0.0655	-3.50
Income Elasticity Coefficient	-	-0.148	0.0607	-2.44

** Toll cost enters the model in the form:* $V_i = \cdots + \beta Cost * TC_i * \left(\frac{income}{\overline{income}}\right)^{\lambda_{c,inc}} * \left(\frac{distance}{\overline{distance}}\right)^{\lambda_{c,dist}}$

Model Statistics	
Number of parameters	18
Number of observations	7185
Number of individuals	1437
Initial log-likelihood	-10224
Final log-likelihood	-7147.61
Rho-square	0.301
Adjusted rho-square	0.299

TABLE 5-6: COMMERCIAL VEHICLE MODEL COEFFICIENTS—CONGESTION PRICING ON ALL LANES

Coefficient	Units	Value	Rob. Std. Error	Rob. T-stat
Travel Time				
Travel Time	Minutes	-0.0379	0.0102	-3.71
Travel Cost				
Toll Cost*	$	-0.102	0.0165	-6.18
Alternative Specific Constants				
Alternative 1: I-95 (Current Route)	1,0	-0.661	0.207	-3.20
Alternative 2: Alternative Toll-free Route	1,0	0	--	--

** Toll cost enters the model in the form:* $V_i = \cdots + \beta Cost * \frac{TC_i}{LN(Axles-1)+1}$

Model Statistics	
Number of parameters	3
Number of observations	2350
Number of individuals	235
Initial log-likelihood	-1628.896
Final log-likelihood	-1501.835
Rho-square	0.078
Adjusted rho-square	0.076

5.3 | 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 under congestion pricing conditions in the I-95 corridor.

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:

EQUATION 5-4: PASSENGER VEHICLE VOT CALCULATION—EXPRESS LANES ON I-95

$$VOT = 60 \times \frac{\beta Time}{\beta Toll * \left(\frac{1}{LN(income)}\right) * \left(\frac{distance}{\overline{distance}}\right)^{\lambda_{c,dist}}}$$

EQUATION 5-5: PASSENGER VEHICLE VOT CALCULATION—CONGESTION PRICING ON ALL LANES

$$VOT = 60 \times \frac{\beta Time}{\beta Toll * \left(\frac{income}{\overline{income}}^{\lambda_{c,inc}}\right) * \left(\frac{distance}{\overline{distance}}^{\lambda_{t,dist}}\right)}$$

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 interactions with toll cost.

Similarly, for commercial vehicle respondents, the value of time can be calculated by simply dividing the travel time coefficient by the toll cost coefficient after accounting for the non-linear transformation of toll cost by vehicle axles.

EQUATION 5-6: COMMERCIAL VEHICLE VOT CALCULATION

$$VOT = 60 \times \frac{\beta Time}{\beta Toll/(LN(Axles - 1) + 1)}$$

Table 5-7 through Table 5-9 present the values of time for the strategy of adding express lanes on I-95 for home-based work, home-based non-work, and non-home-based trips by household income and trip distance. Table 5-10 through Table 5-12 show the estimated values of time for the congestion pricing on all lanes strategy for home-based work, home-based non-work, and non-home-based trips by household income and trip distance. Table 5-13 presents the commercial vehicle values of time for the tolling all lanes scenario by vehicle size (number of axles).

TABLE 5-7: PASSENGER VEHICLE EXPRESS LANES VOT—HOME-BASED WORK TRIPS

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

TABLE 5-8: PASSENGER VEHICLE EXPRESS LANES VOT—HOME-BASED NON-WORK TRIPS

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

TABLE 5-9: PASSENGER VEHICLE EXPRESS LANES VOT—NON-HOME-BASED TRIPS

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

TABLE 5-10: PASSENGER VEHICLE CONGESTION PRICING ON ALL LANES VOT—HOME-BASED WORK TRIPS

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

TABLE 5-11: PASSENGER VEHICLE CONGESTION PRICING ON ALL LANES VOT—HOME-BASED NON-WORK TRIPS

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

TABLE 5-12: PASSENGER VEHICLE CONGESTION PRICING ON ALL LANES VOT—NON-HOME-BASED TRIPS

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

TABLE 5-13: COMMERCIAL VEHICLE CONGESTION PRICING ON ALL LANES VOT

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

5.4 | TRIP SUPPRESSION

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

TRIP SUPPRESSION METHODOLOGY

As described in Section 2.0 above, respondents were asked to indicate how they might change the frequency of their trip under the proposed strategy of implementing congestion pricing on all lanes in the I-95 and Route 15 corridors. Respondents were presented with a possible new travel time and cost for their same trip in the future and asked how many fewer or more trips they would make under the new conditions (Figure 2-10). The travel time and toll cost values for the future conditions were taken from the first alternative of the fifth stated preference experiment from the set of experiments related to congestion pricing on all travel lanes. Respondents who said that they would change the frequency of their trips under the new conditions (they would make either more trips or fewer trips) were asked by how much they might increase or reduce their trips.

As a result, the following information was available for each respondent's current trip (before pricing) and his or her future trip (after pricing):

- Travel time, toll cost, and trip frequency before pricing
- Travel time, toll cost, and adjusted trip frequency after pricing

To estimate the regression model, the differences in travel time and toll cost before and after pricing were converted into a difference in utility using the coefficients from the multinomial logit models.

EQUATION 5-7: DIFFERENCE IN UTILITY BETWEEN PRICED AND UN-PRICED CONDITIONS

$$\Delta V = \beta_T * \Delta T + \beta_C * \Delta C * \left(\frac{Inc}{\overline{Inc}}\right)^{\lambda_{c,inc}} * \left(\frac{Dist}{\overline{Dist}}\right)^{\lambda_{c,dist}}$$

Where:

- $\boldsymbol{\Delta V}$ is the difference in utility
- $\boldsymbol{\beta_T}$ is the travel time coefficient
- $\boldsymbol{\Delta T}$ is the difference in travel time between the baseline scenario and the priced scenario
- $\boldsymbol{\beta_C}$ is the toll cost coefficient
- $\boldsymbol{\Delta C}$ is the difference in toll cost between the baseline scenario and the priced scenario
- $\boldsymbol{Inc}$ is the traveler's annual household income ($)
- $\boldsymbol{\overline{Inc}}$ is the sample mean annual household income ($)
- $\boldsymbol{\lambda_{c,inc}}$ is the cost-income elasticity coefficient estimated in the logit model
- $\boldsymbol{Dist}$ is the traveler's trip distance (miles)
- $\boldsymbol{\overline{Dist}}$ is the sample mean trip distance (miles)
- $\boldsymbol{\lambda_{c,dist}}$ is the cost-distance elasticity coefficient estimated in the logit model

This calculated difference in utility was then used to estimate a linear regression model to evaluate the relationship between utility and trip reduction. The dependent variable in the regression model was the percent of trips reduced after pricing, while the independent variable was the utility difference.

EQUATION 5-8: TRIP REDUCTION REGRESSION EQUATION

$$\Delta Tr = m * \Delta V$$

Where:

- ΔTr is the percentage reduction in the number of trips
- m is the regression coefficient
- ΔV is the difference in utility

TRIP SUPPRESSION RESULTS

The results of the regression model for each traveler segment are presented below in Table 5-14.

TABLE 5-14: TRIP SUPPRESSION REGRESSION MODEL RESULTS

Segment	Coefficient	Std. Error	T-Stat	P-value	R^2
Home-based Work	-0.0824	0.0077	-10.67	<2e-16	0.15
Home-based Non-work	-0.1192	0.0091	-13.13	<2e-16	0.22
Non-home-based	-0.1168	0.0247	-4.756	6.09e-06	0.16

The regression coefficients, along with the sensitivities from the MNL models, can be used to calculate trip suppression rates for different amounts of travel time savings and toll costs at any household income level and trip distance. Table 5-15 through Table 5-17 present the resulting trip suppression rates by travel time and toll cost differences at an annual household income of $114,000 and a trip distance of 51 miles, the average values for the sample. The regression results show no trip reduction if current conditions are maintained (i.e. the facility remains toll-free and travel conditions do not change). However, as toll costs increase, trip reduction rates increase. The amount of reduction varies by trip type; home-based work trips show the least amount of reduction while home-based non-work trips show the greatest amount of reduction. This trip reduction is offset somewhat if the congestion pricing results in a reduction in delay and improvement in travel times in the corridor. For example, given the combination of a $2.00 toll and a 15-minute reduction in travel time, the regression results indicate there would be no reduction in the total number of vehicle trips in the I-95 corridor.

TABLE 5-15: HOME-BASED WORK TRIP SUPPRESSION

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

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

TABLE 5-16: HOME-BASED NON-WORK TRIP SUPRESSION

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

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

TABLE 5-17: NON-HOME-BASED TRIP SUPRESSION

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

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

6.0 SUMMARY AND CONCLUSIONS

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

Choice models were developed to produce estimates of values of time for travelers in the region. Separate models were estimated for passenger and commercial vehicle travelers, and for both congestion pricing strategies being evaluated in the corridor. The magnitude and signs of the sensitivity estimates are reasonable and intuitively correct, and the values of time that were estimated are within the ranges found in other major metropolitan areas across the country, although on the higher end of the range. For passenger vehicle travelers, average values of time varied by the type of congestion pricing, trip type, trip distance, and household income, and generally fell within a range of $9/hr. to $28/hr. For commercial vehicles, the value of time fell within a range of $22/hr. to $60/hr. depending on vehicle size.

The estimated VOTs presented here for passenger vehicle travelers are somewhat higher than the VOTs estimated on other tolled highway corridors in the United States. However, the I-95 corridor has several unique characteristics that intuitively support the higher VOT estimates, including the long-distance nature of the corridor with exceptionally high levels of congestion along the entire length, high income levels in many towns along the corridor, and high value of time trips traveling to/from New York City for business or leisure purposes. These factors likely explain why the willingness to pay for travel time savings in the I-95 corridor is somewhat higher than in other regions of the country, including on I-84 in Hartford.

Overall, the survey and choice model results indicate that travel time savings and toll costs can have a significant impact on individuals' travel behaviors, including shifting route, mode, and time-of-day, and trip reduction. The results of this work will help CDM Smith and the Connecticut Department of Transportation to evaluate a range of tolling scenarios and travel conditions related to the proposed implementation congestion pricing in the corridor.

APPENDIX A

CONNECTICUT CONGESTION PRICING STATED PREFERENCE SURVEY REPORT

the science of insight

10.2.2015

PREPARED FOR:
CONNECTICUT DEPARTMENT OF TRANSPORTATION

SUBMITTED BY:
RSG

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White River Junction, VT 05001
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IN COOPERATION WITH:
CDM SMITH

CONNECTICUT CONGESTION PRICING STATED PREFERENCE SURVEY REPORT

PREPARED FOR:
CONNECTICUT DEPARTMENT OF TRANSPORTATION

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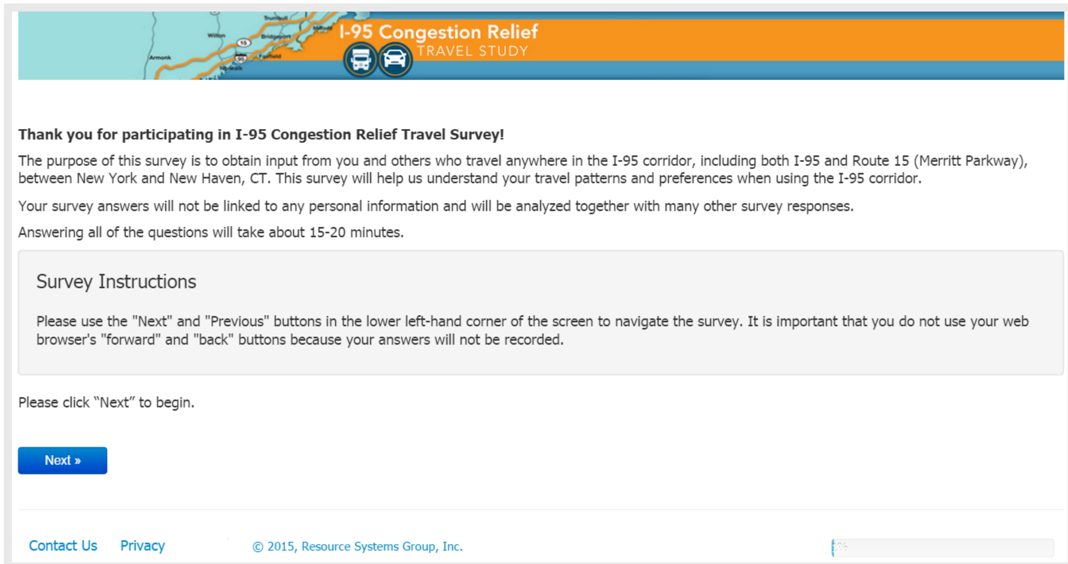
1.0 PASSENGER VEHICLE SURVEY SCREEN CAPTURES

1.1 | INTRODUCTION AND TRIP QUALIFICATION QUESTIONS

FIGURE 1-1: INTRODUCTION AND INSTRUCTIONS


I-95 Congestion Relief
TRAVEL STUDY

Thank you for participating in I-95 Congestion Relief Travel Survey!

The purpose of this survey is to obtain input from you and others who travel anywhere in the I-95 corridor, including both I-95 and Route 15 (Merritt Parkway), between New York and New Haven, CT. This survey will help us understand your travel patterns and preferences when using the I-95 corridor.

Your survey answers will not be linked to any personal information and will be analyzed together with many other survey responses.

Answering all of the questions will take about 15-20 minutes.

Survey Instructions

Please use the "Next" and "Previous" buttons in the lower left-hand corner of the screen to navigate the survey. It is important that you do not use your web browser's "forward" and "back" buttons because your answers will not be recorded.

Please click "Next" to begin.

Next »

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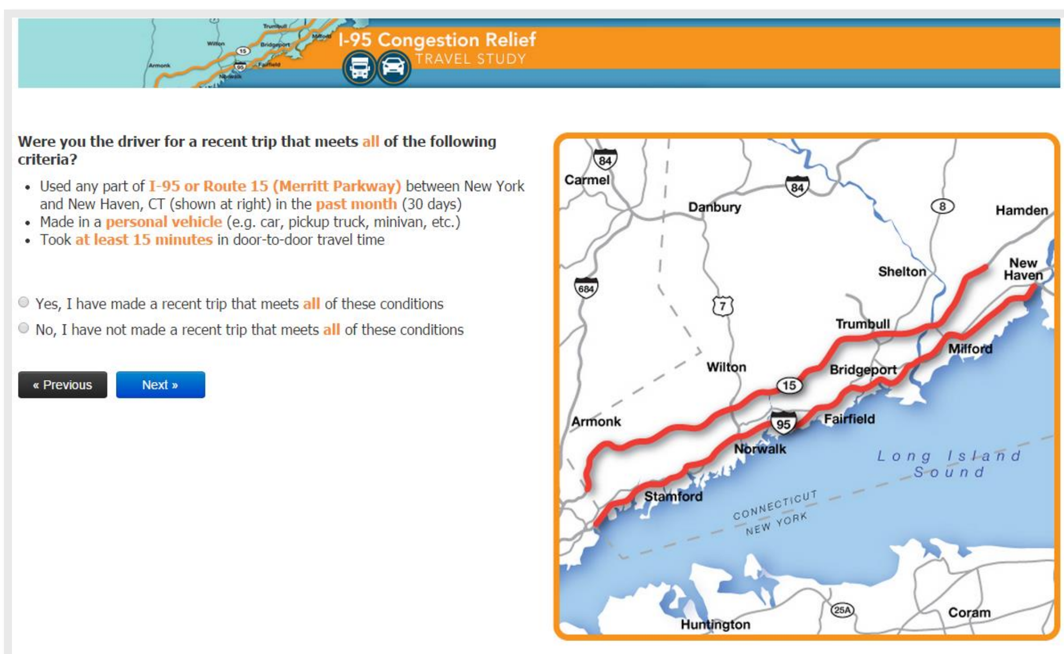
FIGURE 1-2: TRIP QUALIFICATION


I-95 Congestion Relief
TRAVEL STUDY

Were you the driver for a recent trip that meets all of the following criteria?

- Used any part of I-95 or Route 15 (Merritt Parkway) between New York and New Haven, CT (shown at right) in the past month (30 days)
- Made in a personal vehicle (e.g. car, pickup truck, minivan, etc.)
- Took at least 15 minutes in door-to-door travel time

○ Yes, I have made a recent trip that meets all of these conditions
○ No, I have not made a recent trip that meets all of these conditions

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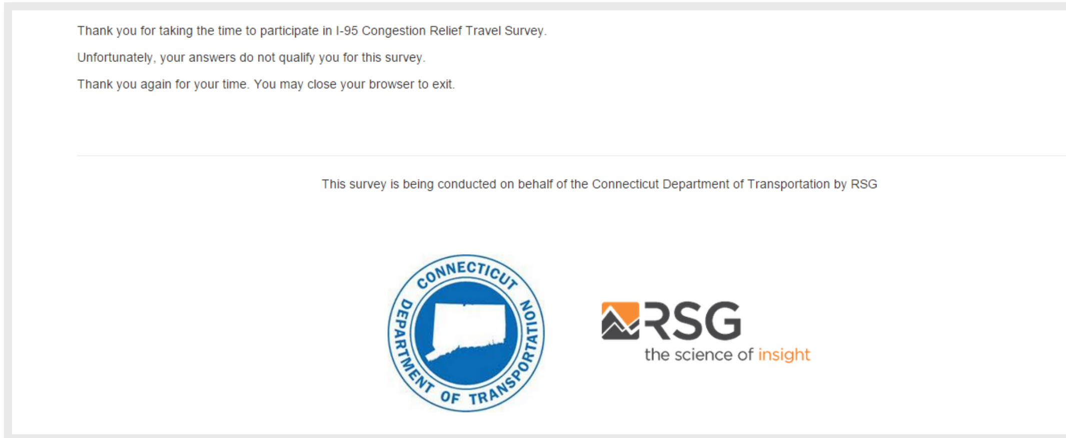
FIGURE 1-3: TERMINATION



If respondent has not made a qualifying trip.

1.2 | TRIP DETAIL QUESTIONS

FIGURE 1-4: DEFINITION OF QUALIFYING ONE-WAY TRIP

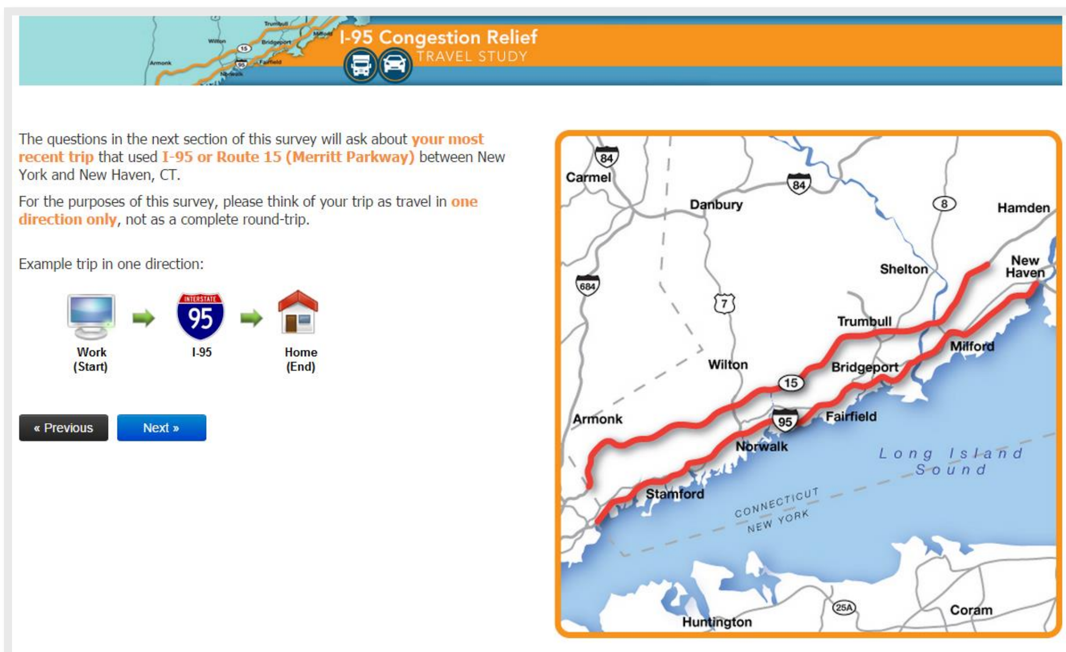
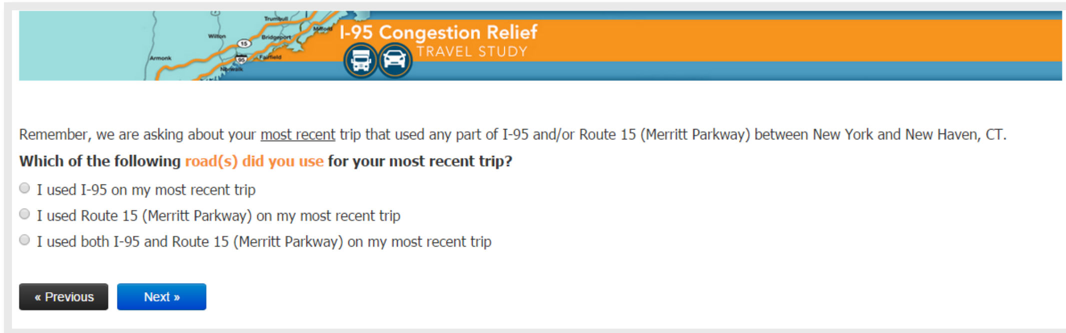


FIGURE 1-5: ROAD(S) USED



Remember, we are asking about your most recent trip that used any part of I-95 and/or Route 15 (Merritt Parkway) between New York and New Haven, CT.

Which of the following road(s) did you use for your most recent trip?

- I used I-95 on my most recent trip
- I used Route 15 (Merritt Parkway) on my most recent trip
- I used both I-95 and Route 15 (Merritt Parkway) on my most recent trip

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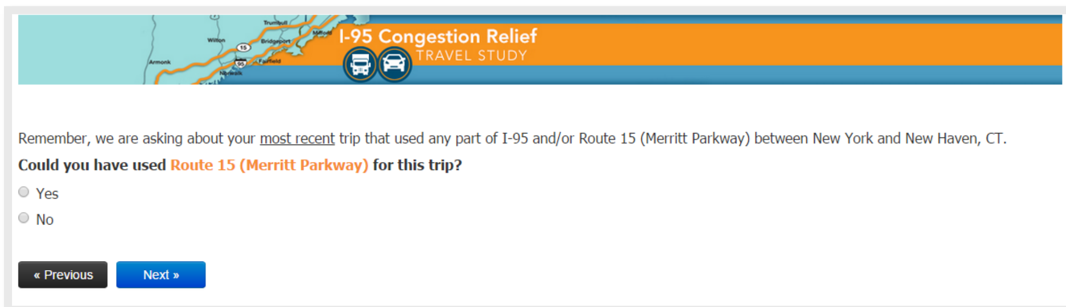
FIGURE 1-6: POTENTIAL USE OF I-95 OR ROUTE 15 (MERRITT PARKWAY)



Remember, we are asking about your most recent trip that used any part of I-95 and/or Route 15 (Merritt Parkway) between New York and New Haven, CT.

Could you have used Route 15 (Merritt Parkway) for this trip?

- Yes
- No

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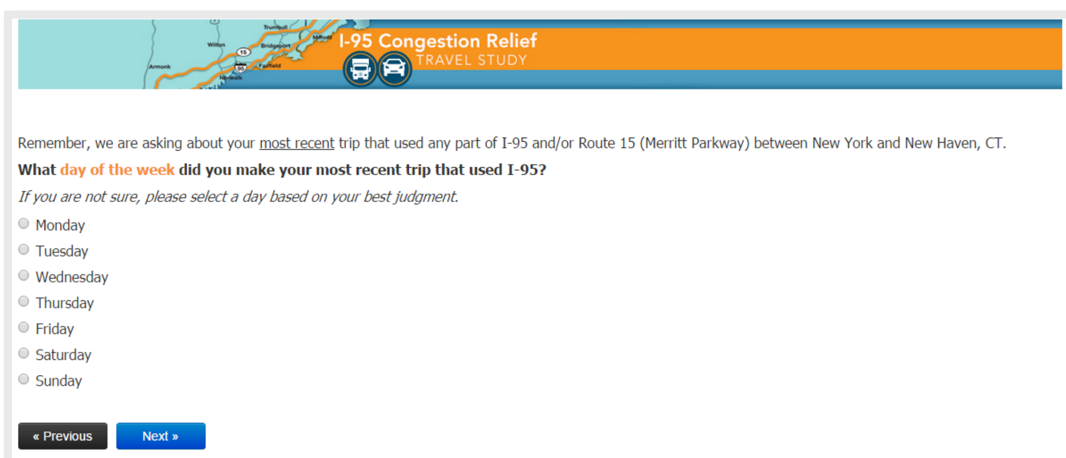
If respondent only used I-95 or only used Route 15 (Merritt Parkway).

FIGURE 1-7: DAY OF WEEK



Remember, we are asking about your most recent trip that used any part of I-95 and/or Route 15 (Merritt Parkway) between New York and New Haven, CT.

What day of the week did you make your most recent trip that used I-95?

If you are not sure, please select a day based on your best judgment.

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday

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FIGURE 1-8: TRIP PURPOSE


I-95 Congestion Relief
TRAVEL STUDY

What was the primary purpose of your most recent trip?

- Commute to/from work
- Business-related travel (such as going to a meeting, sales call, etc.)
- Go to/from school/college/university or drop off/pick up a student
- Go to/from the airport
- Shop
- Social or recreational (such as going to a restaurant, visiting a friend, or going to a sporting event)
- Other personal business (such as a medical appointment)

Your Trip Details
Day of Travel: Tuesday

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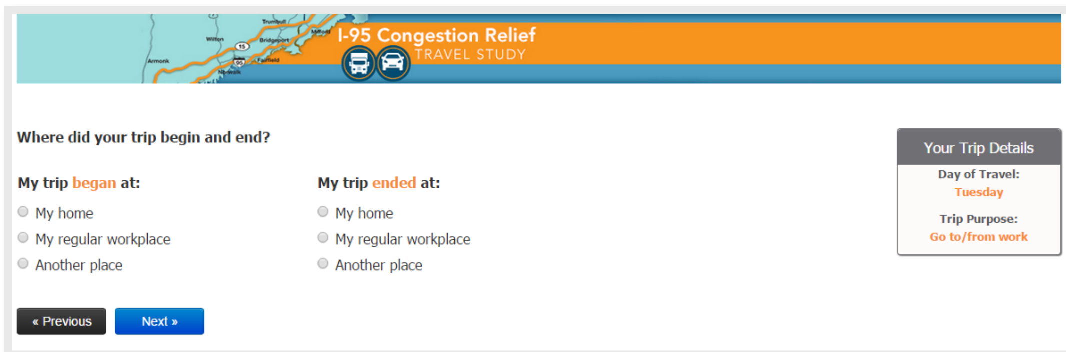
FIGURE 1-9: BEGIN AND END LOCATIONS


I-95 Congestion Relief
TRAVEL STUDY

Where did your trip begin and end?

My trip began at:
- My home
- My regular workplace
- Another place

My trip ended at:
- My home
- My regular workplace
- Another place

Your Trip Details
Day of Travel: Tuesday
Trip Purpose: Go to/from work

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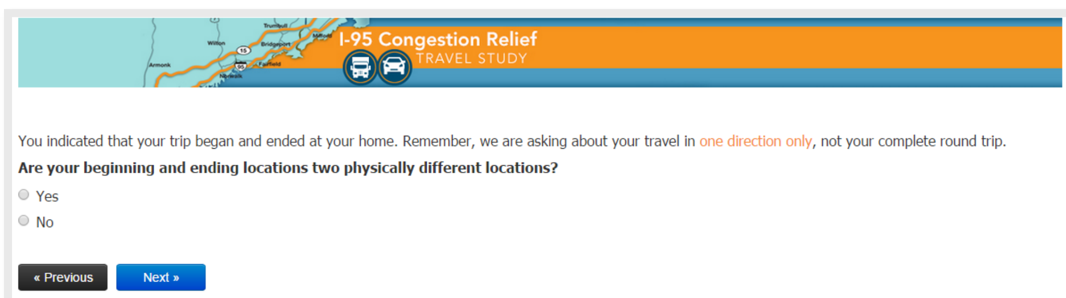
FIGURE 1-10: LOCATION CONFIRMATION


I-95 Congestion Relief
TRAVEL STUDY

You indicated that your trip began and ended at your home. Remember, we are asking about your travel in one direction only, not your complete round trip.

Are your beginning and ending locations two physically different locations?

- Yes
- No

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If beginning and ending locations are both home or both work.

FIGURE 1-11: ORIGIN

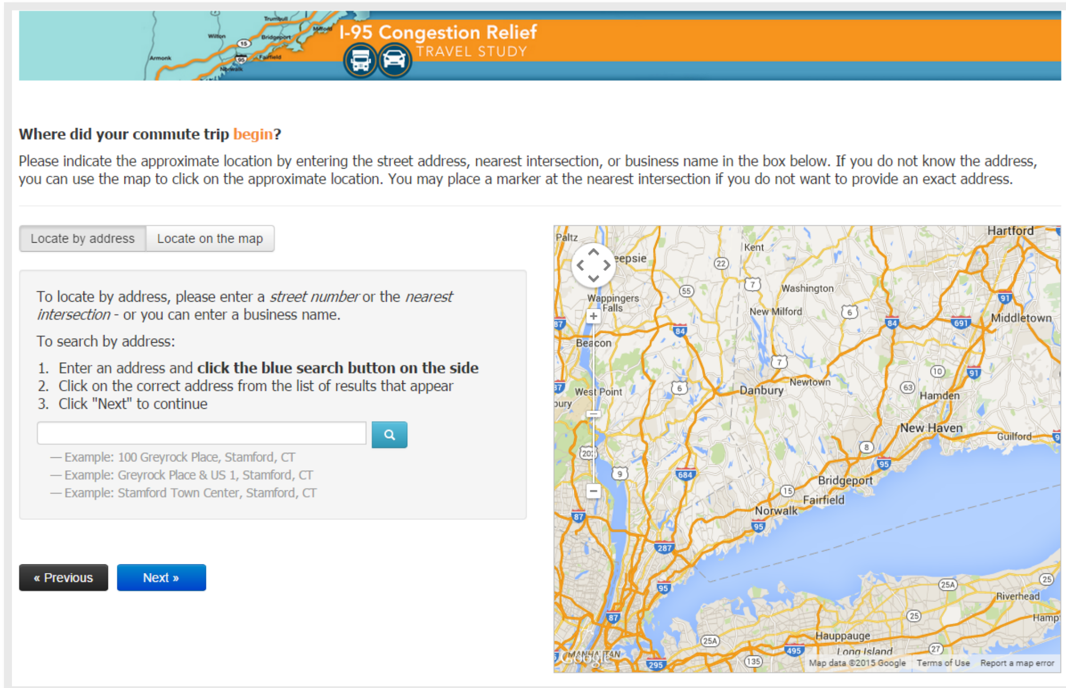


FIGURE 1-12: DESTINATION

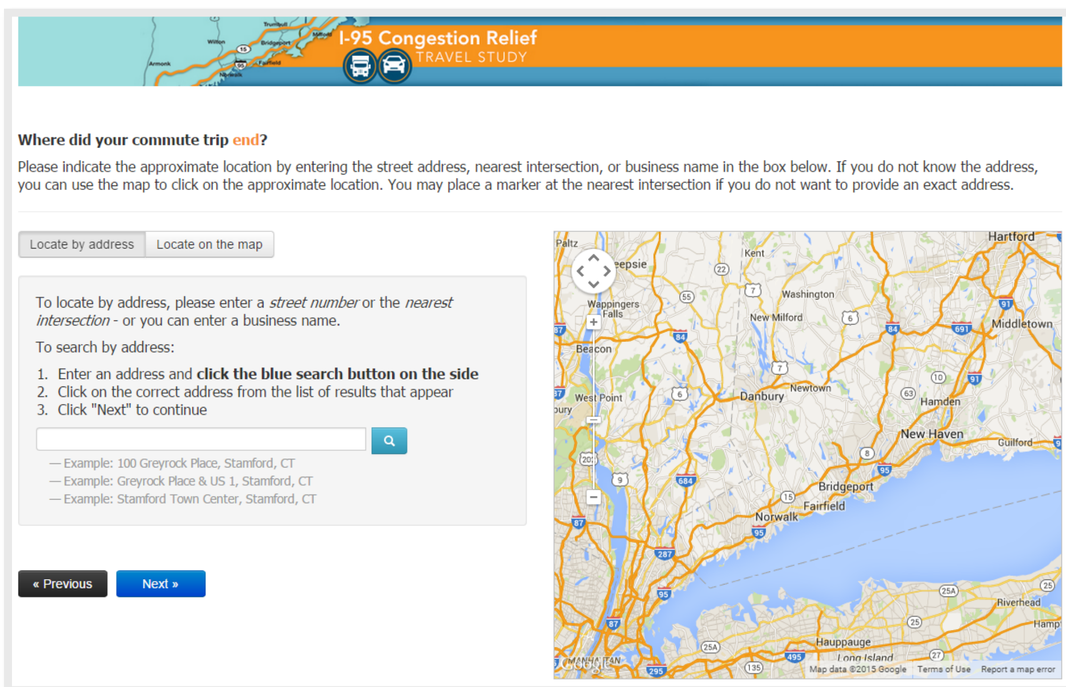
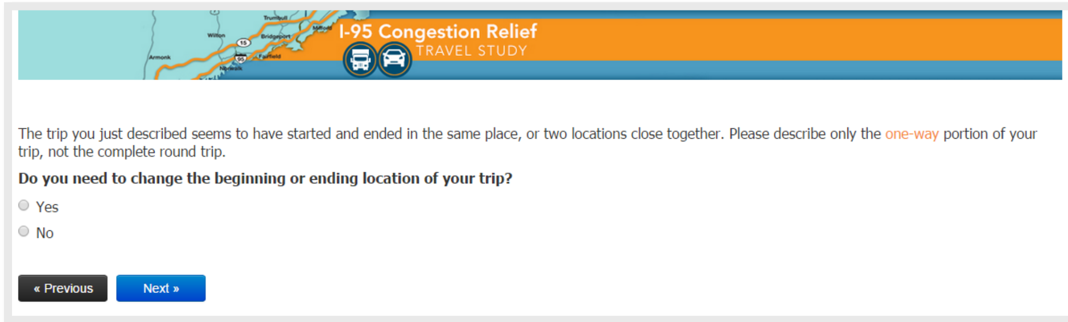


FIGURE 1-13: INVALID TRIP



If origin and destination indicate an invalid trip.

FIGURE 1-14: ORIGIN AND DESTINATION CONFIRMATION

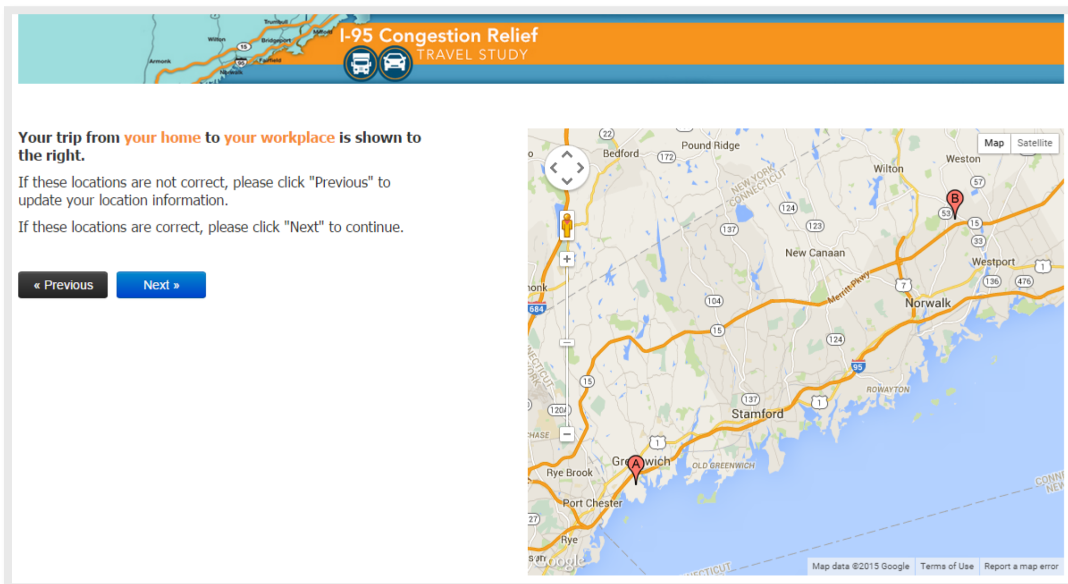
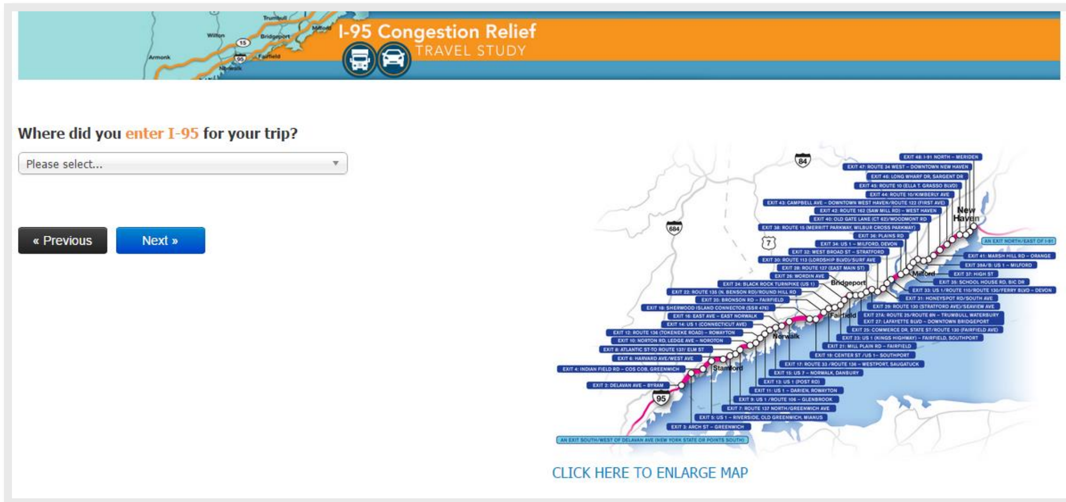
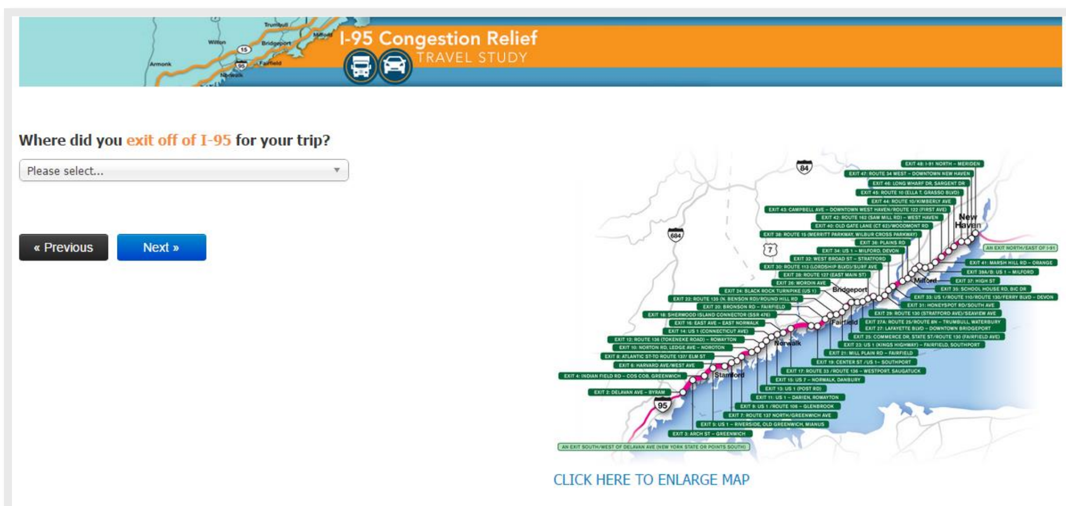


FIGURE 1-15: I-95 ENTRANCE RAMP



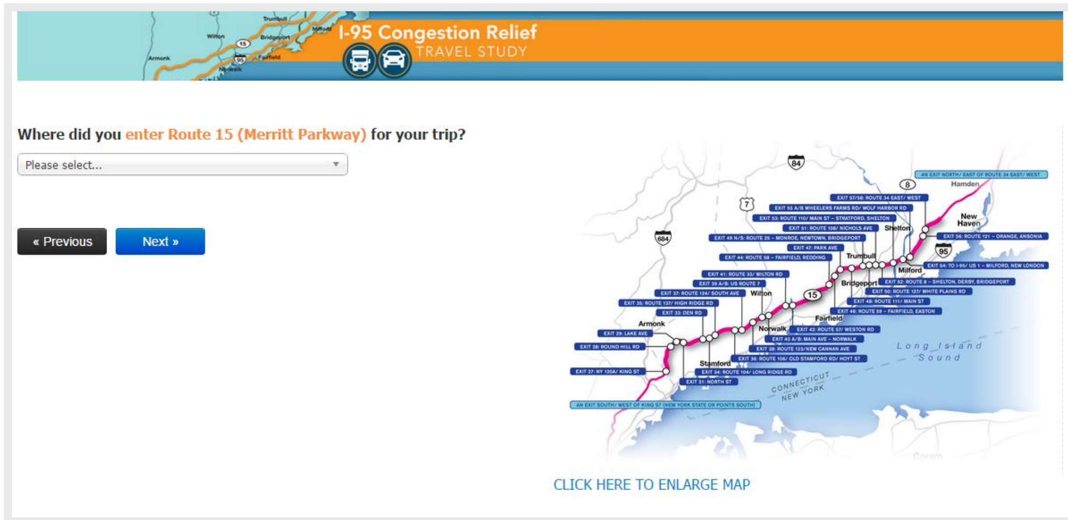
If respondent used I-95 for the qualifying trip.

FIGURE 1-16: I-95 EXIT RAMP



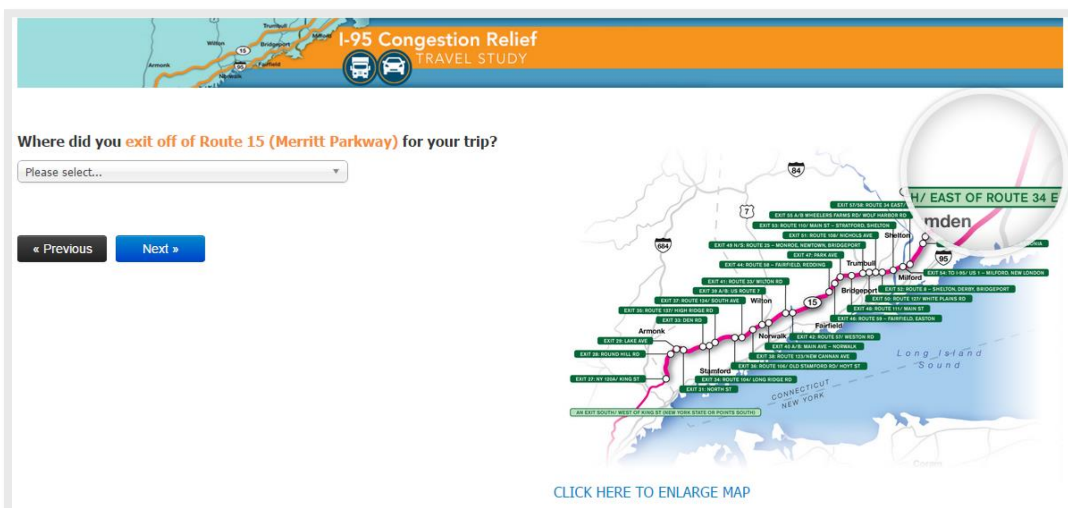
If respondent used I-95 for the qualifying trip.

FIGURE 1-17: ROUTE 15 (MERRITT PARKWAY) ENTRANCE RAMP



If respondent used Route 15 (Merritt Parkway) for the qualifying trip.

FIGURE 1-18: ROUTE 15 (MERRITT PARKWAY) EXIT RAMP



If respondent used Route 15 (Merritt Parkway) for the qualifying trip.

FIGURE 1-19: DEPARTURE TIME

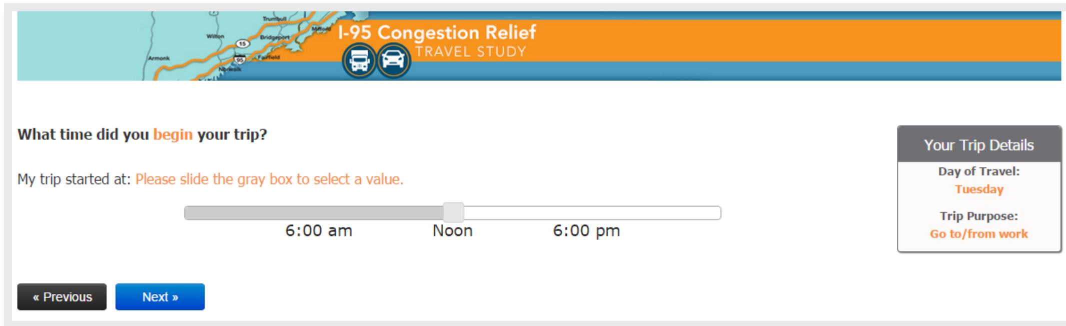


FIGURE 1-20: PREFER DIFFERENT DEPARTURE TIME

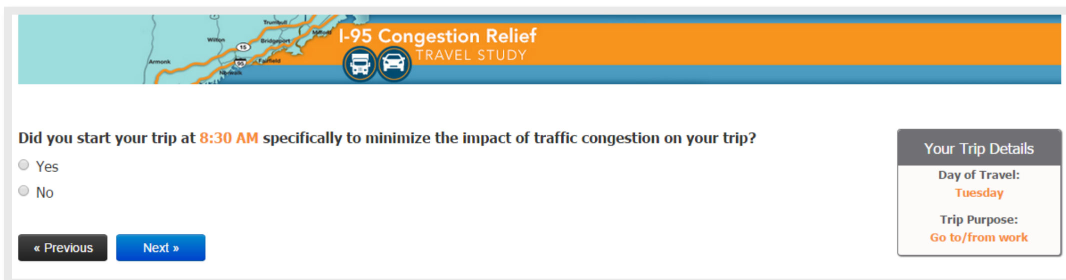
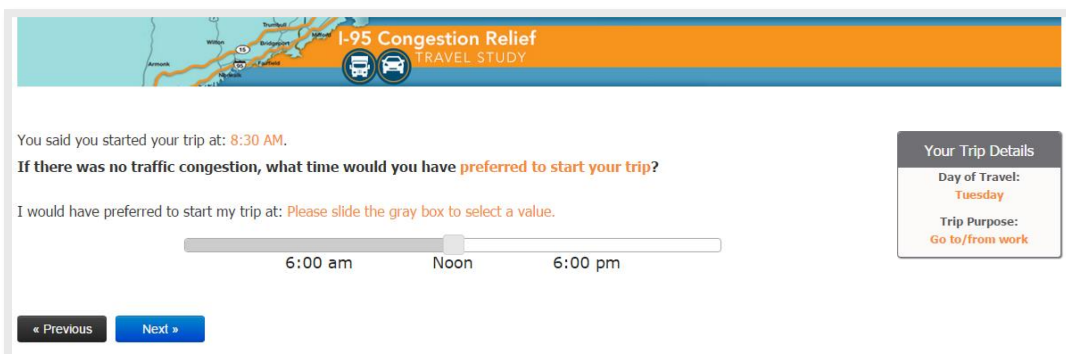


FIGURE 1-21: PREFERRED DEPARTURE TIME



If respondent chose start time to avoid traffic congestion.

FIGURE 1-22: TRAVEL TIME

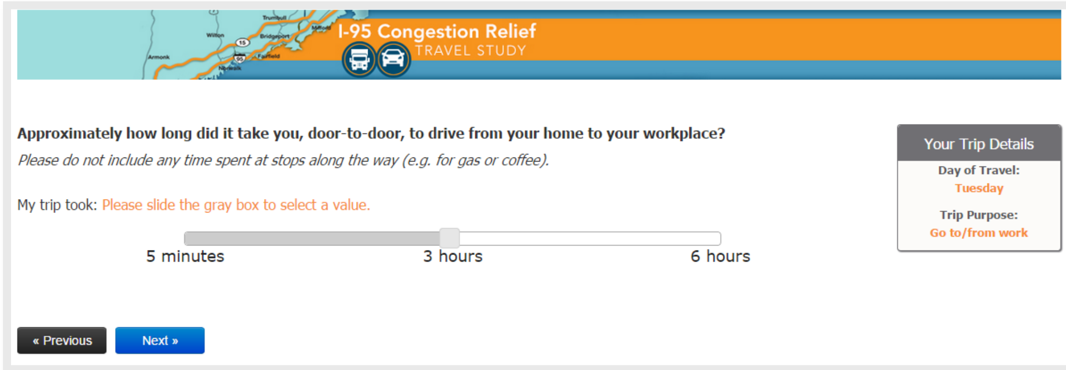
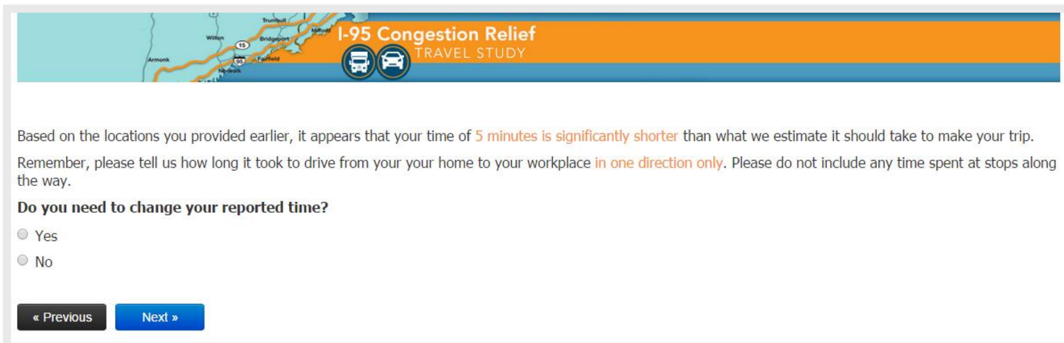


FIGURE 1-23: TRAVEL TIME CONFIRMATION



If travel time appears too short or too long.

FIGURE 1-24: DELAY DUE TO TRAFFIC CONGESTION

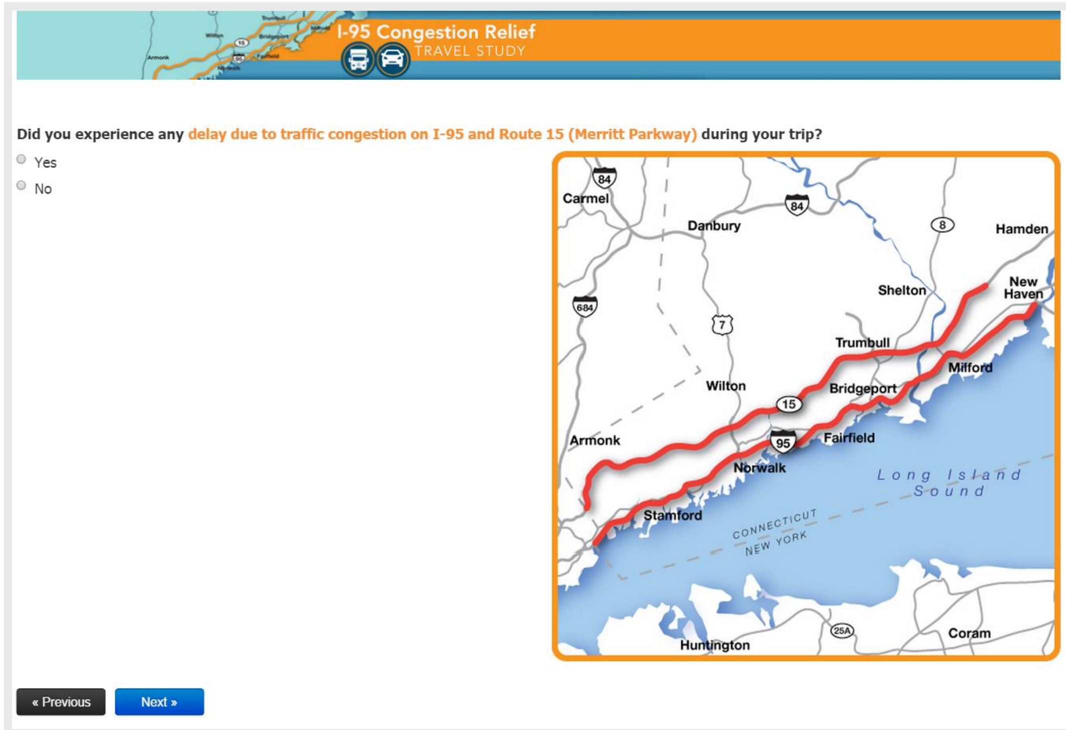
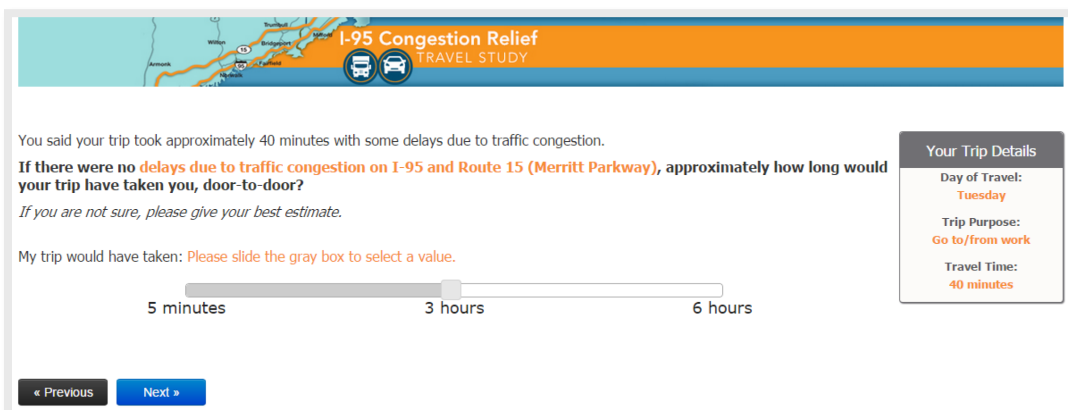


FIGURE 1-25: TRAVEL TIME WITHOUT DELAY



If experienced delay due to traffic congestion.

FIGURE 1-26: PERCEIVED LEVEL OF CONGESTION

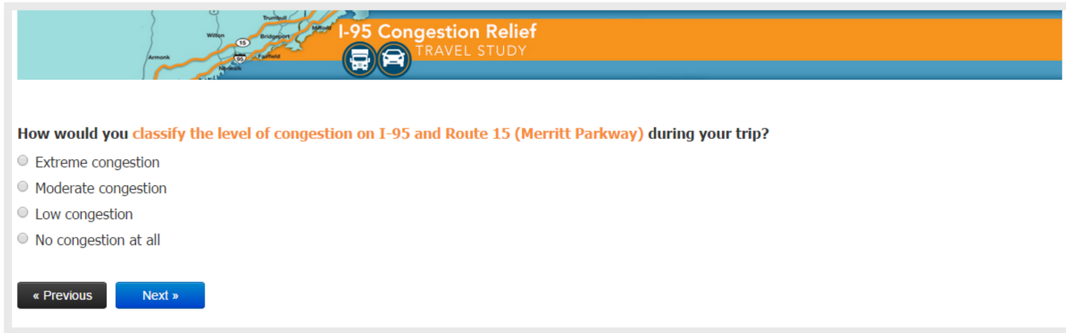


FIGURE 1-27: VEHICLE OCCUPANCY

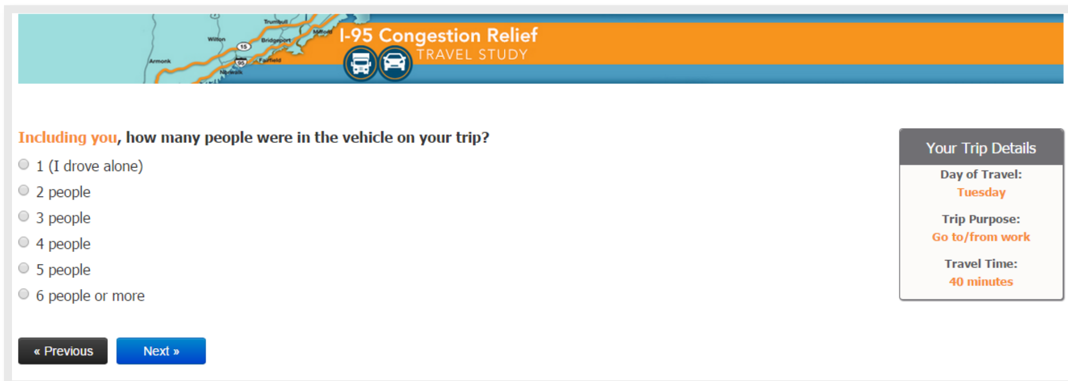


FIGURE 1-28: TRIP FREQUENCY

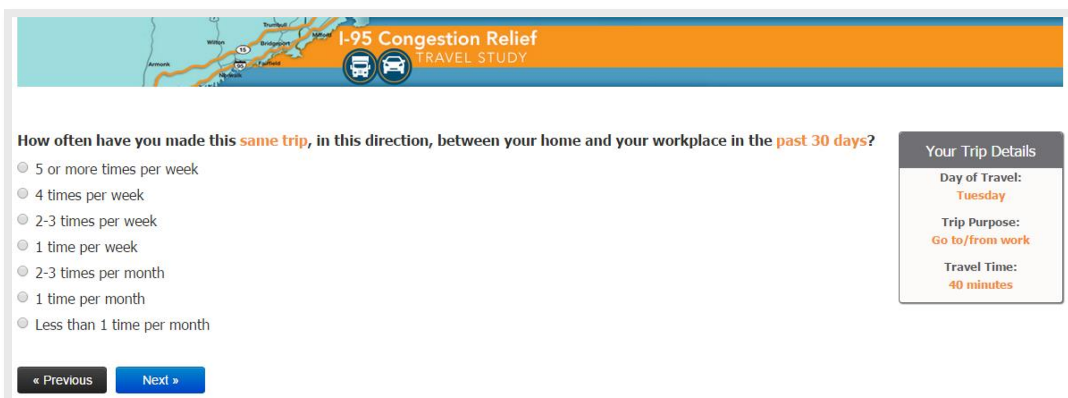


FIGURE 1-29: USE OF METRO NORTH RAILROAD

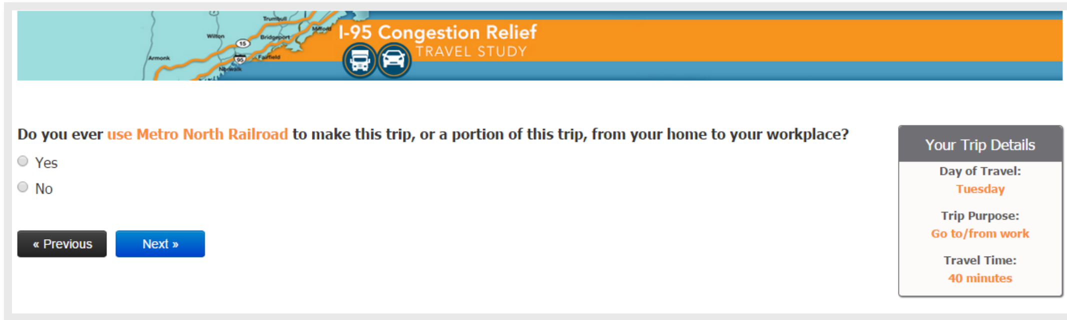
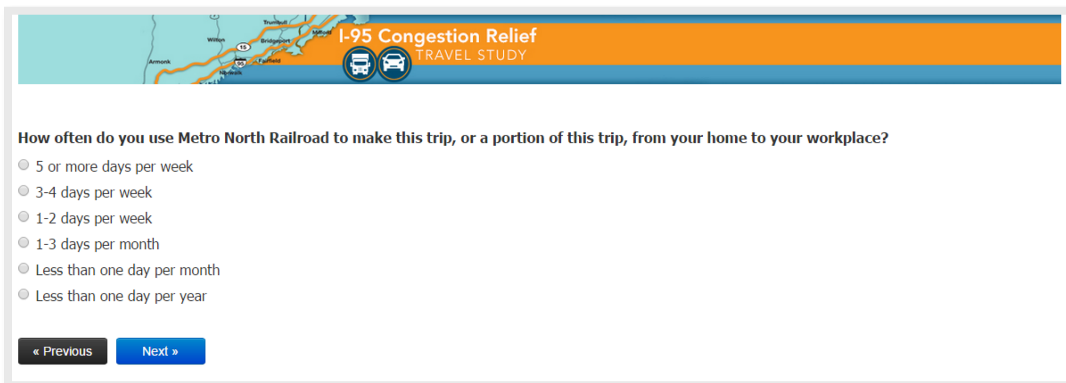
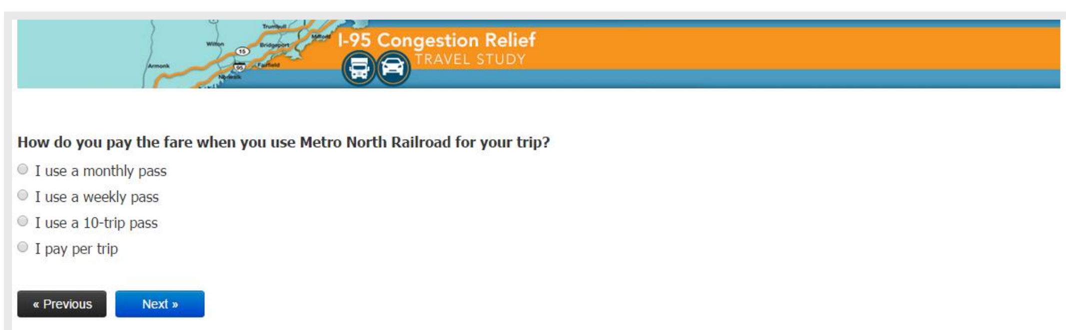


FIGURE 1-30: METRO NORTH RAILROAD FREQUENCY



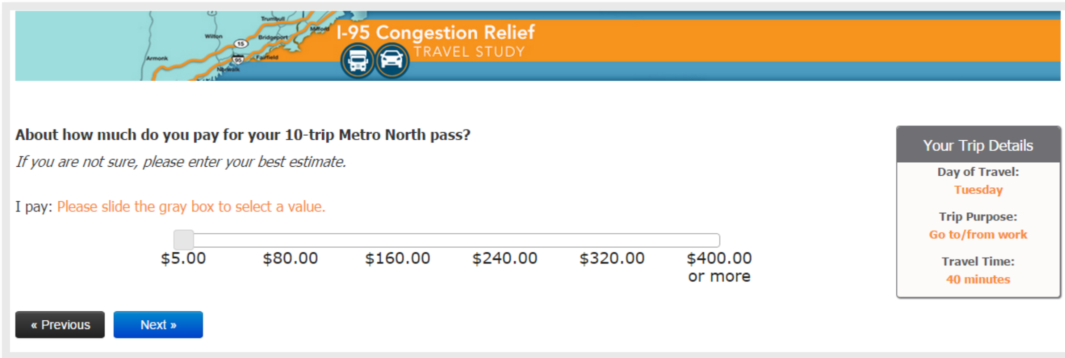
If uses Metro North Railroad.

FIGURE 1-31: METRO NORTH RAILROAD PAYMENT METHOD



If uses Metro North Railroad.

FIGURE 1-32: METRO NORTH RAILROAD FARE



If uses Metro North Railroad.

FIGURE 1-33: USE OF ALTERNATE ROUTES

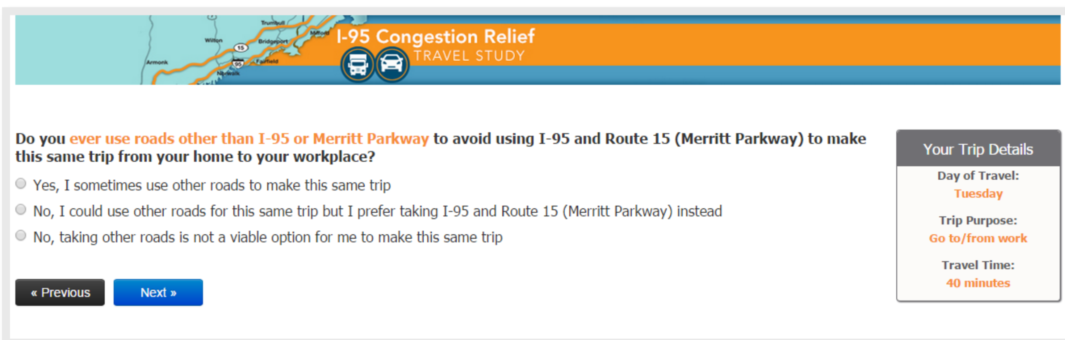
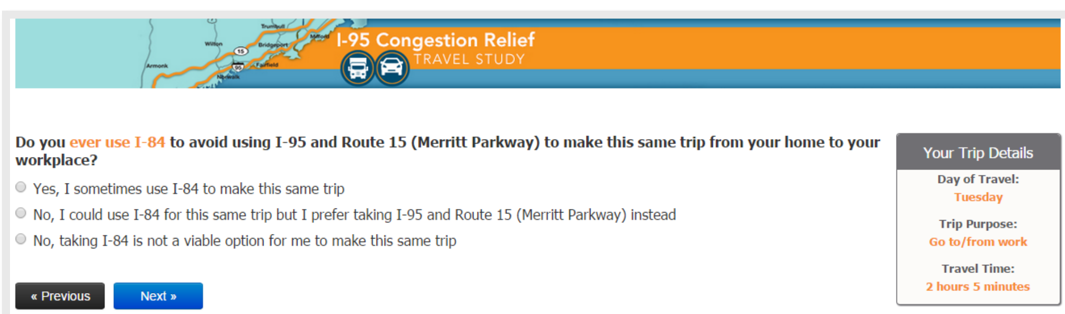
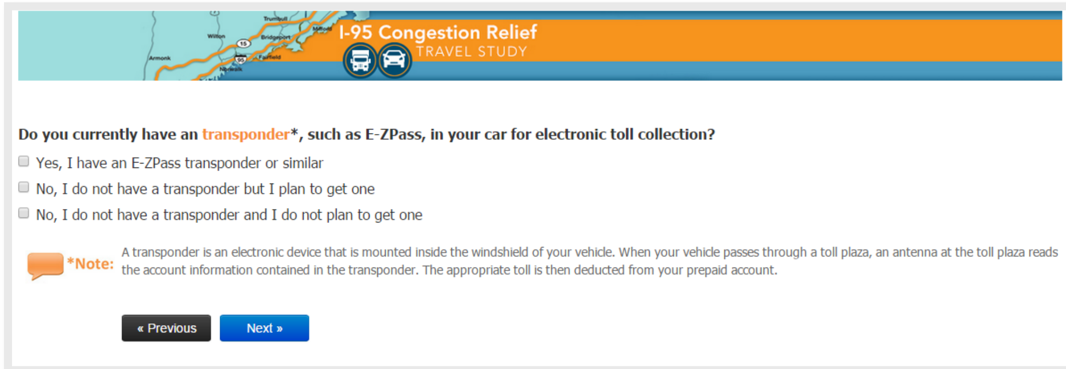


FIGURE 1-34: USE OF I-84



If trip is greater than 100 miles in total distance.

FIGURE 1-35: ETC OWNERSHIP



I-95 Congestion Relief
TRAVEL STUDY

Do you currently have an transponder*, such as E-ZPass, in your car for electronic toll collection?

- Yes, I have an E-ZPass transponder or similar
- No, I do not have a transponder but I plan to get one
- No, I do not have a transponder and I do not plan to get one

*Note: A transponder is an electronic device that is mounted inside the windshield of your vehicle. When your vehicle passes through a toll plaza, an antenna at the toll plaza reads the account information contained in the transponder. The appropriate toll is then deducted from your prepaid account.

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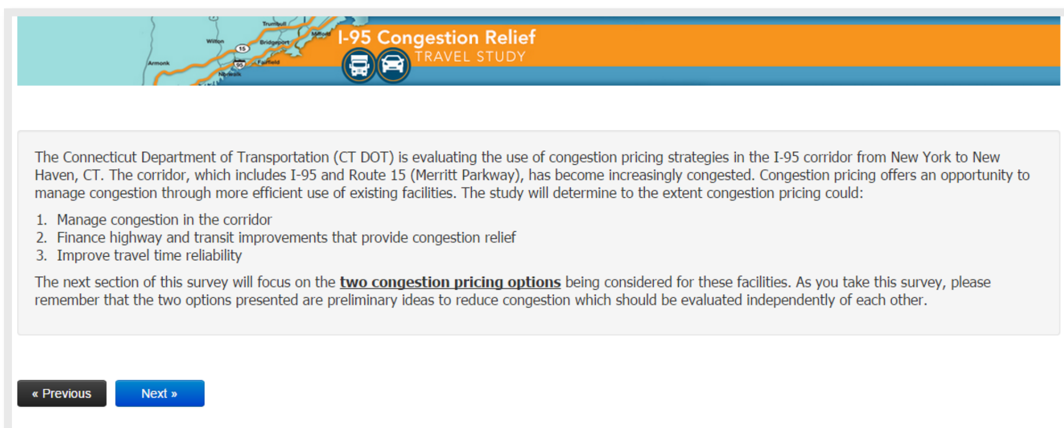
1.3 | STATED PREFERENCE QUESTIONS—EXPRESS LANES ON I-95

FIGURE 1-36: INTRODUCTION TO CONGESTION PRICING



I-95 Congestion Relief
TRAVEL STUDY

The Connecticut Department of Transportation (CT DOT) is evaluating the use of congestion pricing strategies in the I-95 corridor from New York to New Haven, CT. The corridor, which includes I-95 and Route 15 (Merritt Parkway), has become increasingly congested. Congestion pricing offers an opportunity to manage congestion through more efficient use of existing facilities. The study will determine to the extent congestion pricing could:

1. Manage congestion in the corridor
2. Finance highway and transit improvements that provide congestion relief
3. Improve travel time reliability

The next section of this survey will focus on the **two congestion pricing options** being considered for these facilities. As you take this survey, please remember that the two options presented are preliminary ideas to reduce congestion which should be evaluated independently of each other.

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FIGURE 1-37: PROJECT INFORMATION—EXPRESS LANES

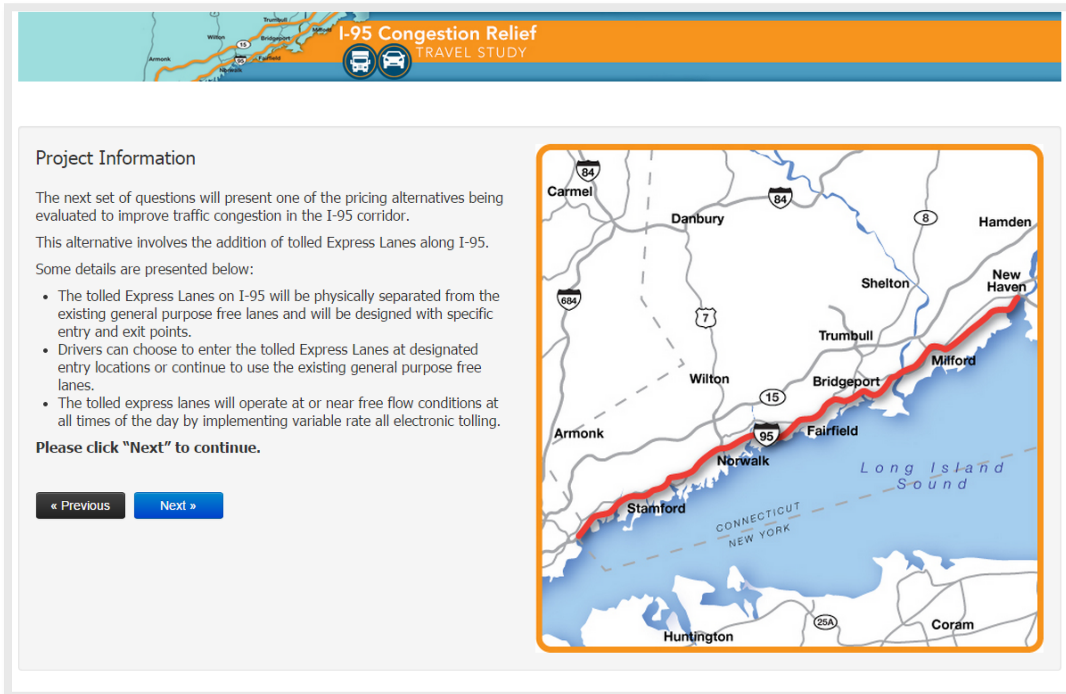


FIGURE 1-38: PRICING INFORMATION—EXPRESS LANES

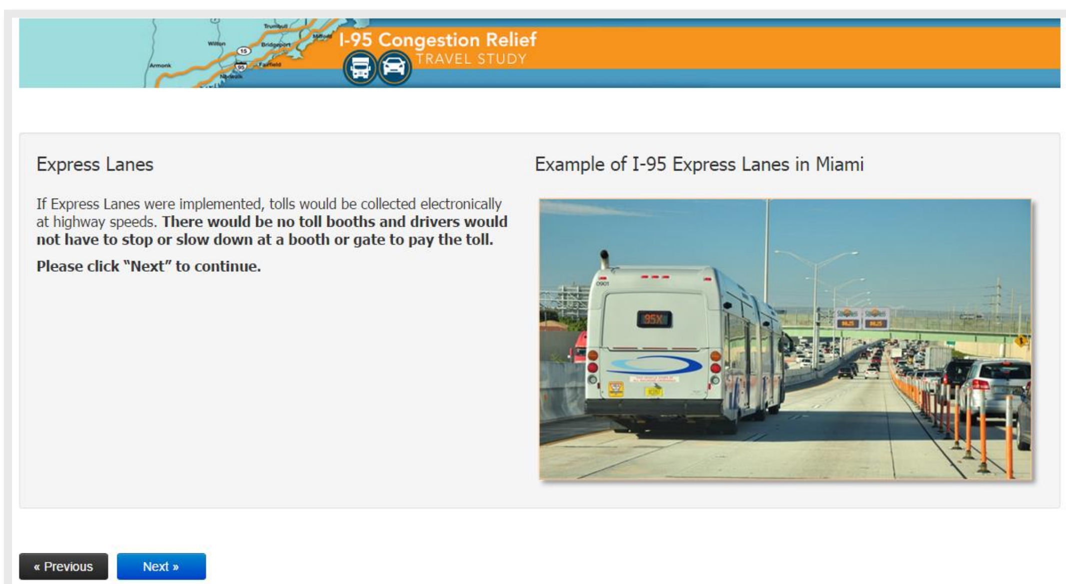
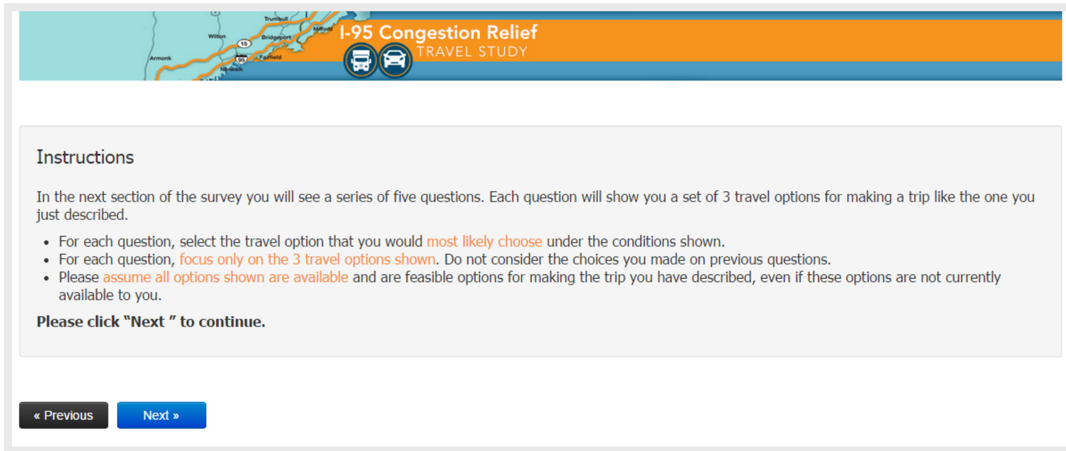


FIGURE 1-39: SP INSTRUCTIONS—EXPRESS LANES


I-95 Congestion Relief
TRAVEL STUDY

Instructions

In the next section of the survey you will see a series of five questions. Each question will show you a set of 3 travel options for making a trip like the one you just described.

- For each question, select the travel option that you would most likely choose under the conditions shown.
- For each question, focus only on the 3 travel options shown. Do not consider the choices you made on previous questions.
- Please assume all options shown are available and are feasible options for making the trip you have described, even if these options are not currently available to you.

Please click "Next " to continue.

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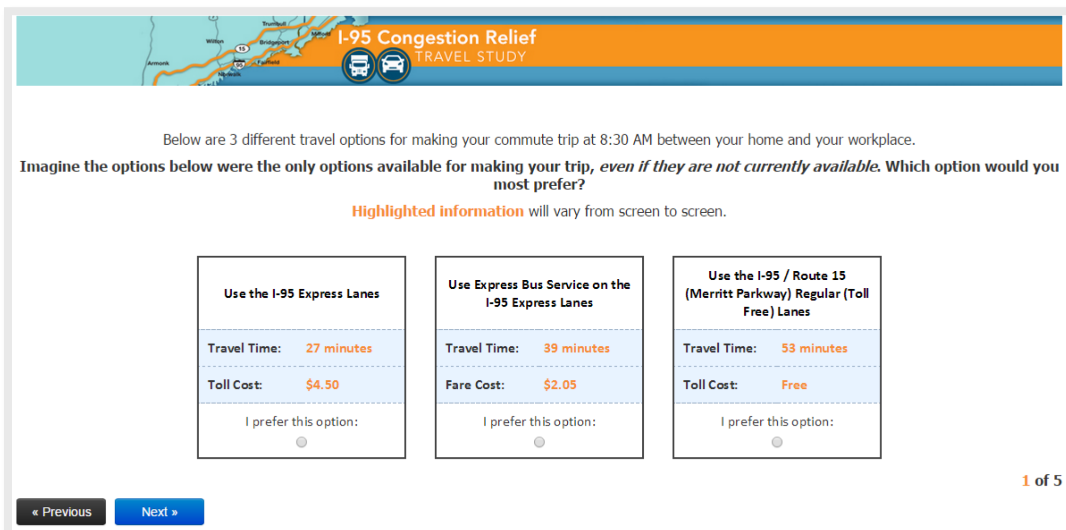
FIGURE 1-40: EXPRESS LANES SP EXPERIMENT—EXAMPLE 1


I-95 Congestion Relief
TRAVEL STUDY

Below are 3 different travel options for making your commute trip at 8:30 AM between your home and your workplace.

Imagine the options below were the only options available for making your trip, *even if they are not currently available*. Which option would you most prefer?

Highlighted information will vary from screen to screen.

Use the I-95 Express Lanes	Use Express Bus Service on the I-95 Express Lanes	Use the I-95 / Route 15 (Merritt Parkway) Regular (Toll Free) Lanes
Travel Time: 27 minutes	Travel Time: 39 minutes	Travel Time: 53 minutes
Toll Cost: $4.50	Fare Cost: $2.05	Toll Cost: Free
I prefer this option:	I prefer this option:	I prefer this option:

1 of 5

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FIGURE 1-41: EXPRESS LANES SP EXPERIMENT—EXAMPLE 2

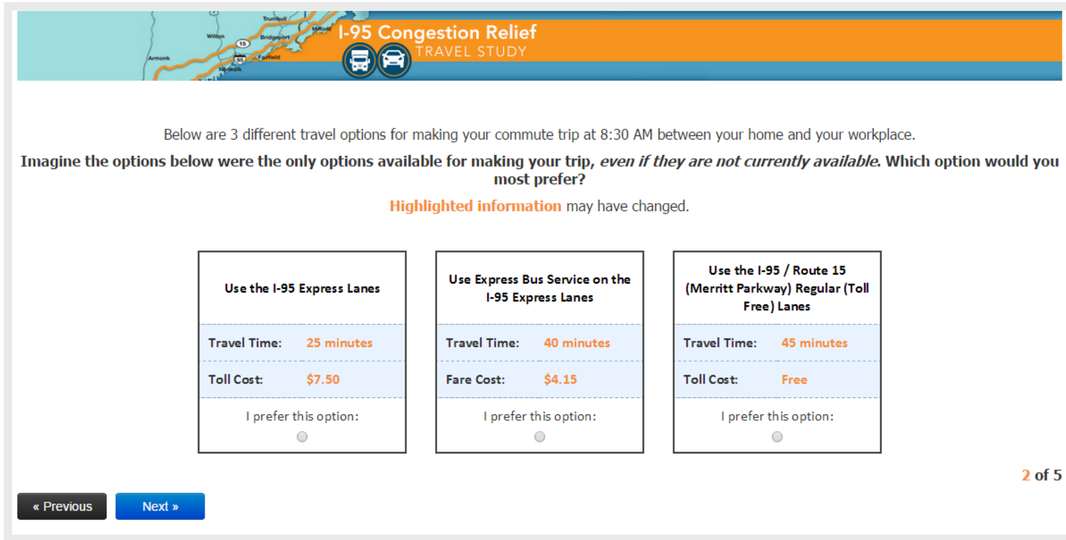


FIGURE 1-42: EXPRESS LANES SP EXPERIMENT—EXAMPLE 3

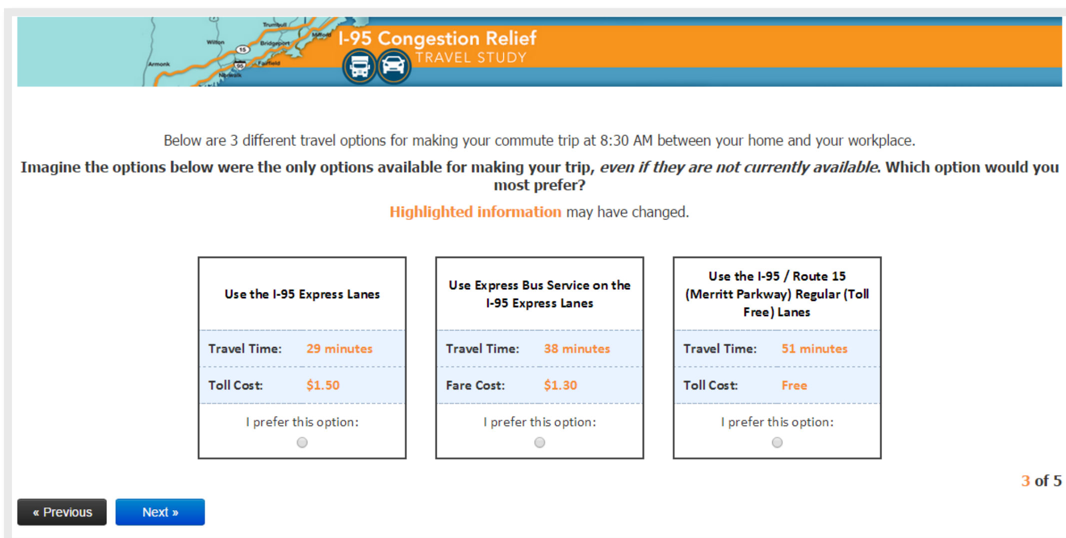


FIGURE 1-43: EXPRESS LANES SP EXPERIMENT—EXAMPLE 4

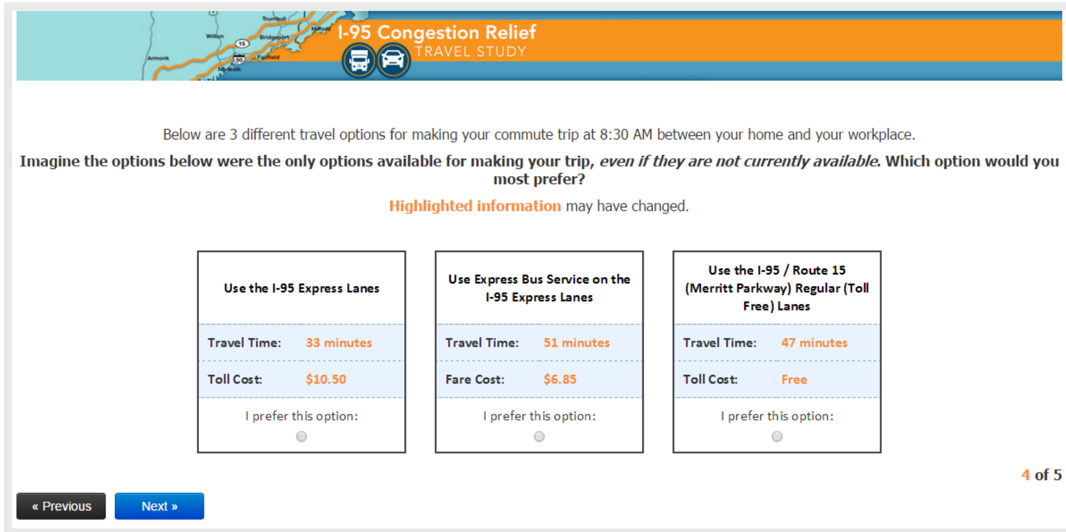
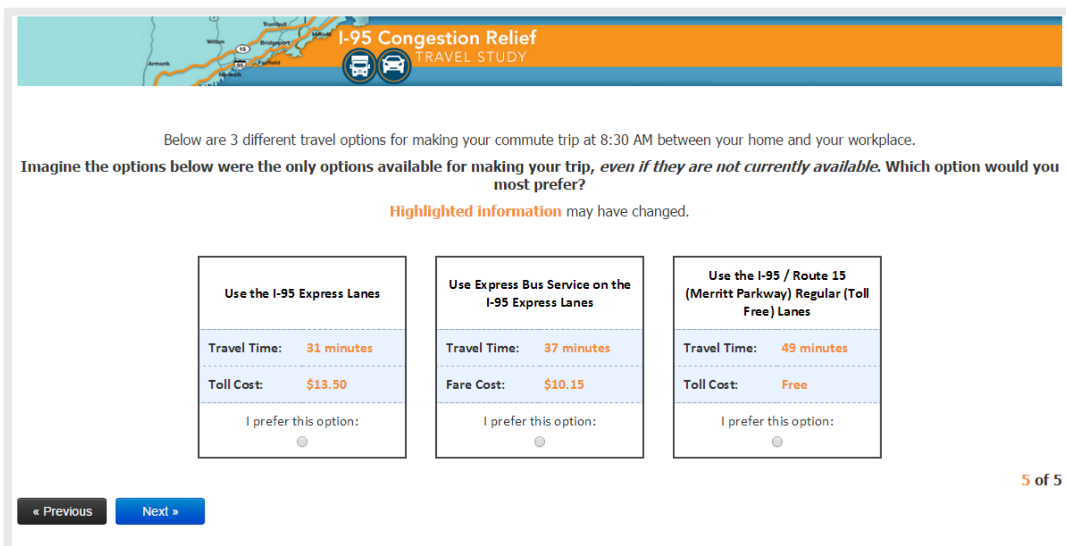
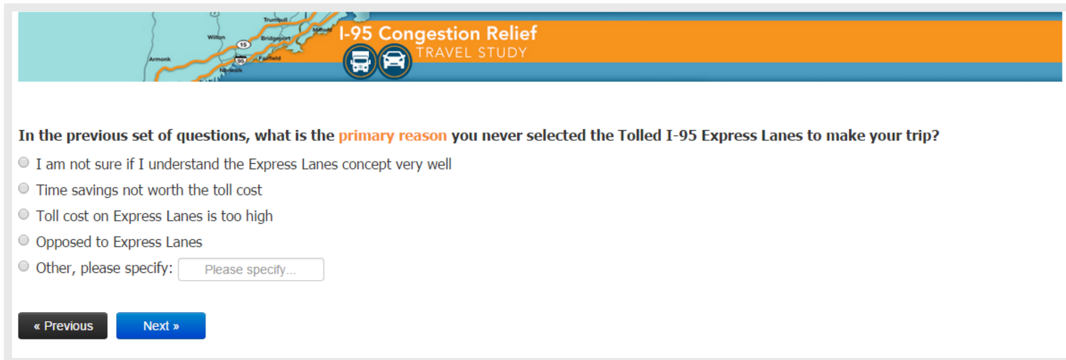


FIGURE 1-44: EXPRESS LANES SP EXPERIMENT—EXAMPLE 5



1.4 | DEBRIEF AND OPINION QUESTIONS—EXPRESS LANES ON I-95

FIGURE 1-45: PRIMARY REASON FOR NOT SELECTING TOLLED I-95 EXPRESS LANES



In the previous set of questions, what is the primary reason you never selected the Tolled I-95 Express Lanes to make your trip?

- I am not sure if I understand the Express Lanes concept very well
- Time savings not worth the toll cost
- Toll cost on Express Lanes is too high
- Opposed to Express Lanes
- Other, please specify: Please specify...

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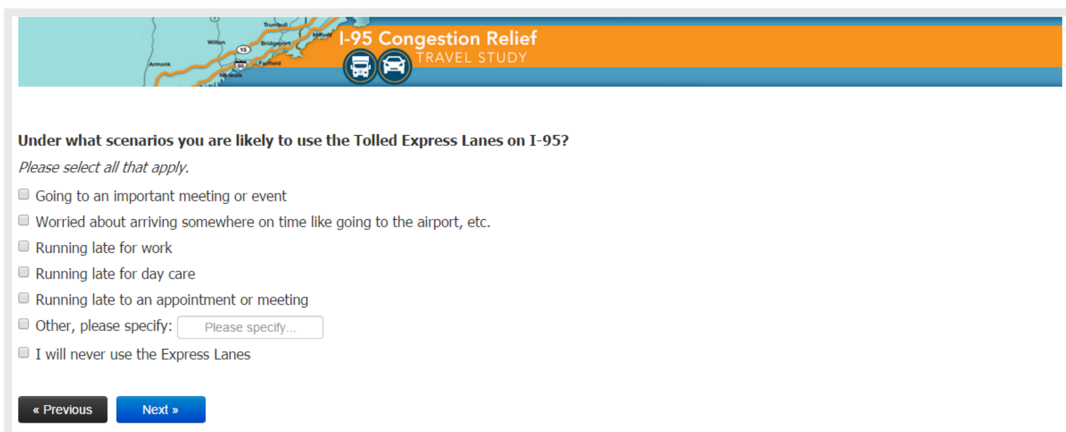
If never selected tolled I-95 Express Lanes alternative.

FIGURE 1-46: EXPRESS LANES USE



Under what scenarios you are likely to use the Tolled Express Lanes on I-95?

Please select all that apply.

- Going to an important meeting or event
- Worried about arriving somewhere on time like going to the airport, etc.
- Running late for work
- Running late for day care
- Running late to an appointment or meeting
- Other, please specify: Please specify...
- I will never use the Express Lanes

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FIGURE 1-47: OPINION OF EXPRESS LANES

Which of the following best describes how you feel about Tolled Express Lanes on I-95?

- Strongly favor
- Somewhat favor
- Neutral
- Somewhat opposed
- Strongly opposed

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FIGURE 1-48: REASON(S) FOR FAVORING EXPRESS LANES


I-95 Congestion Relief
TRAVEL STUDY

Why are you in favor of Tolled Express Lanes **on I-95?**

Select all that apply.

- Safe road conditions
- Faster travel times in the proposed Express Lanes
- Easier driving in the proposed Express Lanes
- Fuel savings by traveling faster in the proposed Express Lanes
- More predictable/reliable travel times in the proposed Express Lanes
- Reduced emissions and improved air quality
- Other, please specify: Please specify...

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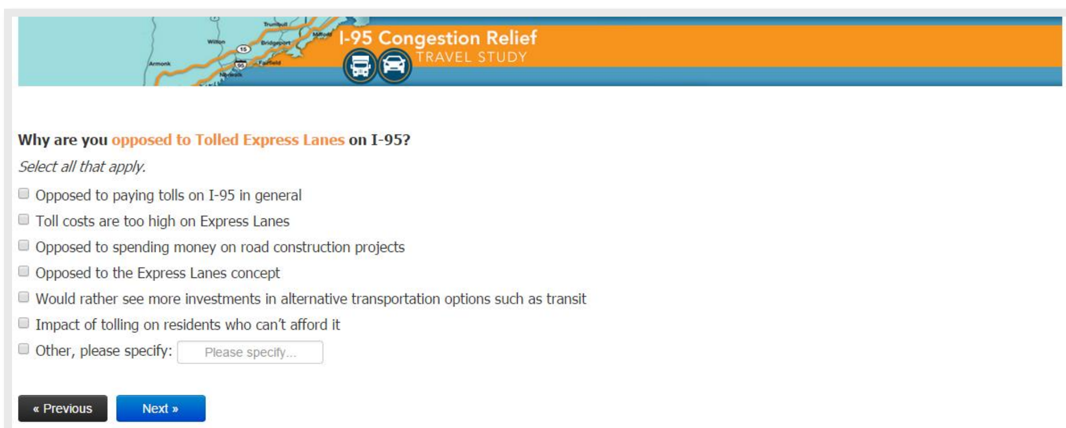
If somewhat or strongly favors Tolled Express Lanes on I-95.

FIGURE 1-49: REASON(S) FOR OPPOSING EXPRESS LANES


I-95 Congestion Relief
TRAVEL STUDY

Why are you opposed to Tolled Express Lanes **on I-95?**

Select all that apply.

- Opposed to paying tolls on I-95 in general
- Toll costs are too high on Express Lanes
- Opposed to spending money on road construction projects
- Opposed to the Express Lanes concept
- Would rather see more investments in alternative transportation options such as transit
- Impact of tolling on residents who can't afford it
- Other, please specify: Please specify...

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If somewhat or strongly opposes Tolled Express Lanes on I-95.

1.5 | STATED PREFERENCE QUESTIONS—CONGESTION PRICING ON ALL LANES

FIGURE 1-50: PROJECT INFORMATION—CONGESTION PRICING ON ALL LANES

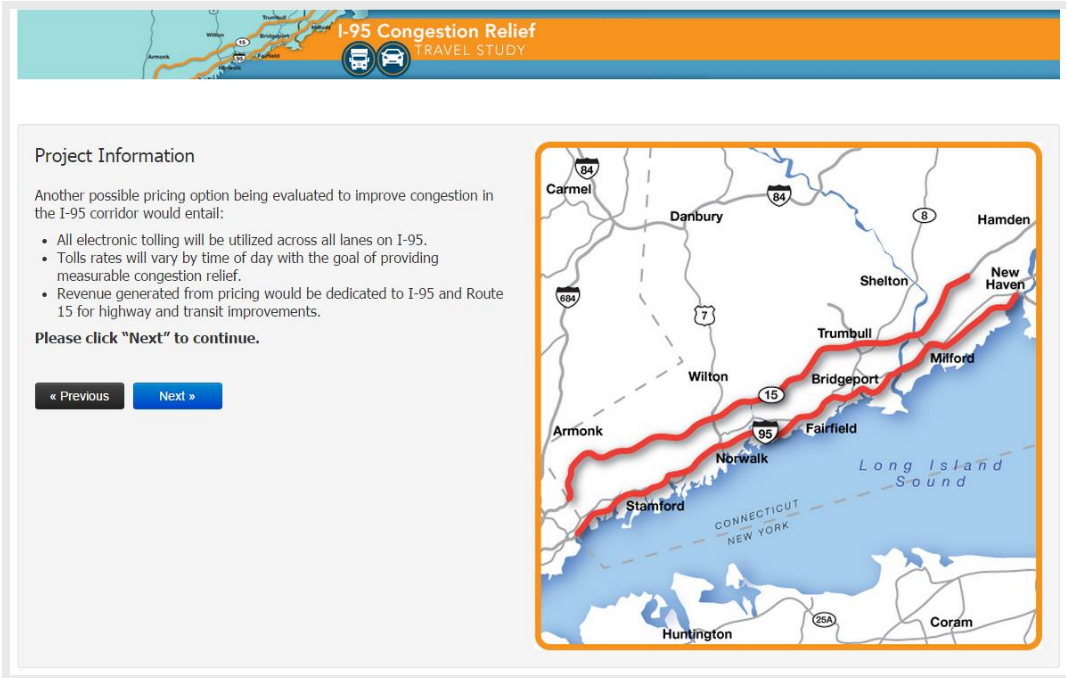


FIGURE 1-51: PRICING INFORMATION—CONGESTION PRICING ON ALL LANES

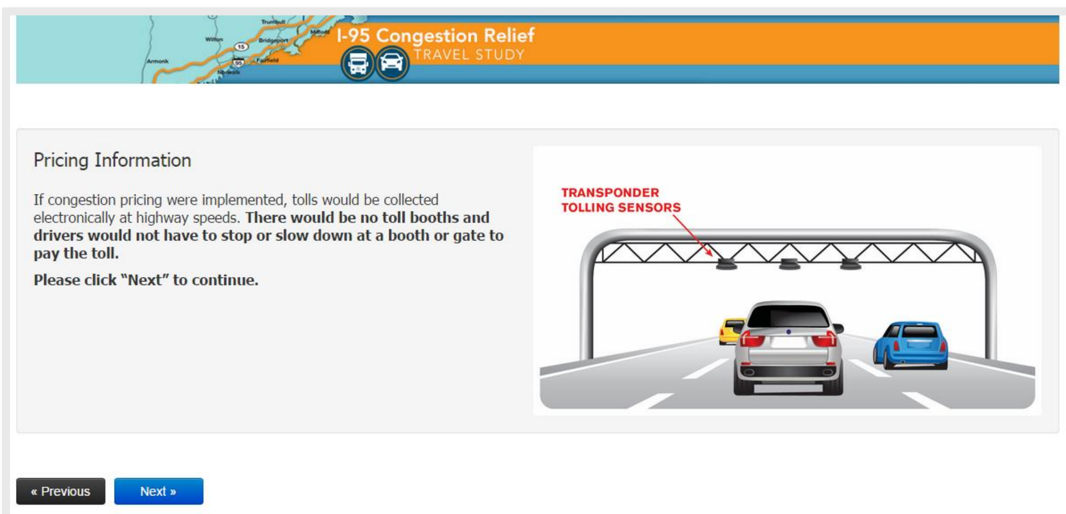


FIGURE 1-52: SP INSTRUCTIONS—CONGESTION PRICING ON ALL LANES

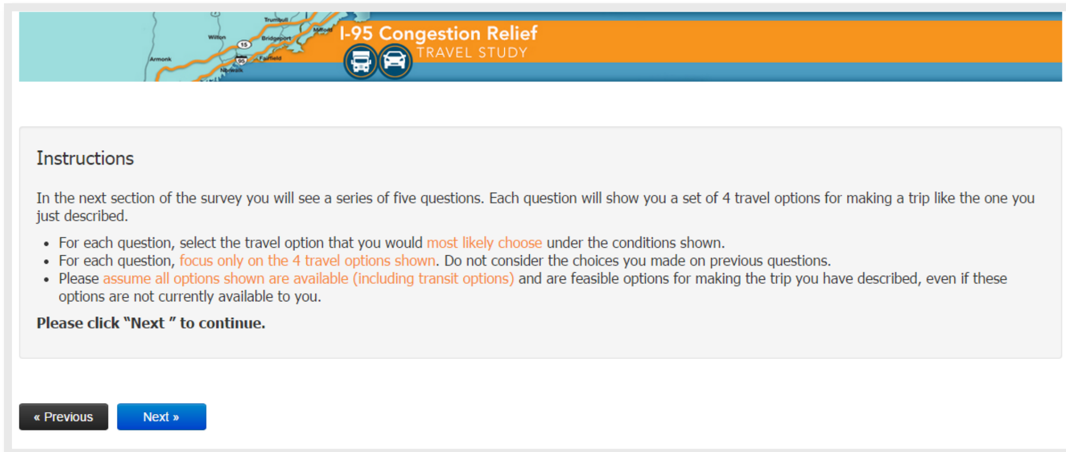
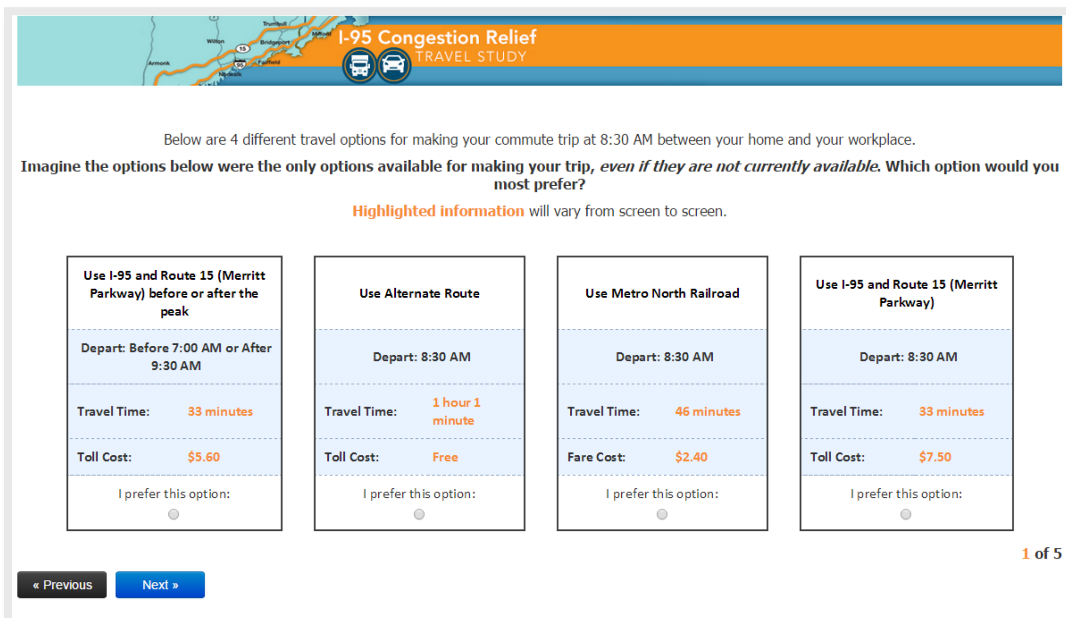


FIGURE 1-53: CONGESTION PRICING SP EXPERIMENT—EXAMPLE 1



Respondents shown three, four, or five options depending on roads used, time of trip, and length of trip.

FIGURE 1-54: CONGESTION PRICING SP EXPERIMENT—EXAMPLE 2

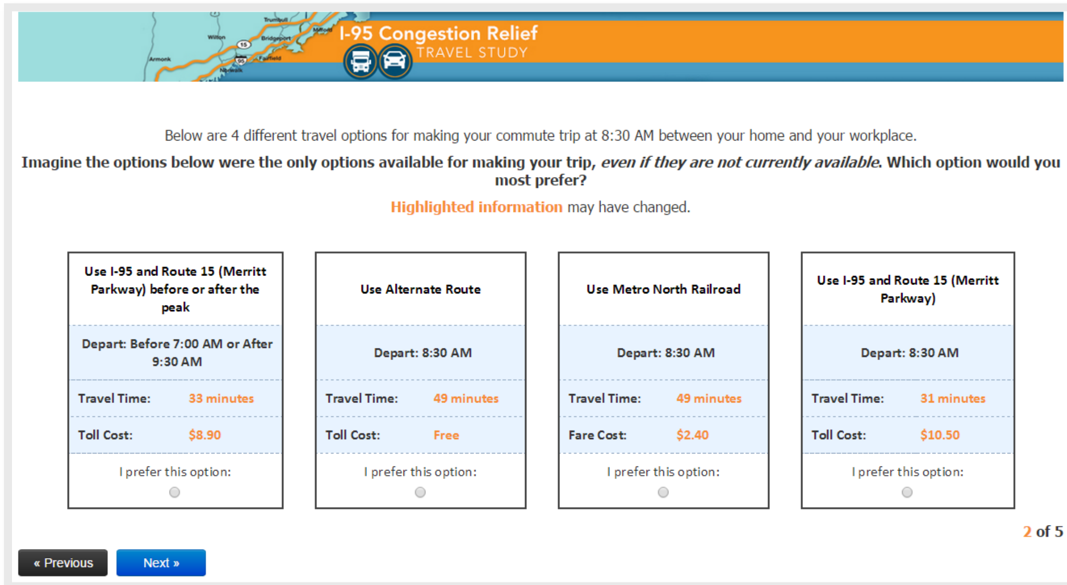


FIGURE 1-55: CONGESTION PRICING SP EXPERIMENT—EXAMPLE 3

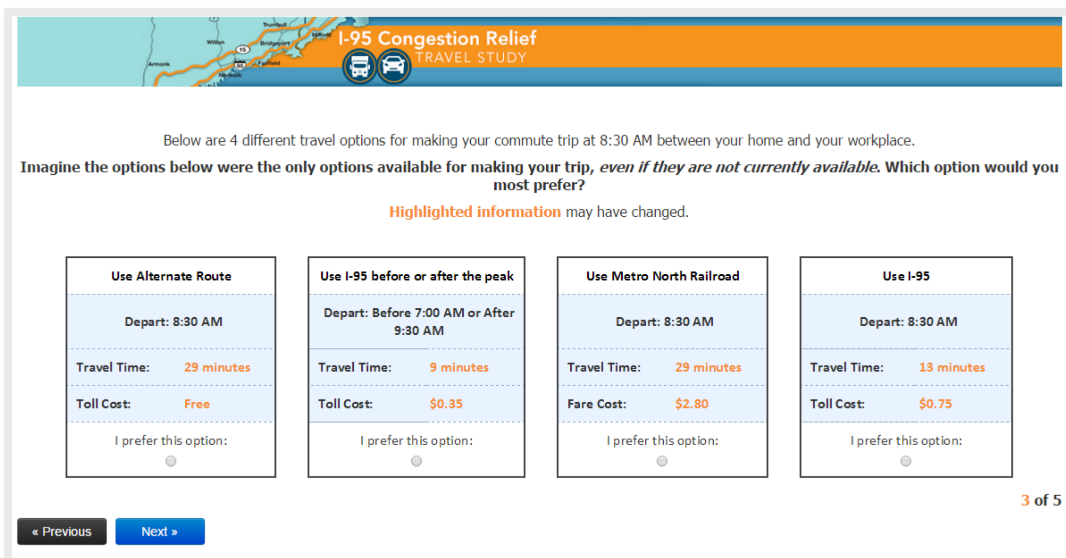


FIGURE 1-56: CONGESTION PRICING SP EXPERIMENT—EXAMPLE 4

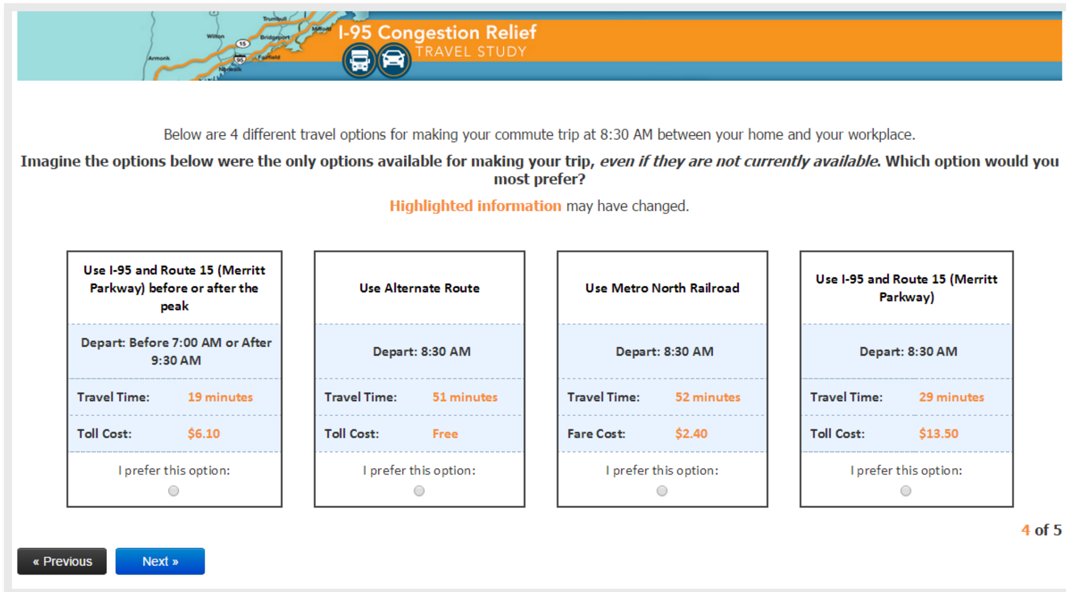
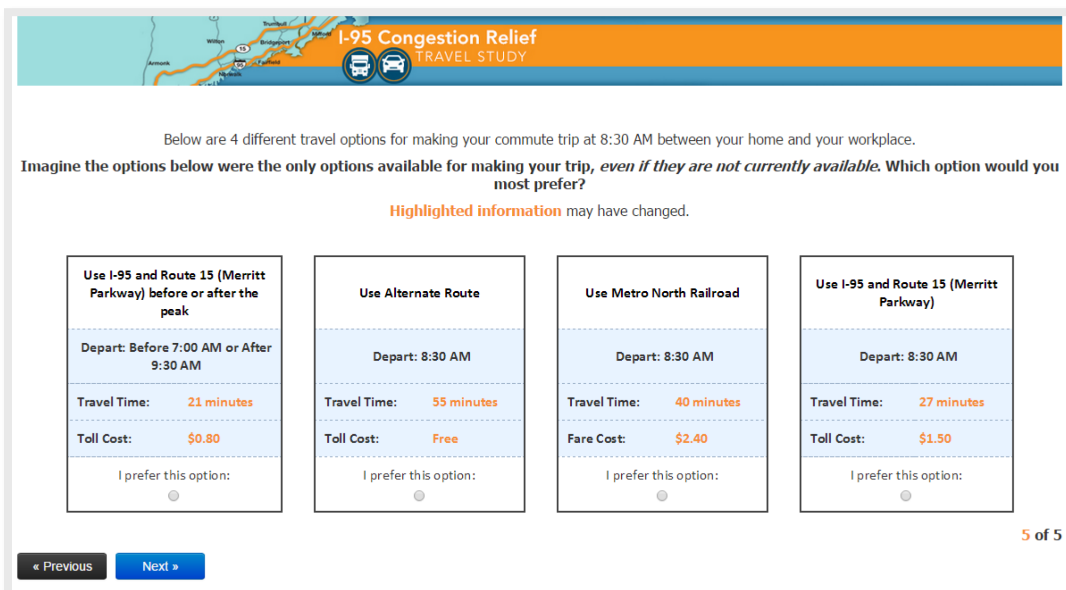
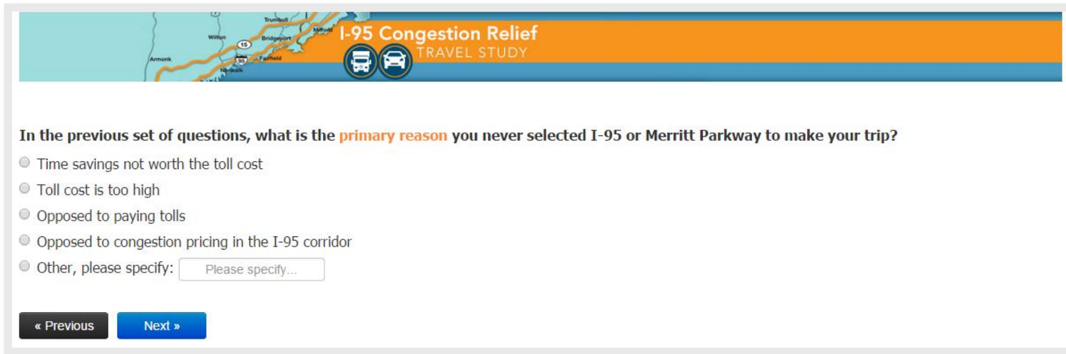


FIGURE 1-57: CONGESTION PRICING SP EXPERIMENT—EXAMPLE 5



1.6 | DEBRIEF AND OPINION QUESTIONS—CONGESTION PRICING ON ALL LANES

FIGURE 1-58: PRIMARY REASON FOR NOT SELECTING TOLLED ROUTE


I-95 Congestion Relief
TRAVEL STUDY

In the previous set of questions, what is the primary reason you never selected I-95 or Merritt Parkway to make your trip?

- Time savings not worth the toll cost
- Toll cost is too high
- Opposed to paying tolls
- Opposed to congestion pricing in the I-95 corridor
- Other, please specify: Please specify...

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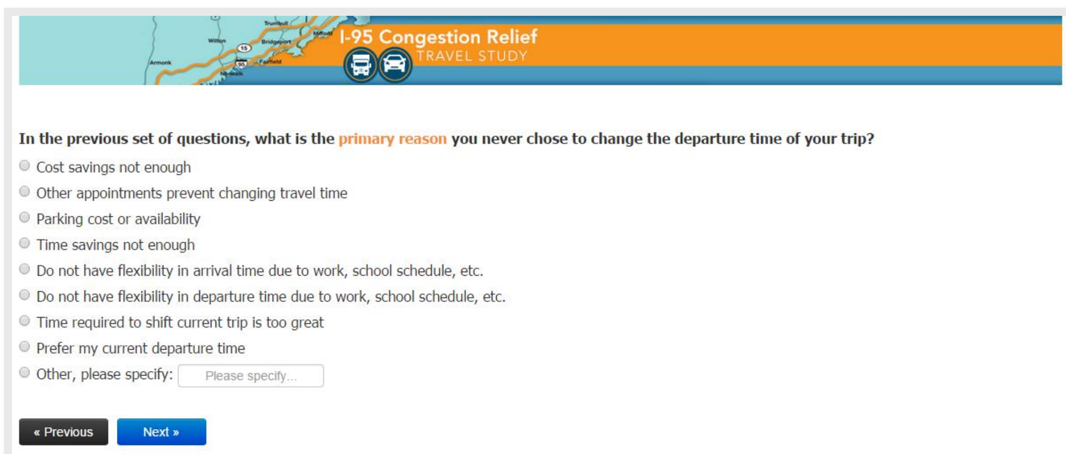
If never selected tolled I-95 or Merritt Parkway alternative.

FIGURE 1-59: PRIMARY REASON FOR NOT SELECTING ALTERNATE DEPARTURE TIME


I-95 Congestion Relief
TRAVEL STUDY

In the previous set of questions, what is the primary reason you never chose to change the departure time of your trip?

- Cost savings not enough
- Other appointments prevent changing travel time
- Parking cost or availability
- Time savings not enough
- Do not have flexibility in arrival time due to work, school schedule, etc.
- Do not have flexibility in departure time due to work, school schedule, etc.
- Time required to shift current trip is too great
- Prefer my current departure time
- Other, please specify: Please specify...

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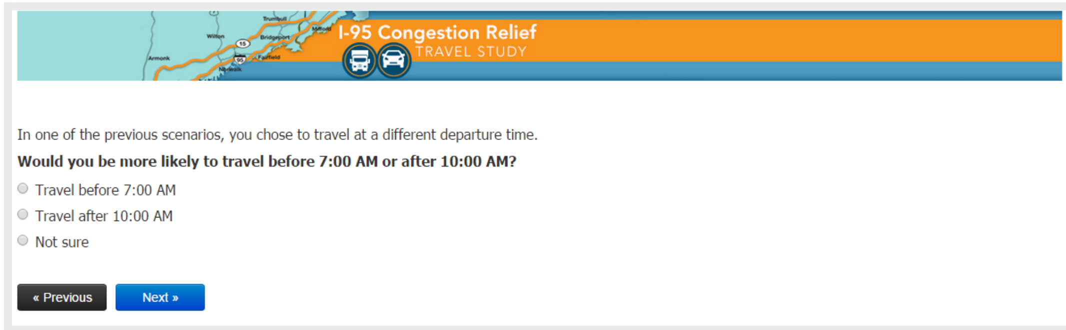
If never selected to shift departure time in stated preference section.

FIGURE 1-60: DIRECTION OF DEPARTURE TIME SHIFT



In one of the previous scenarios, you chose to travel at a different departure time.

Would you be more likely to travel before 7:00 AM or after 10:00 AM?

- Travel before 7:00 AM
- Travel after 10:00 AM
- Not sure

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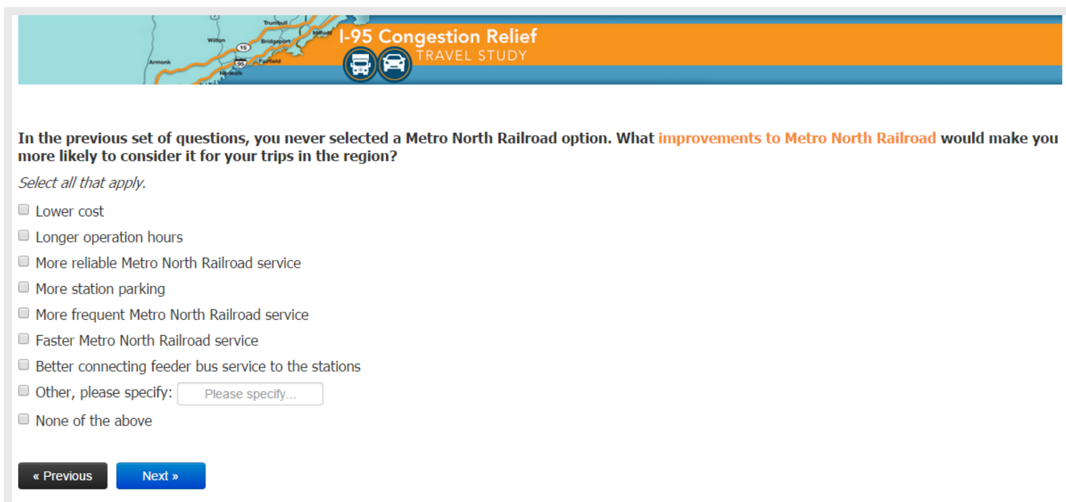
If selected to shift departure time in stated preference section.

FIGURE 1-61: FACTORS TO INCREASE USE OF METRO NORTH RAILROAD



In the previous set of questions, you never selected a Metro North Railroad option. What improvements to Metro North Railroad would make you more likely to consider it for your trips in the region?

Select all that apply.

- Lower cost
- Longer operation hours
- More reliable Metro North Railroad service
- More station parking
- More frequent Metro North Railroad service
- Faster Metro North Railroad service
- Better connecting feeder bus service to the stations
- Other, please specify: Please specify...
- None of the above

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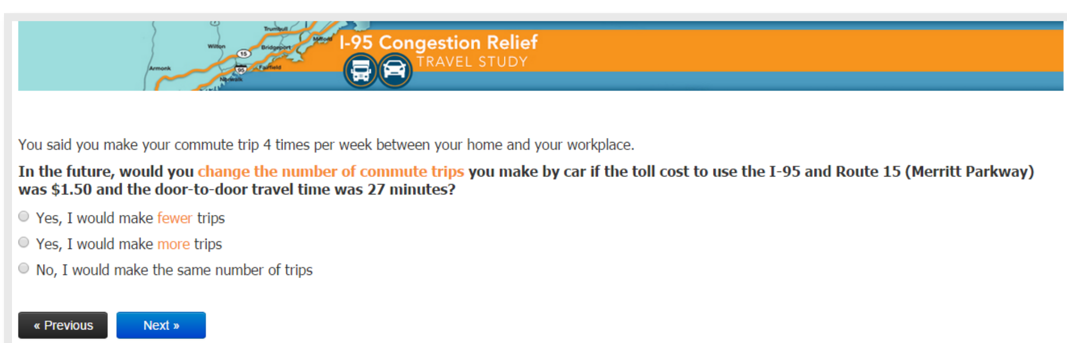
If respondent never selected to travel on the Metro North Railroad in stated preference section.

FIGURE 1-62: POTENTIAL CHANGE IN FUTURE TRIP RATES



You said you make your commute trip 4 times per week between your home and your workplace.

In the future, would you change the number of commute trips you make by car if the toll cost to use the I-95 and Route 15 (Merritt Parkway) was $1.50 and the door-to-door travel time was 27 minutes?

- Yes, I would make fewer trips
- Yes, I would make more trips
- No, I would make the same number of trips

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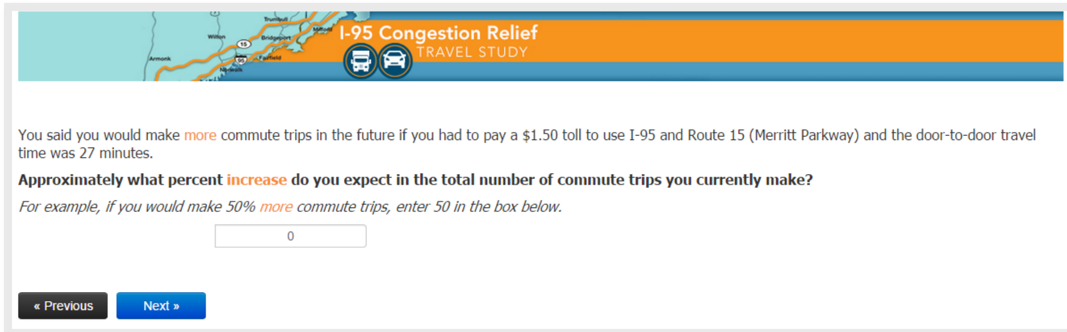
FIGURE 1-63: PERCENT INCREASE IN FUTURE TRIPS



You said you would make more commute trips in the future if you had to pay a $1.50 toll to use I-95 and Route 15 (Merritt Parkway) and the door-to-door travel time was 27 minutes.

Approximately what percent increase do you expect in the total number of commute trips you currently make?

For example, if you would make 50% more commute trips, enter 50 in the box below.

0

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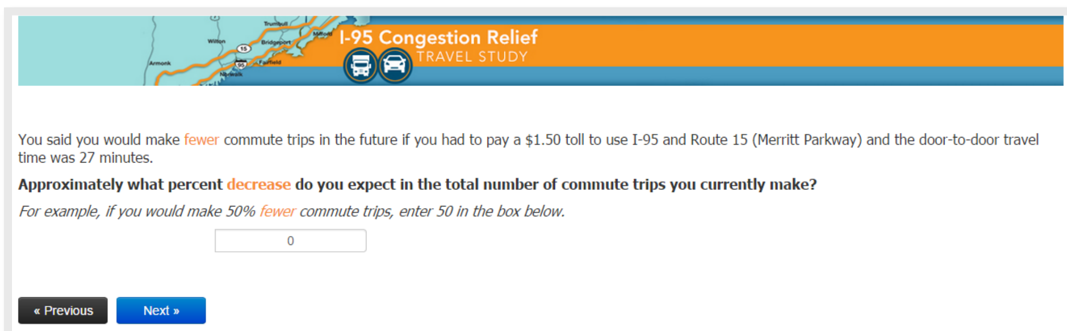
If respondent indicated they would make more commute trips in the future given a particular toll cost and travel time.

FIGURE 1-64: PERCENT DECREASE IN FUTURE TRIPS



You said you would make fewer commute trips in the future if you had to pay a $1.50 toll to use I-95 and Route 15 (Merritt Parkway) and the door-to-door travel time was 27 minutes.

Approximately what percent decrease do you expect in the total number of commute trips you currently make?

For example, if you would make 50% fewer commute trips, enter 50 in the box below.

0

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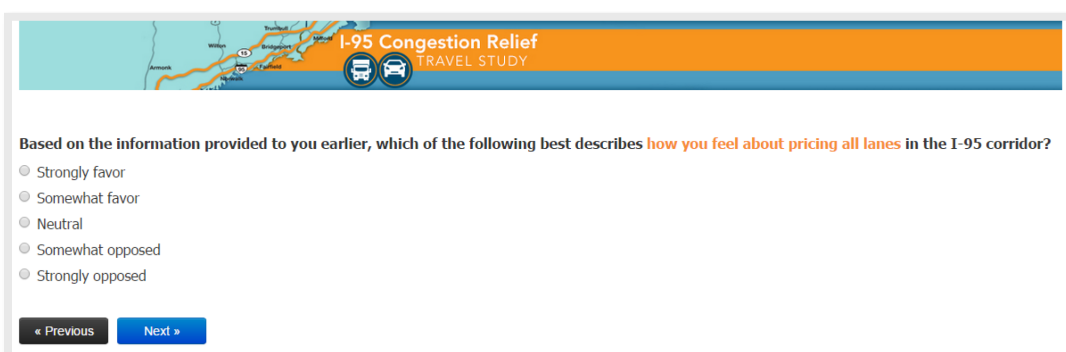
If respondent indicated they would make fewer commute trips in the future given a particular toll cost and travel time.

FIGURE 1-65: OPINION OF CONGESTION PRICING ON ALL LANES



Based on the information provided to you earlier, which of the following best describes how you feel about pricing all lanes in the I-95 corridor?

- Strongly favor
- Somewhat favor
- Neutral
- Somewhat opposed
- Strongly opposed

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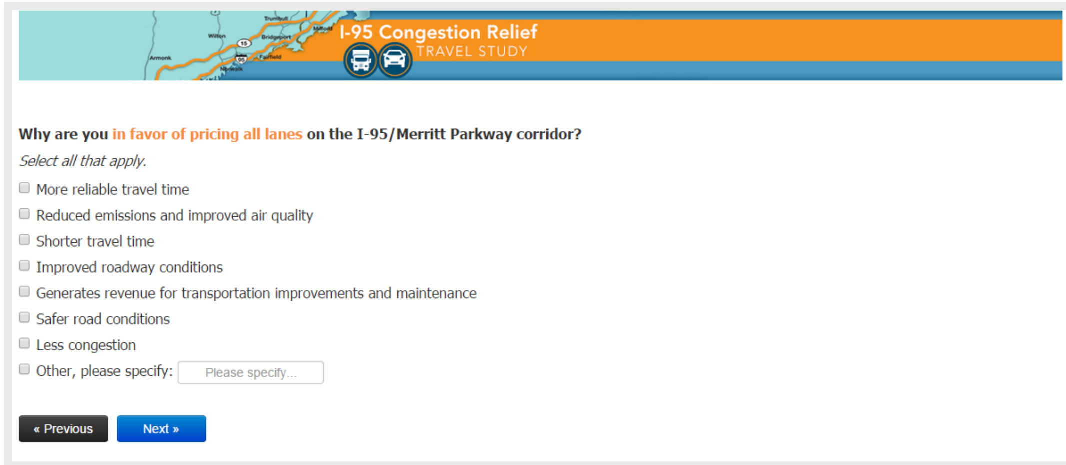
FIGURE 1-66: REASON(S) FOR FAVORING CONGESTION PRICING ON ALL LANES


I-95 Congestion Relief
TRAVEL STUDY

Why are you in favor of pricing all lanes on the I-95/Merritt Parkway corridor?

Select all that apply.

- More reliable travel time
- Reduced emissions and improved air quality
- Shorter travel time
- Improved roadway conditions
- Generates revenue for transportation improvements and maintenance
- Safer road conditions
- Less congestion
- Other, please specify: Please specify...

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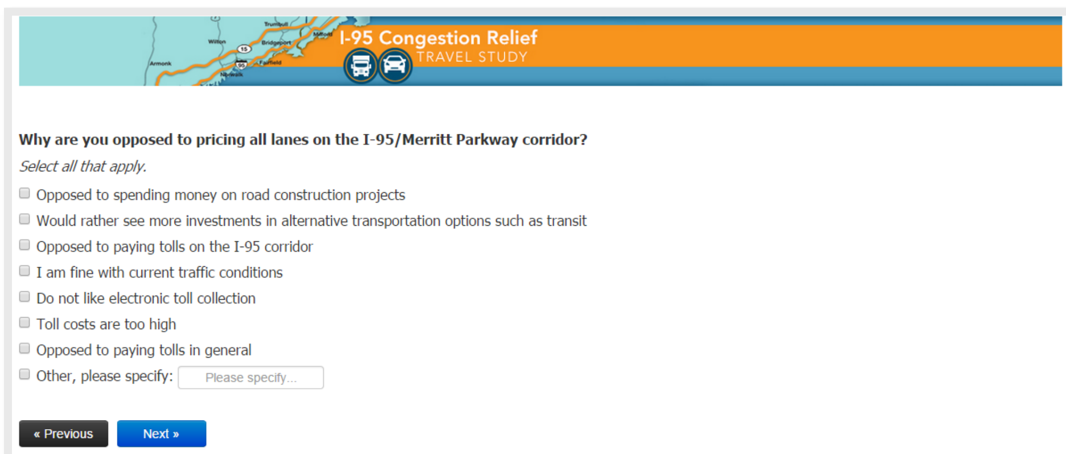
If somewhat or strongly favors the project.

FIGURE 1-67: REASON(S) FOR OPPOSING CONGESTION PRICING ON ALL LANES


I-95 Congestion Relief
TRAVEL STUDY

Why are you opposed to pricing all lanes on the I-95/Merritt Parkway corridor?

Select all that apply.

- Opposed to spending money on road construction projects
- Would rather see more investments in alternative transportation options such as transit
- Opposed to paying tolls on the I-95 corridor
- I am fine with current traffic conditions
- Do not like electronic toll collection
- Toll costs are too high
- Opposed to paying tolls in general
- Other, please specify: Please specify...

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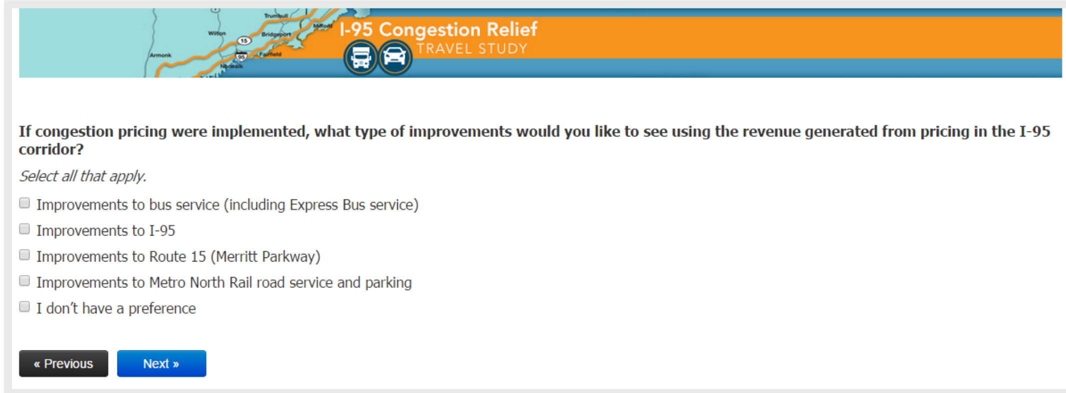
If somewhat or strongly opposes the project.

FIGURE 1-68: IMPROVEMENTS TO CORRIDOR FROM CONGESTION PRICING REVENUE


I-95 Congestion Relief
TRAVEL STUDY

If congestion pricing were implemented, what type of improvements would you like to see using the revenue generated from pricing in the I-95 corridor?

Select all that apply.

- Improvements to bus service (including Express Bus service)
- Improvements to I-95
- Improvements to Route 15 (Merritt Parkway)
- Improvements to Metro North Rail road service and parking
- I don't have a preference

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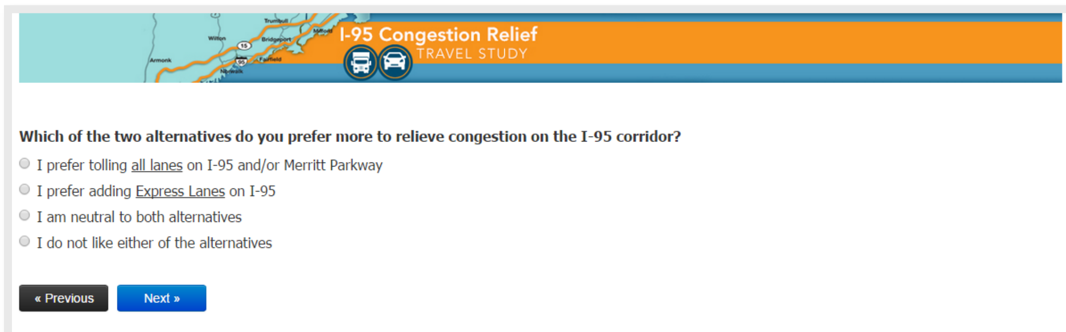
FIGURE 1-69: PREFERRED CONGESTION RELIEF ALTERNATIVE


I-95 Congestion Relief
TRAVEL STUDY

Which of the two alternatives do you prefer more to relieve congestion on the I-95 corridor?

- I prefer tolling all lanes on I-95 and/or Merritt Parkway
- I prefer adding Express Lanes on I-95
- I am neutral to both alternatives
- I do not like either of the alternatives

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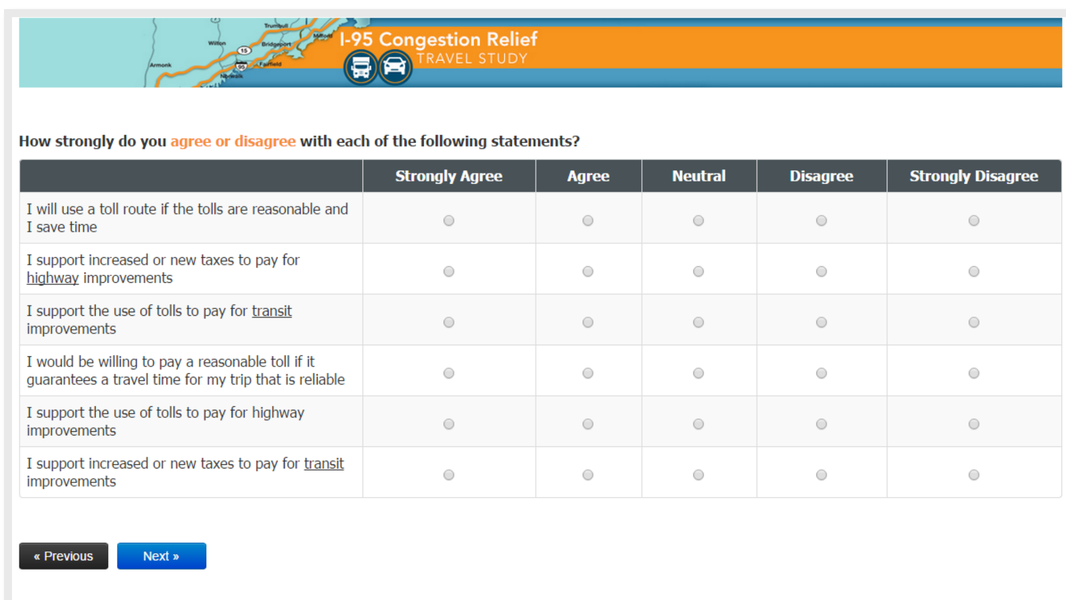
FIGURE 1-70: TOLL ATTITUDE STATEMENTS


I-95 Congestion Relief
TRAVEL STUDY

How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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 support the use of tolls to pay for transit improvements					
I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable					
I support the use of tolls to pay for highway improvements					
I support increased or new taxes to pay for transit improvements					

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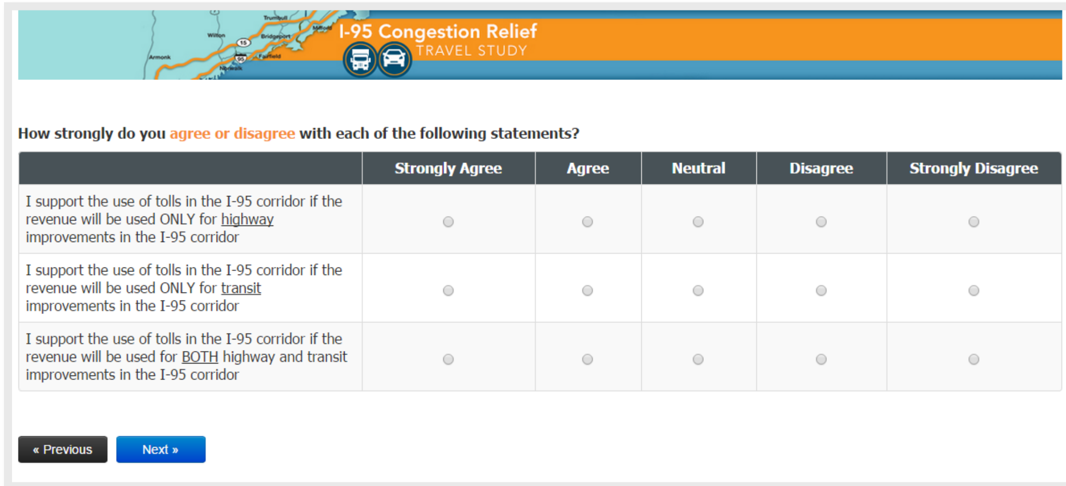
FIGURE 1-71: TOLL REVENUE ATTITUDE STATEMENTS



I-95 Congestion Relief
TRAVEL STUDY

How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for highway improvements in the I-95 corridor	○	○	○	○	○
I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for transit improvements in the I-95 corridor	○	○	○	○	○
I support the use of tolls in the I-95 corridor if the revenue will be used for BOTH highway and transit improvements in the I-95 corridor	○	○	○	○	○

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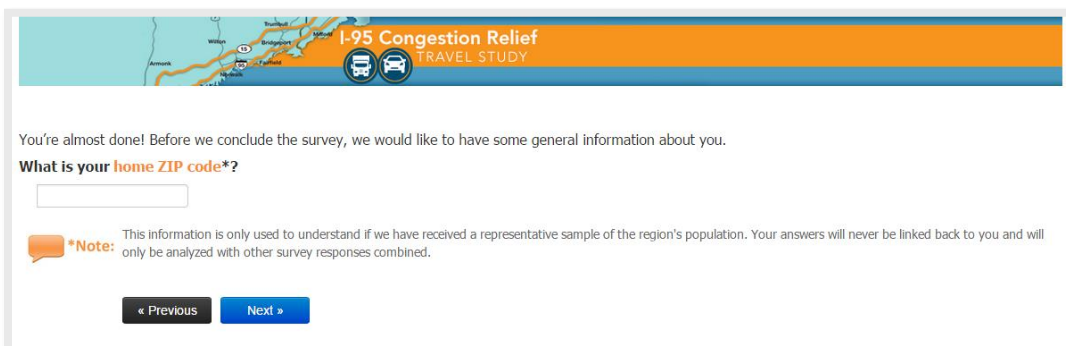
1.7 | DEMOGRAPHIC QUESTIONS

FIGURE 1-72: HOME ZIP CODE



I-95 Congestion Relief
TRAVEL STUDY

You're almost done! Before we conclude the survey, we would like to have some general information about you.

What is your home ZIP code*?

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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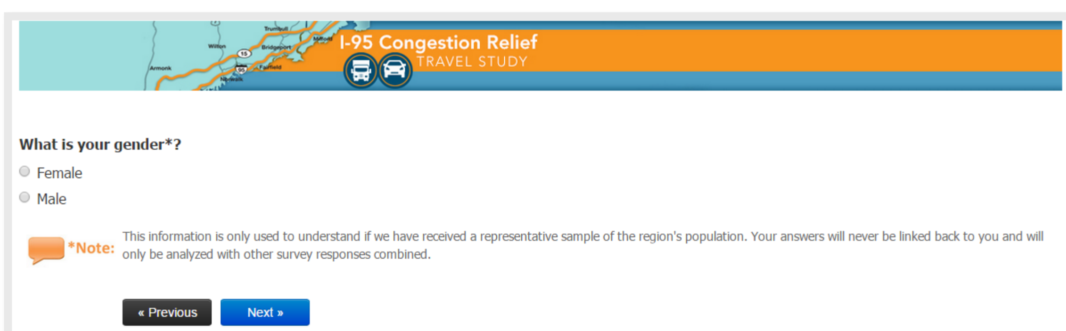
FIGURE 1-73: GENDER



I-95 Congestion Relief
TRAVEL STUDY

What is your gender*?

○ Female
○ Male

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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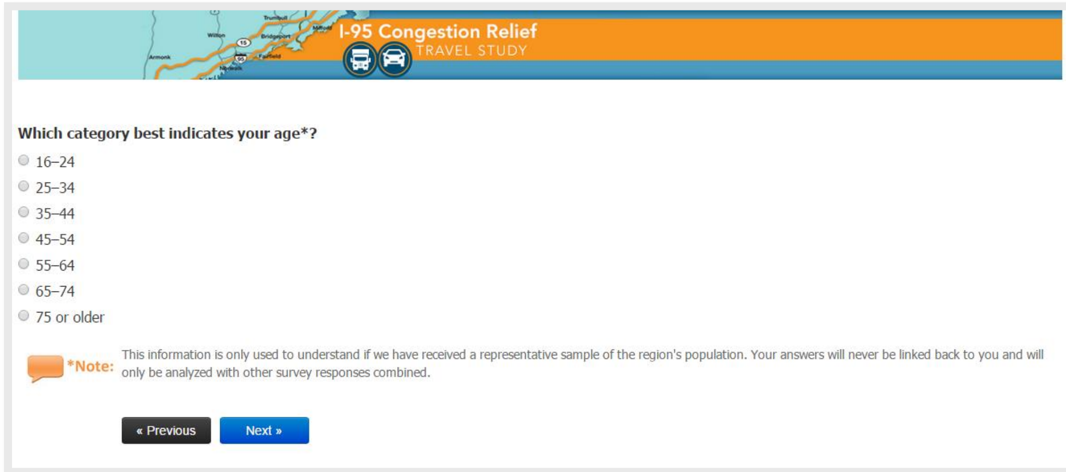
FIGURE 1-74: AGE


I-95 Congestion Relief
TRAVEL STUDY

Which category best indicates your age*?

- 16–24
- 25–34
- 35–44
- 45–54
- 55–64
- 65–74
- 75 or older

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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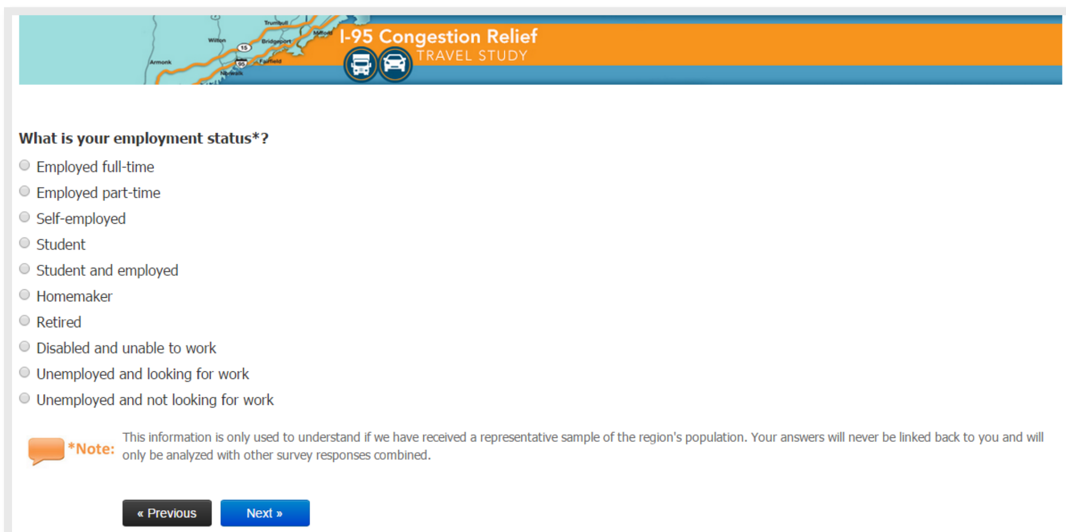
FIGURE 1-75: EMPLOYMENT STATUS


I-95 Congestion Relief
TRAVEL STUDY

What is your employment status*?

- Employed full-time
- Employed part-time
- Self-employed
- Student
- Student and employed
- Homemaker
- Retired
- Disabled and unable to work
- Unemployed and looking for work
- Unemployed and not looking for work

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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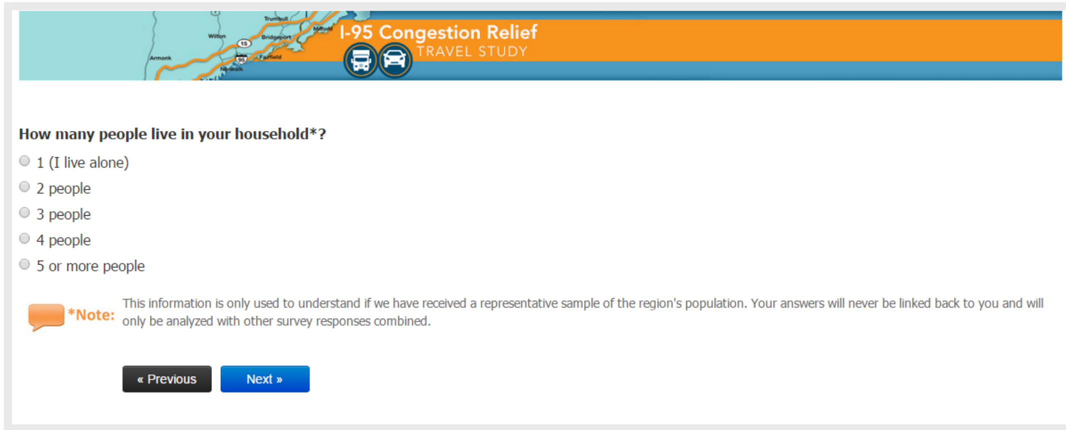
FIGURE 1-76: HOUSEHOLD SIZE


I-95 Congestion Relief
TRAVEL STUDY

How many people live in your household*?

- 1 (I live alone)
- 2 people
- 3 people
- 4 people
- 5 or more people

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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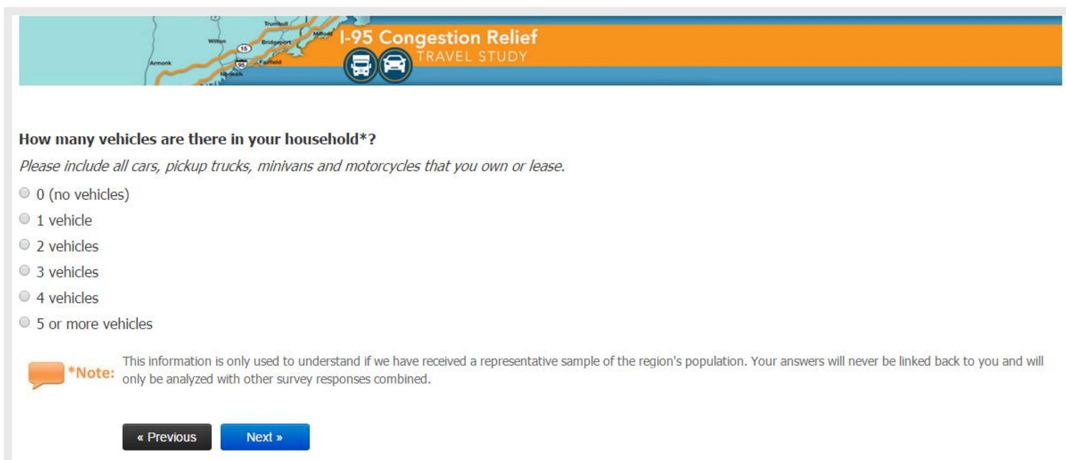
FIGURE 1-77: HOUSEHOLD VEHICLES


I-95 Congestion Relief
TRAVEL STUDY

How many vehicles are there in your household*?

Please include all cars, pickup trucks, minivans and motorcycles that you own or lease.

- 0 (no vehicles)
- 1 vehicle
- 2 vehicles
- 3 vehicles
- 4 vehicles
- 5 or more vehicles

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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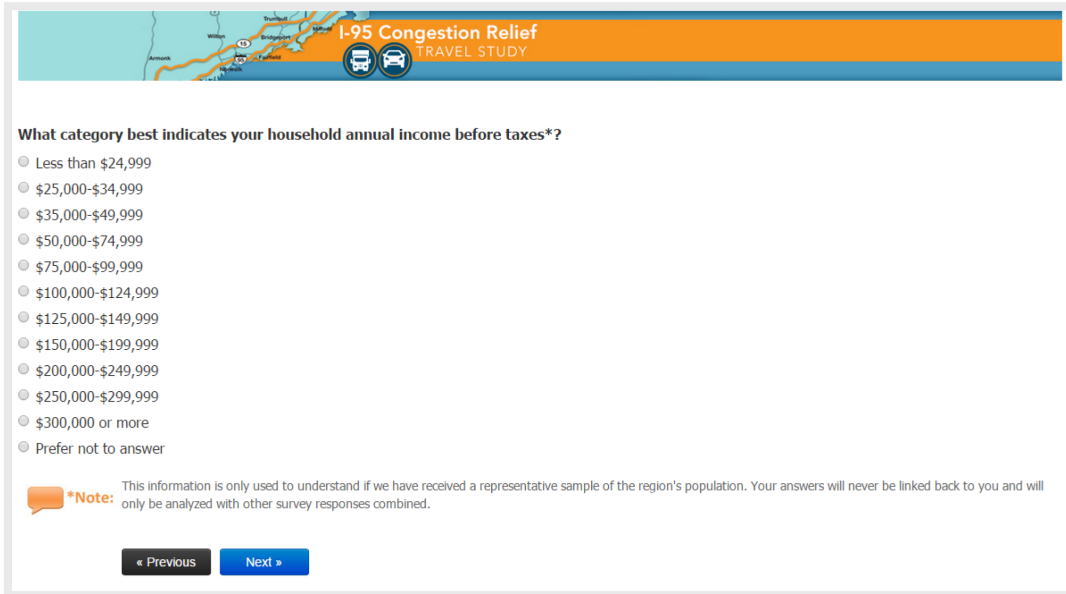
FIGURE 1-78: INCOME



I-95 Congestion Relief
TRAVEL STUDY

What category best indicates your household annual income before taxes*?

- Less than $24,999
- $25,000-$34,999
- $35,000-$49,999
- $50,000-$74,999
- $75,000-$99,999
- $100,000-$124,999
- $125,000-$149,999
- $150,000-$199,999
- $200,000-$249,999
- $250,000-$299,999
- $300,000 or more
- Prefer not to answer

*Note: This information is only used to understand if we have received a representative sample of the region's population. Your answers will never be linked back to you and will only be analyzed with other survey responses combined.

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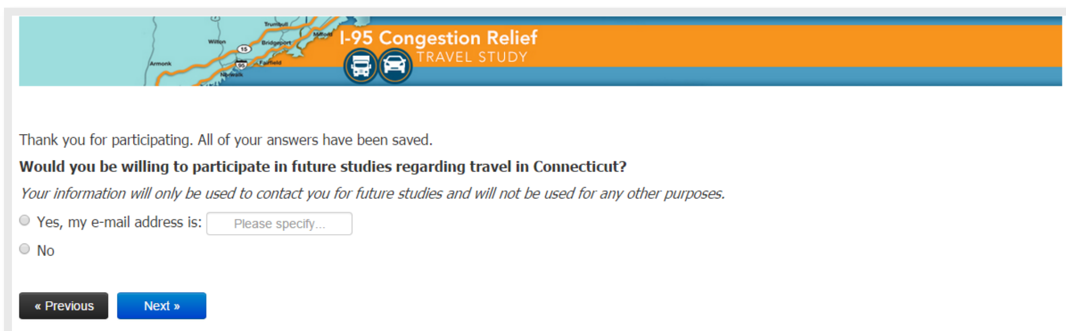
FIGURE 1-79: PARTICIPATION IN FUTURE STUDIES



I-95 Congestion Relief
TRAVEL STUDY

Thank you for participating. All of your answers have been saved.

Would you be willing to participate in future studies regarding travel in Connecticut?

Your information will only be used to contact you for future studies and will not be used for any other purposes.

- Yes, my e-mail address is: Please specify...
- No

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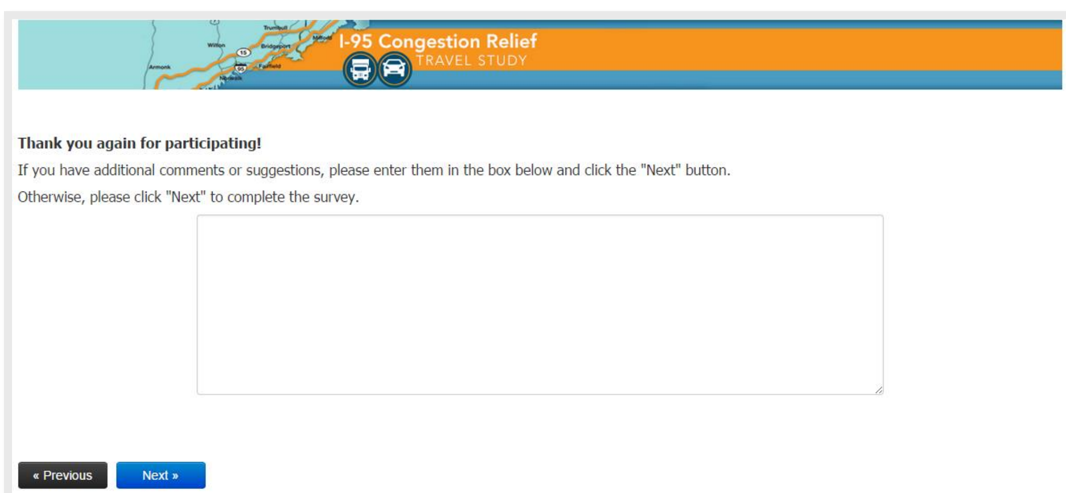
FIGURE 1-80: COMMENTS



I-95 Congestion Relief
TRAVEL STUDY

Thank you again for participating!

If you have additional comments or suggestions, please enter them in the box below and click the "Next" button.

Otherwise, please click "Next" to complete the survey.

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FIGURE 1-81: SURVEY END

Thank you for taking the time to complete this survey. All of your responses have been saved, so you may now exit your browser.

Please note: the information collected in this survey will be used to support planning efforts related to I-95 and Merritt Parkway corridors. The information presented about the proposed I-95/Merritt Parkway changes, including hypothetical travel times and toll costs, will be used for planning purposes only and does not reflect current or future tolling policies.

This survey is being conducted on behalf of the Connecticut Department of Transportation by RSG

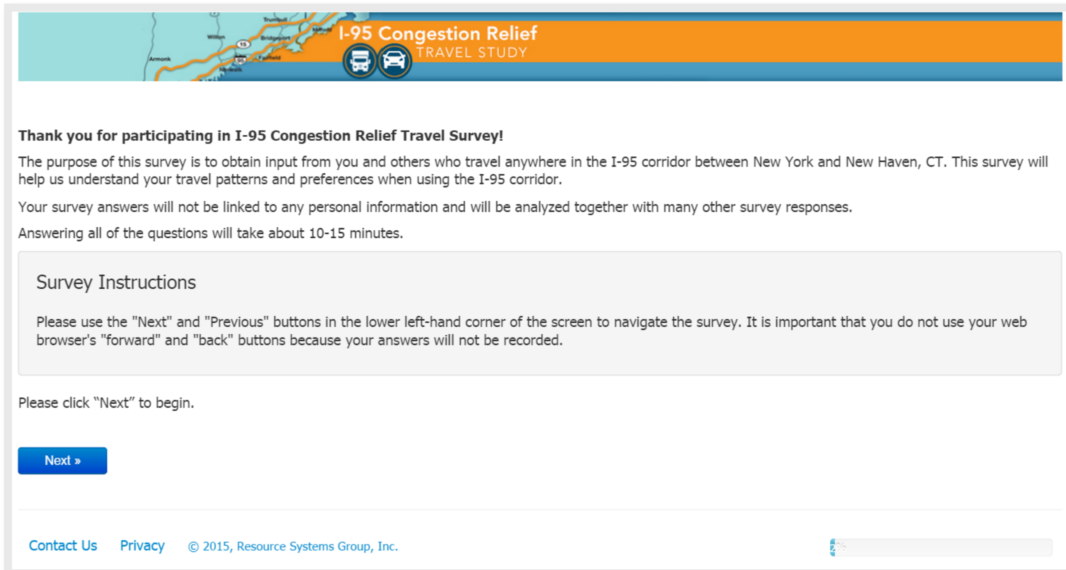
CONNECTICUT DEPARTMENT OF TRANSPORTATION

RSG the science of insight

2.0 COMMERCIAL VEHICLE SURVEY SCREEN CAPTURES

2.1 | INTRODUCTION AND QUALIFICATION QUESTIONS

FIGURE 2-1: INTRODUCTION AND INSTRUCTIONS


I-95 Congestion Relief
TRAVEL STUDY

Thank you for participating in I-95 Congestion Relief Travel Survey!

The purpose of this survey is to obtain input from you and others who travel anywhere in the I-95 corridor between New York and New Haven, CT. This survey will help us understand your travel patterns and preferences when using the I-95 corridor.

Your survey answers will not be linked to any personal information and will be analyzed together with many other survey responses.

Answering all of the questions will take about 10-15 minutes.

Survey Instructions

Please use the "Next" and "Previous" buttons in the lower left-hand corner of the screen to navigate the survey. It is important that you do not use your web browser's "forward" and "back" buttons because your answers will not be recorded.

Please click "Next" to begin.

Next »

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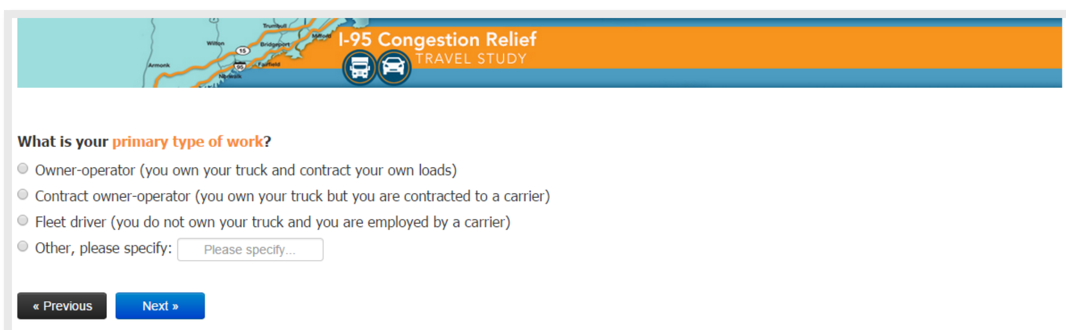
FIGURE 2-2: ROLE


I-95 Congestion Relief
TRAVEL STUDY

What is your primary type of work?

- Owner-operator (you own your truck and contract your own loads)
- Contract owner-operator (you own your truck but you are contracted to a carrier)
- Fleet driver (you do not own your truck and you are employed by a carrier)
- Other, please specify: Please specify...

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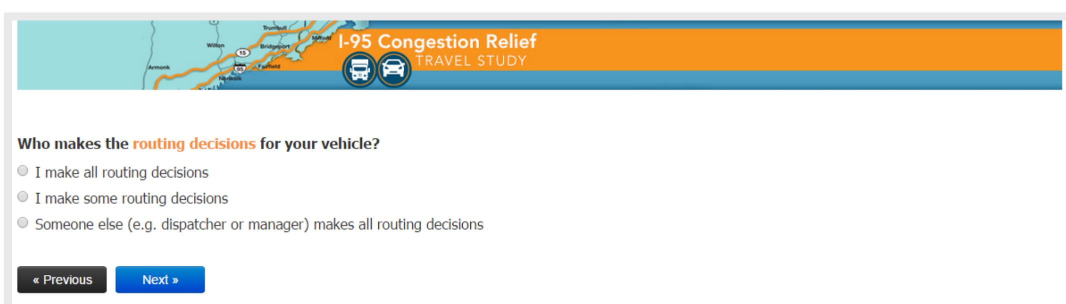
FIGURE 2-3: ROUTING DECISIONS


I-95 Congestion Relief
TRAVEL STUDY

Who makes the routing decisions for your vehicle?

- I make all routing decisions
- I make some routing decisions
- Someone else (e.g. dispatcher or manager) makes all routing decisions

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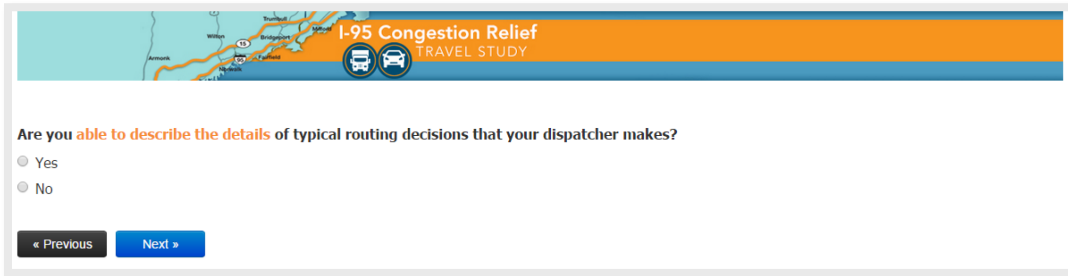
FIGURE 2-4: ROUTING DESCRIPTION


I-95 Congestion Relief
TRAVEL STUDY

Are you able to describe the details of typical routing decisions that your dispatcher makes?

- Yes
- No

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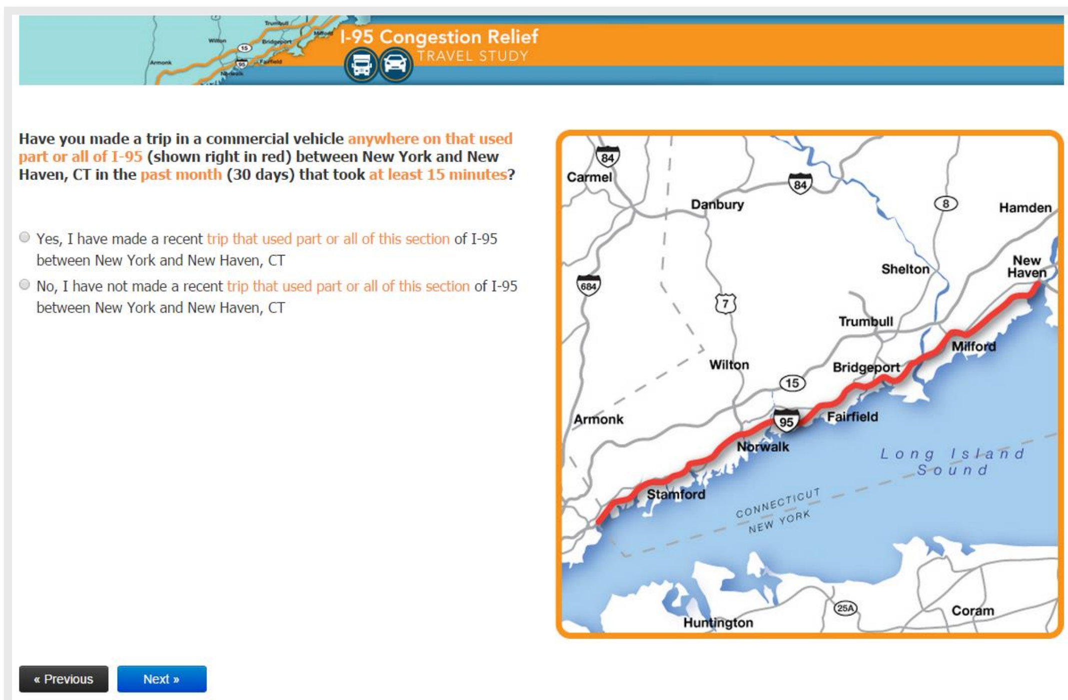
FIGURE 2-5: TRIP QUALIFICATION


I-95 Congestion Relief
TRAVEL STUDY

Have you made a trip in a commercial vehicle anywhere on that used part or all of I-95 (shown right in red) between New York and New Haven, CT in the past month (30 days) that took at least 15 minutes?

- Yes, I have made a recent trip that used part or all of this section of I-95 between New York and New Haven, CT
- No, I have not made a recent trip that used part or all of this section of I-95 between New York and New Haven, CT

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FIGURE 2-6: TERMINATION

If respondent does not make any routing decisions and cannot describe routing decisions, or did not make a qualifying trip.

2.2 | TRIP DETAIL QUESTIONS

FIGURE 2-7: DEFINITION OF QUALIFYING ONE-WAY TRIP

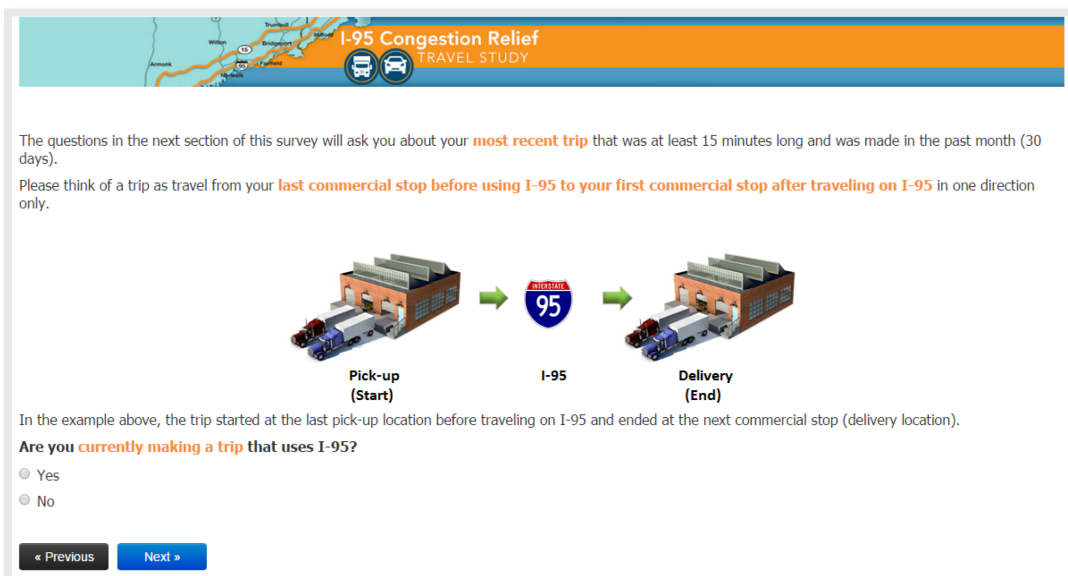


FIGURE 2-8: SINGLE OR MULTI-DAY TRIP

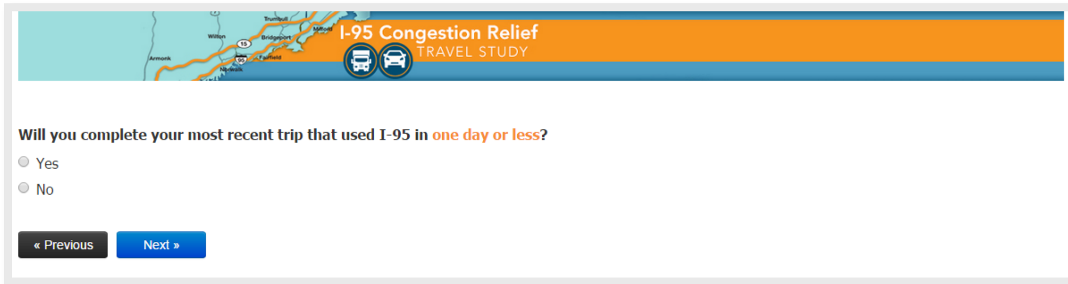
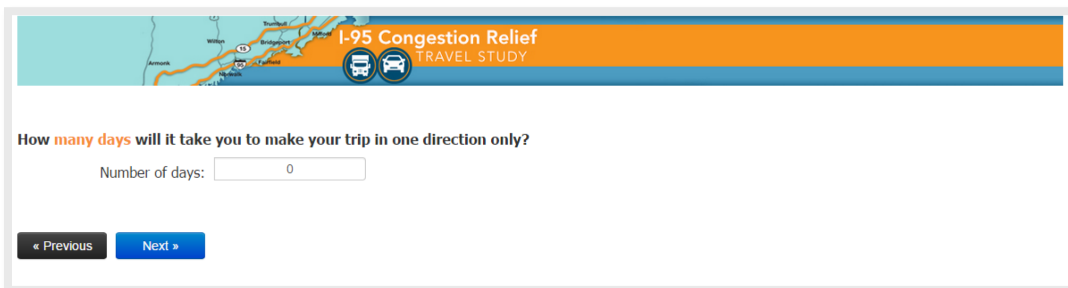
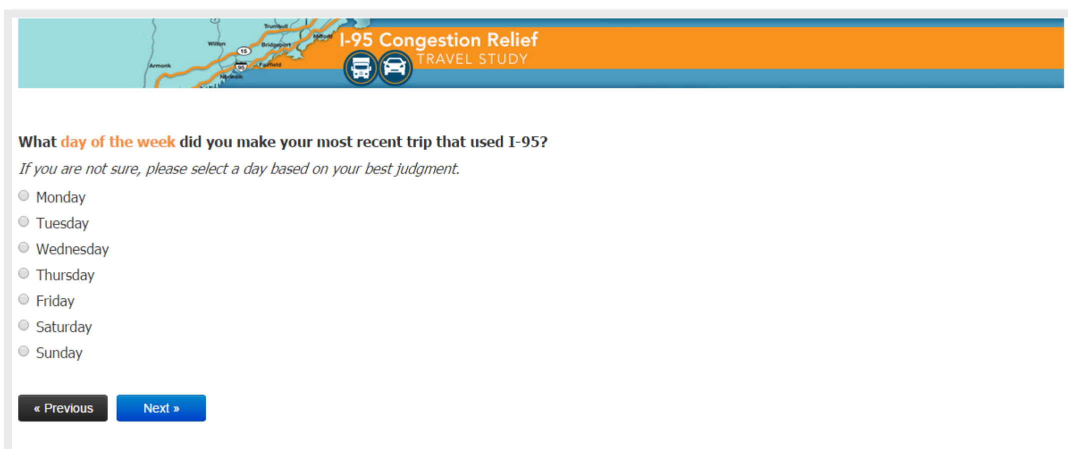


FIGURE 2-9: TRIP DURATION IN DAYS



If trip was not completed in one day or less.

FIGURE 2-10: DAY OF WEEK



If not currently on qualifying trip.

FIGURE 2-11: ORIGIN

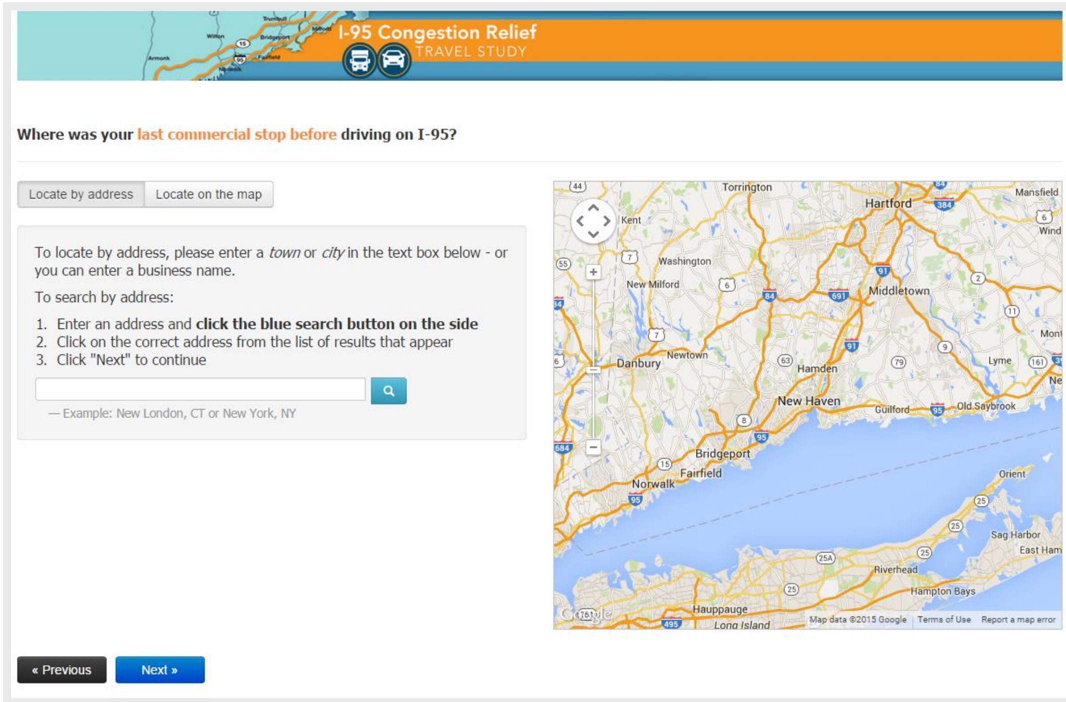


FIGURE 2-12: DESTINATION

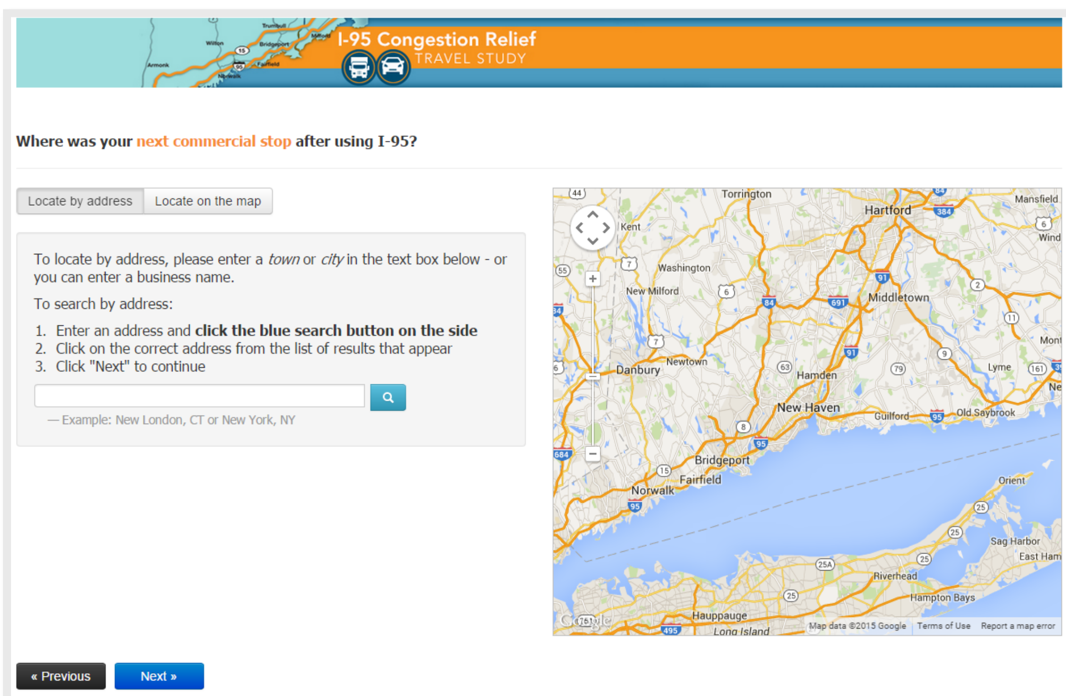


FIGURE 2-13: ORIGIN AND DESTINATION CONFIRMATION

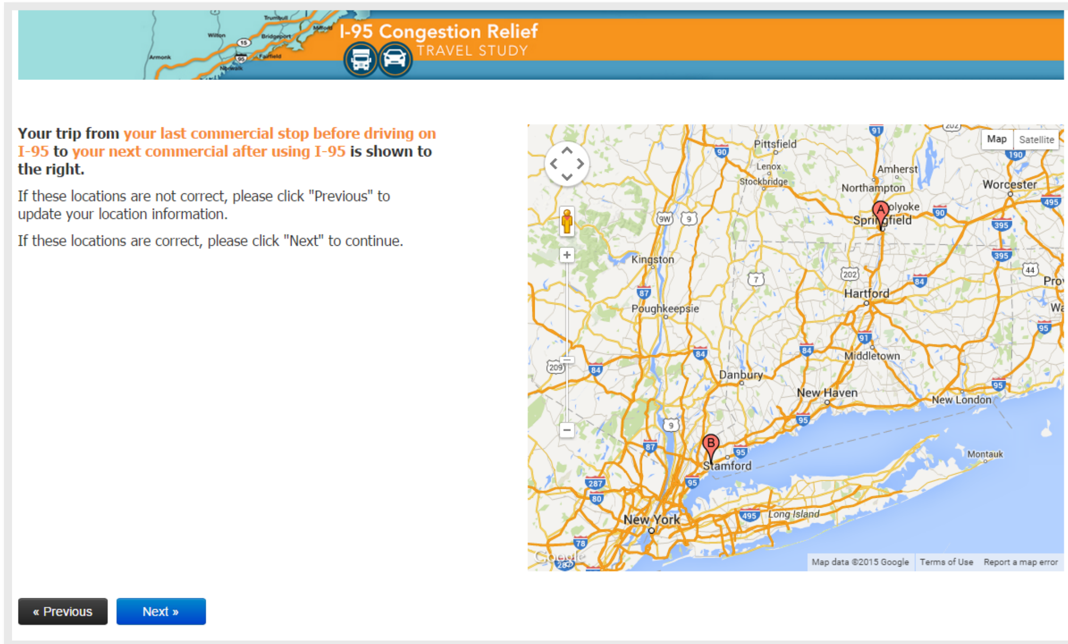


FIGURE 2-14: DISTANCE

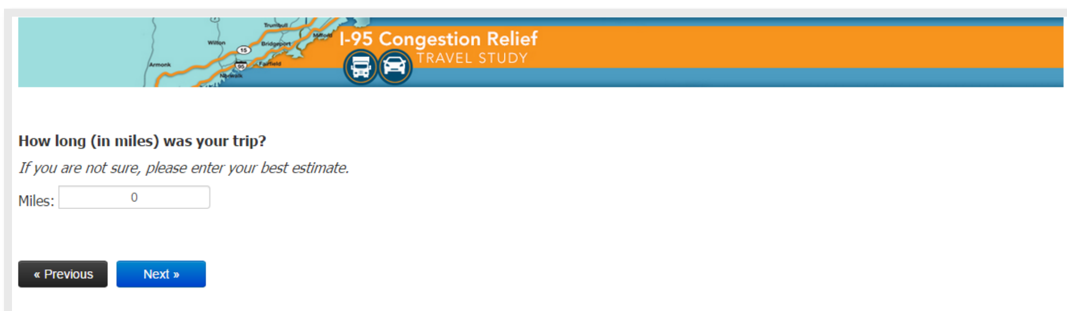


FIGURE 2-15: DEPARTURE TIME

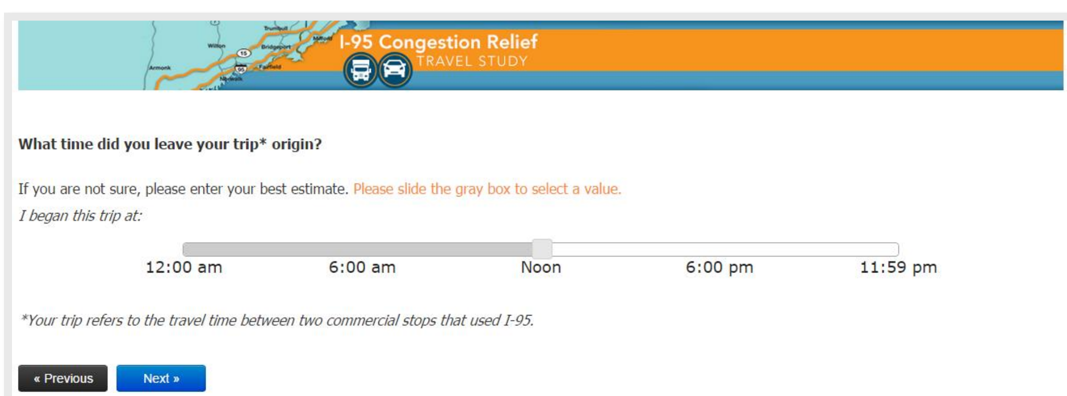


FIGURE 2-16: TRAVEL TIME

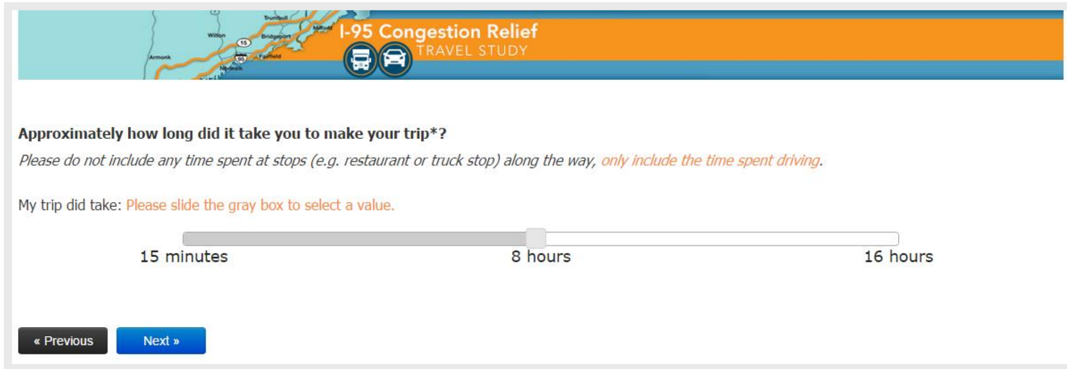


FIGURE 2-17: DELAY DUE TO TRAFFIC CONGESTION

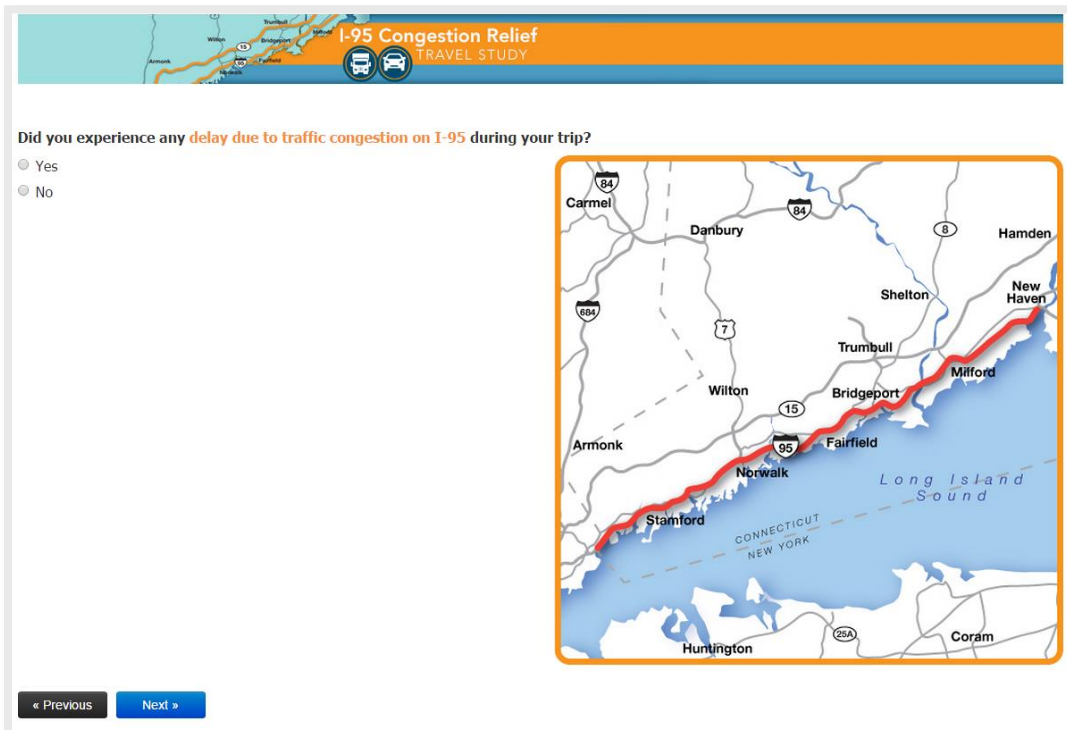
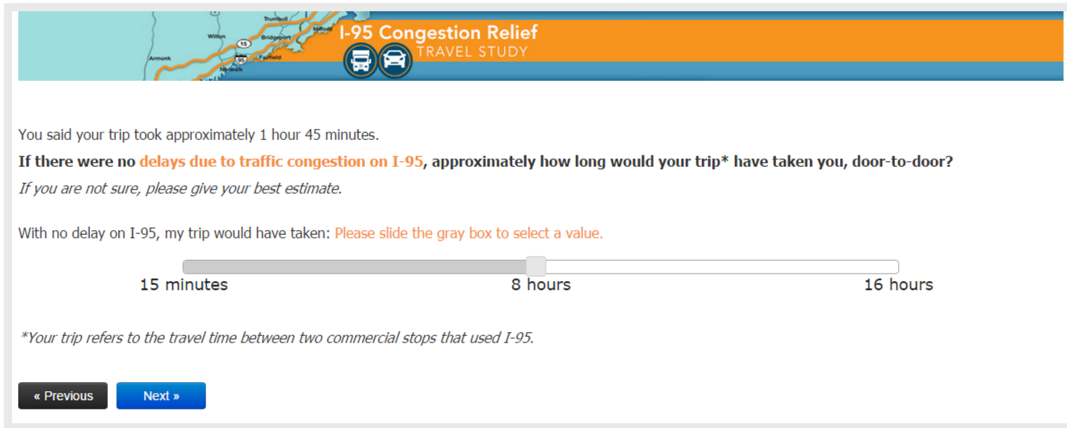


FIGURE 2-18: TRAVEL TIME WITHOUT DELAY



If reported delay due to traffic congestion.

FIGURE 2-19: TOLLS PAID

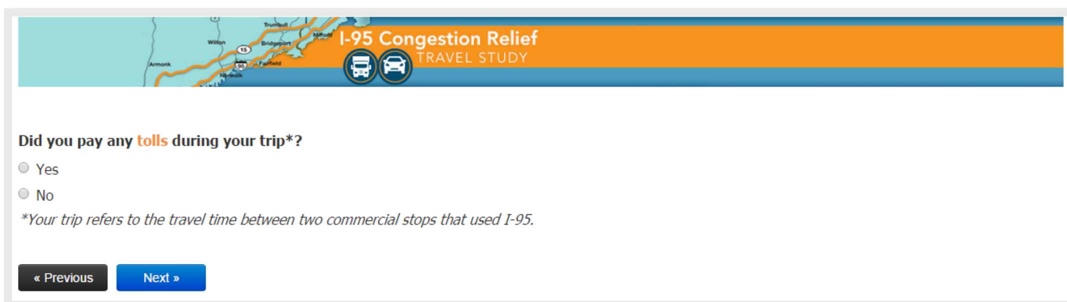
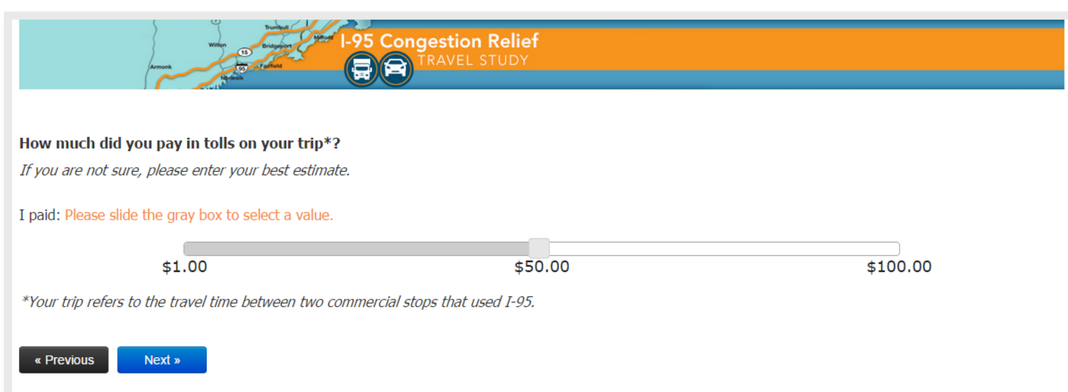
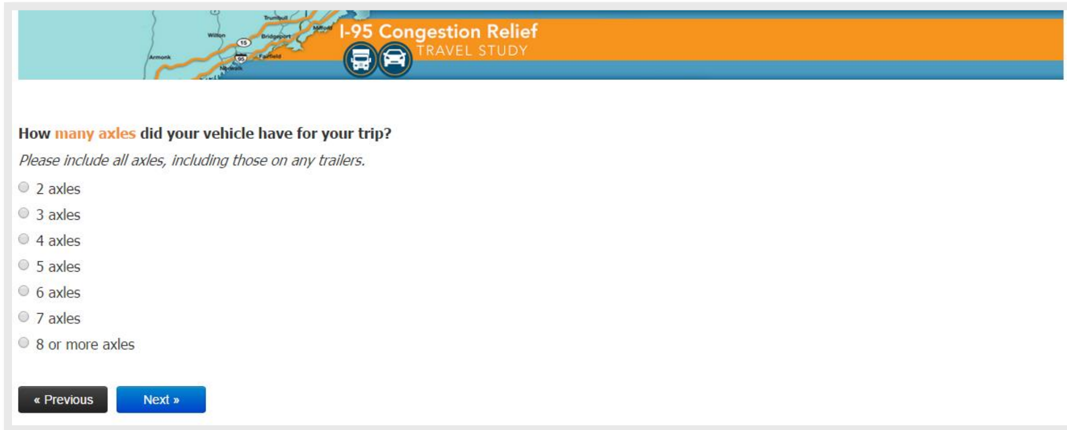


FIGURE 2-20: TOLL AMOUNT



If respondent paid tolls on trip.

FIGURE 2-21: AXLES


I-95 Congestion Relief
TRAVEL STUDY

How many axles did your vehicle have for your trip?

Please include all axles, including those on any trailers.

- 2 axles
- 3 axles
- 4 axles
- 5 axles
- 6 axles
- 7 axles
- 8 or more axles

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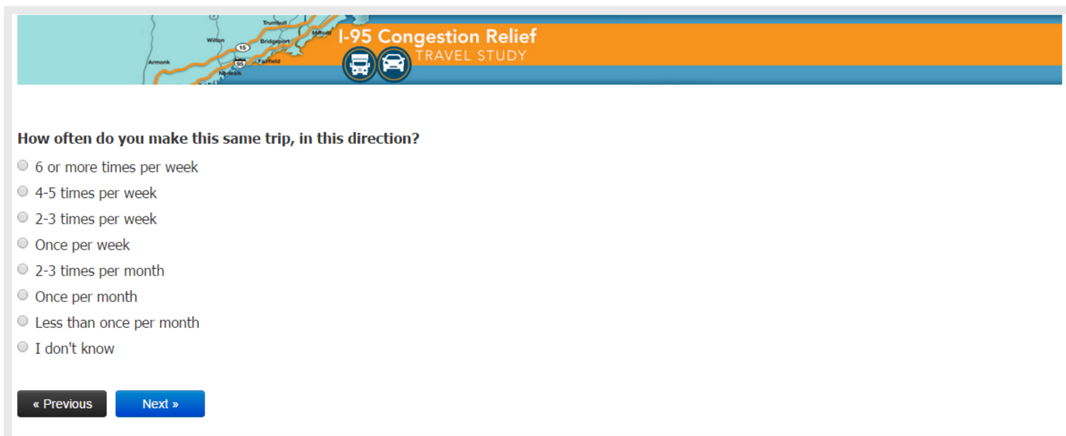
FIGURE 2-22: TRIP FREQUENCY


I-95 Congestion Relief
TRAVEL STUDY

How often do you make this same trip, in this direction?

- 6 or more times per week
- 4-5 times per week
- 2-3 times per week
- Once per week
- 2-3 times per month
- Once per month
- Less than once per month
- I don't know

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FIGURE 2-23: USE OF ALTERNATE ROUTES

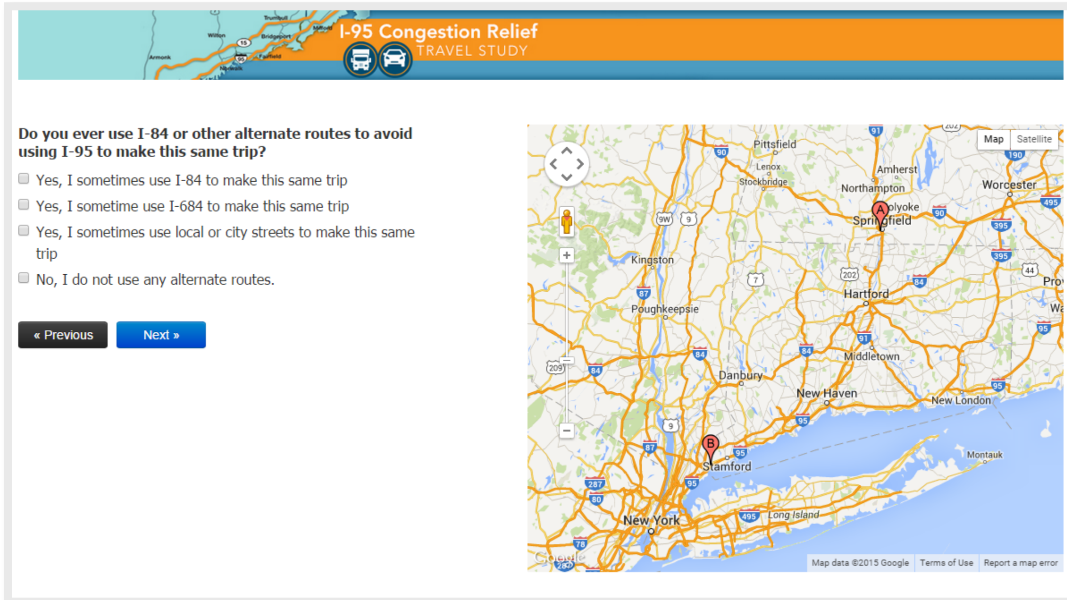
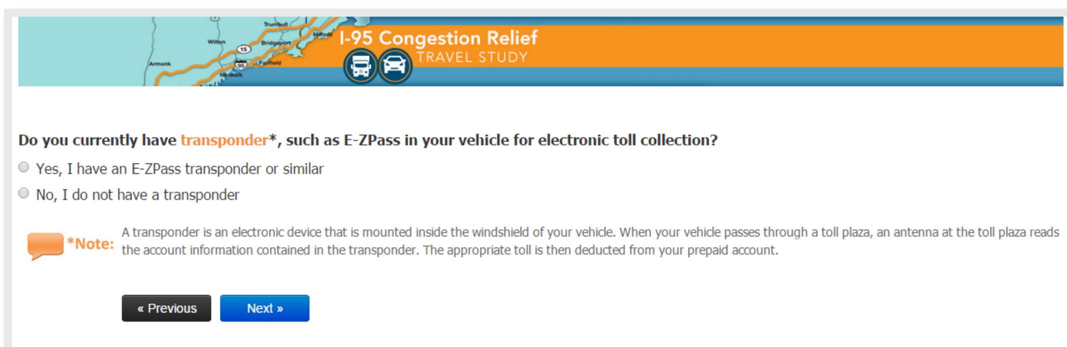


FIGURE 2-24: ETC OWNERSHIP



2.3 | STATED PREFERENCE QUESTIONS

FIGURE 2-25: PROJECT INFORMATION—CONGESTION PRICING ON ALL LANES

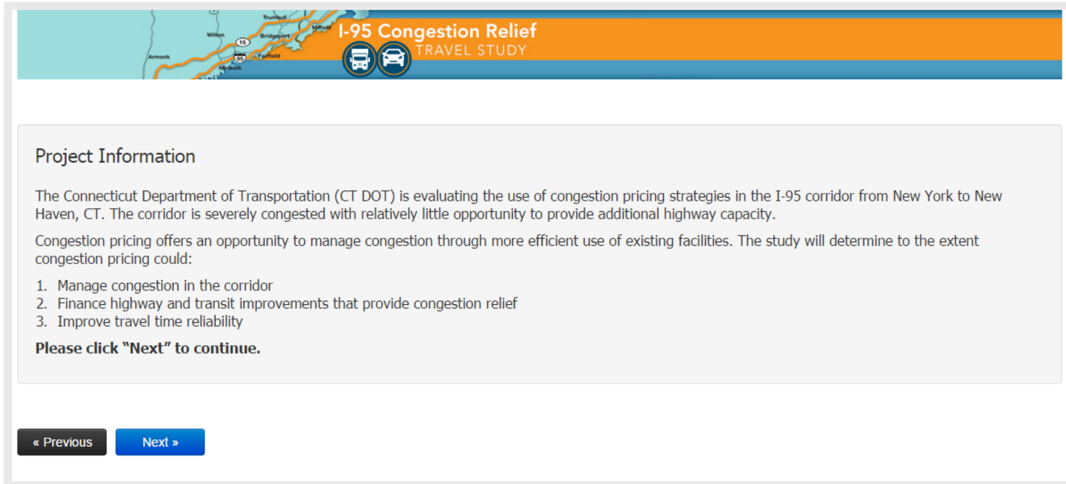


FIGURE 2-26: PRICING INFORMATION—CONGESTION PRICING ON ALL LANES

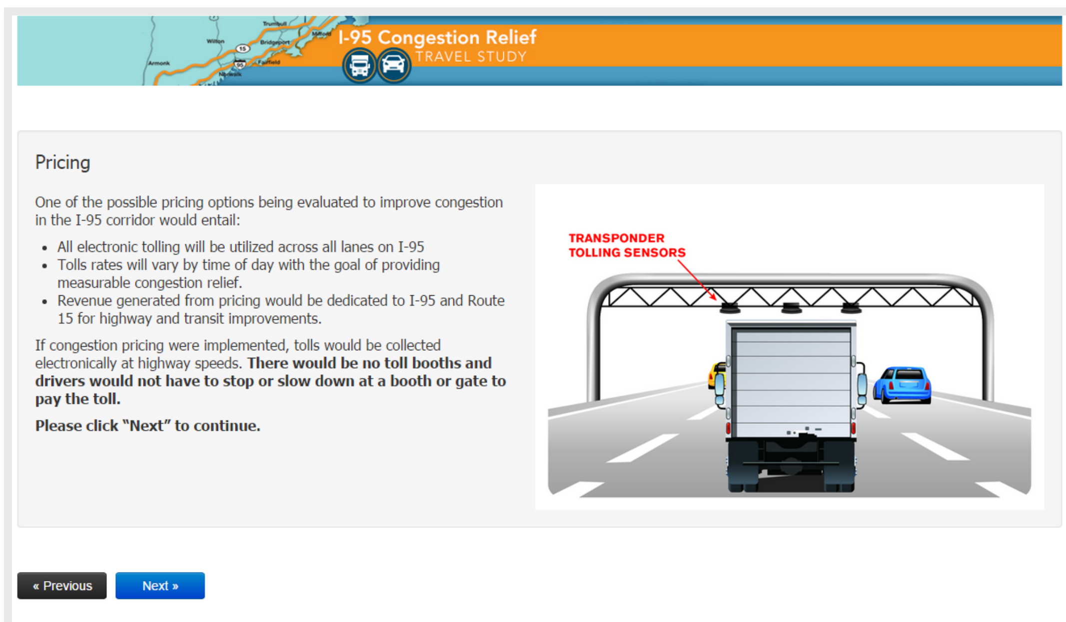


FIGURE 2-27: SP INSTRUCTIONS—CONGESTION PRICING ON ALL LANES

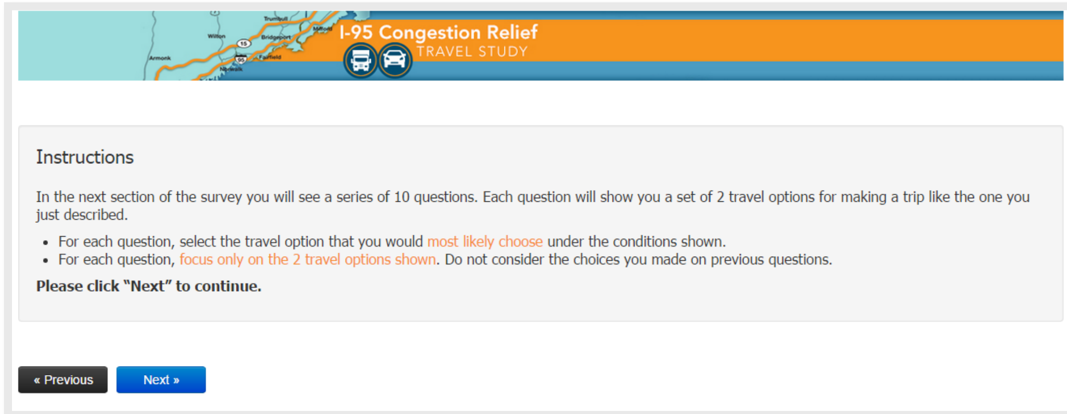


FIGURE 2-28: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 1

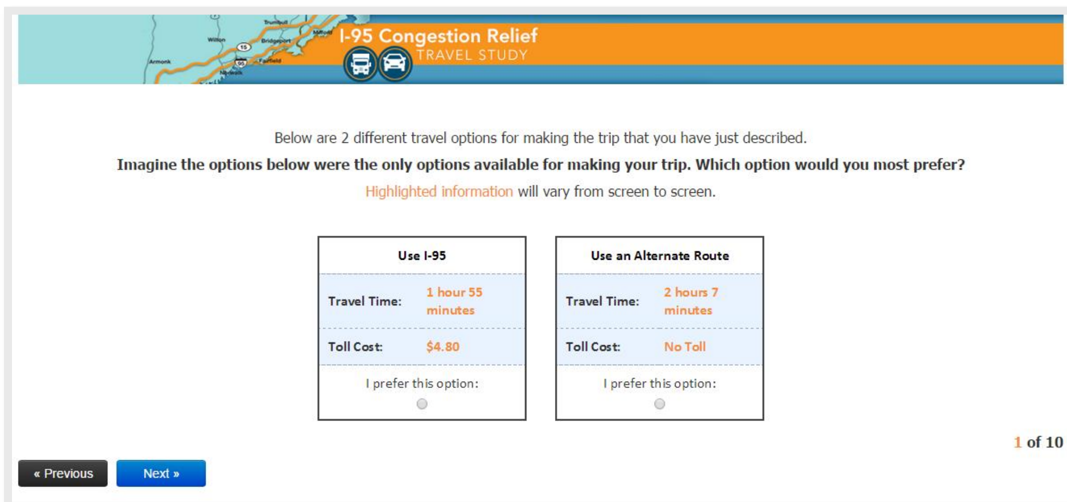


FIGURE 2-29: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 2

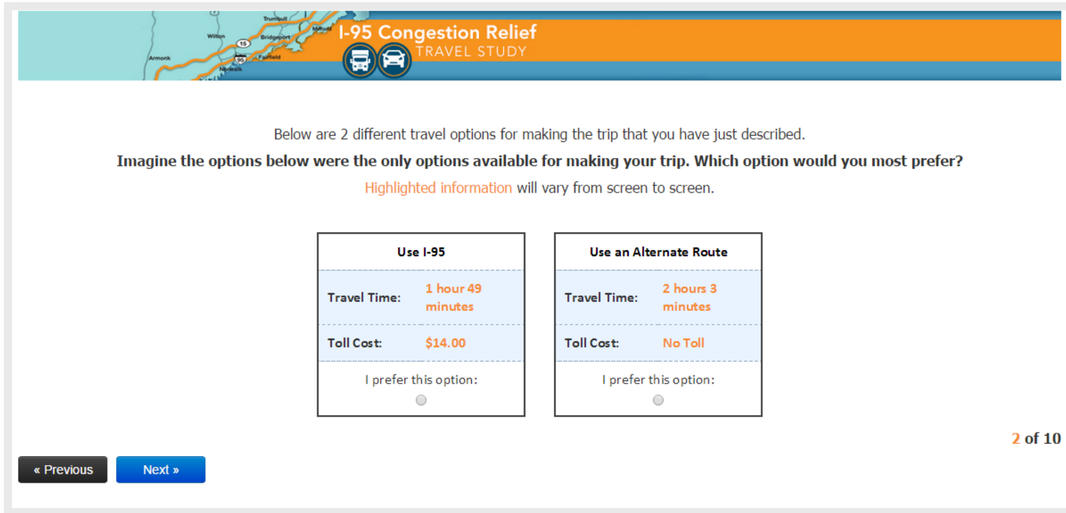


FIGURE 2-30: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 3

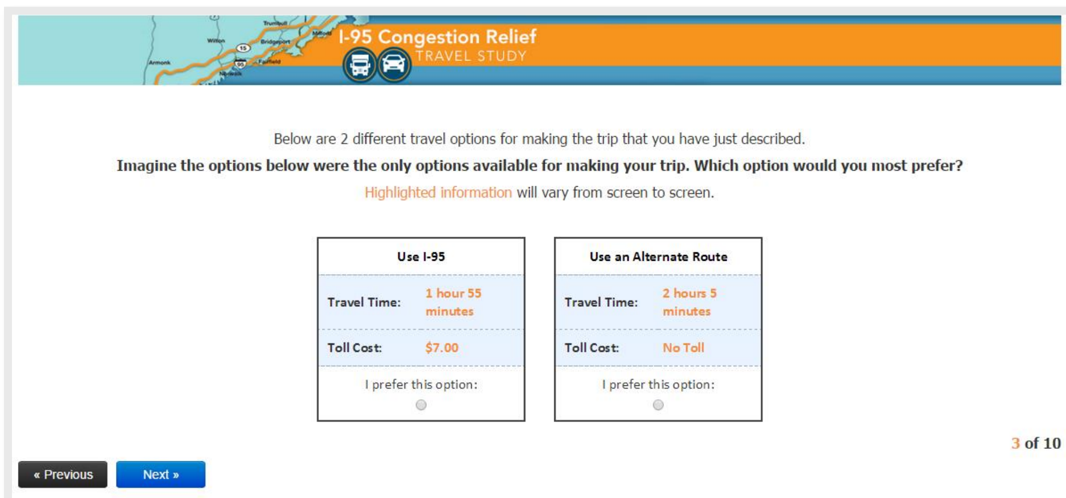


FIGURE 2-31: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 4

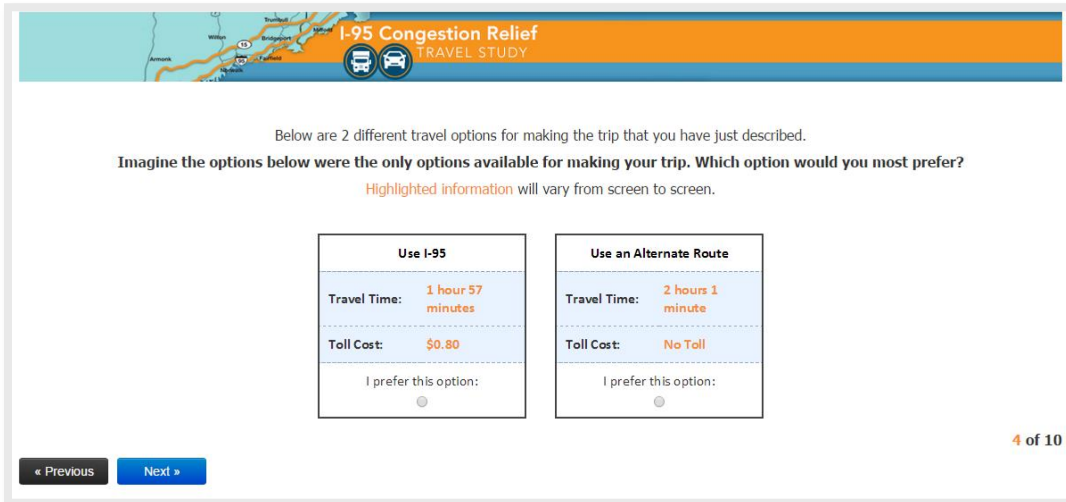


FIGURE 2-32: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 5

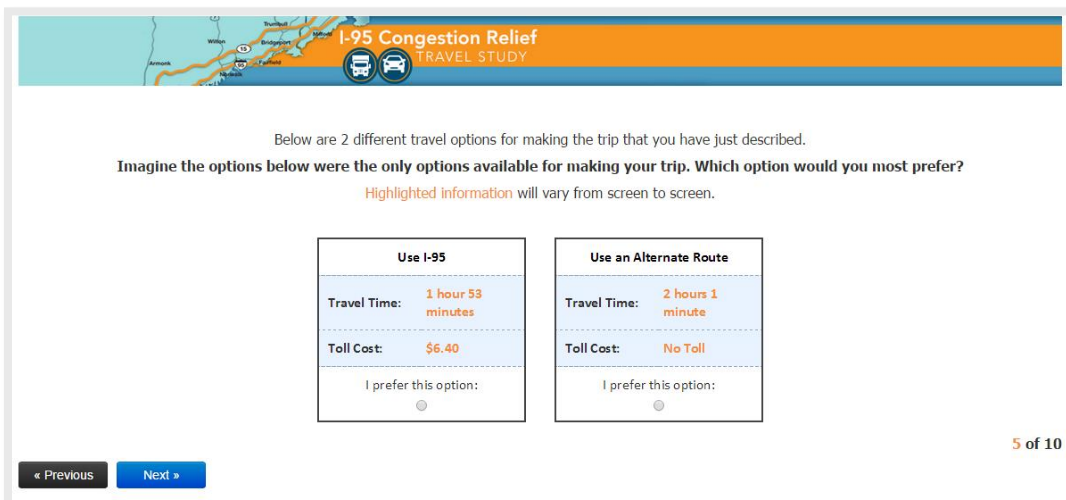


FIGURE 2-33: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 6

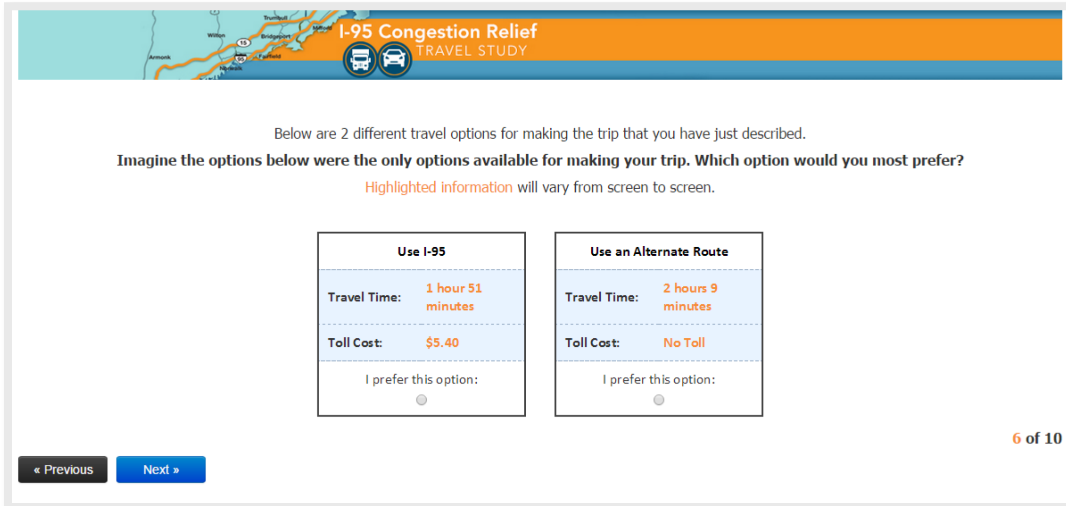


FIGURE 2-34: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 7

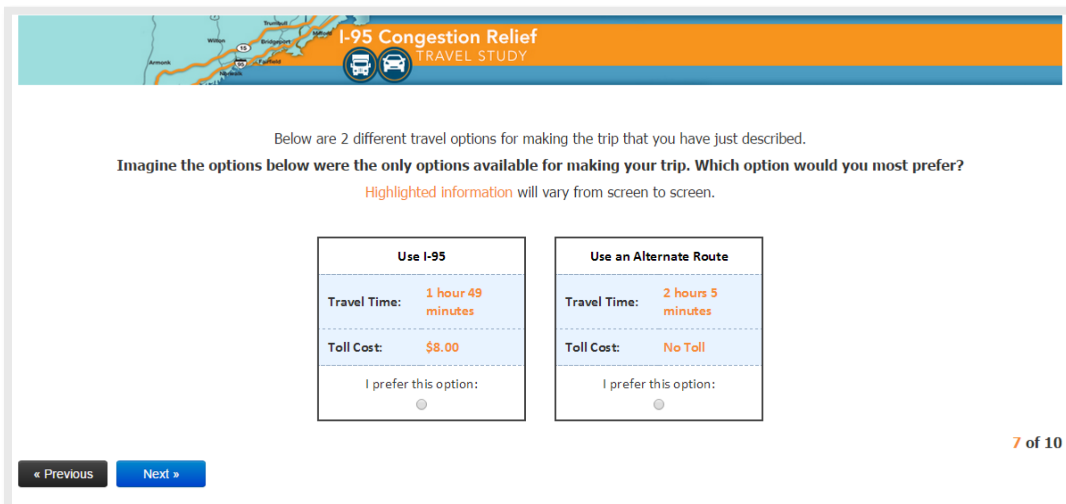


FIGURE 2-35: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 8

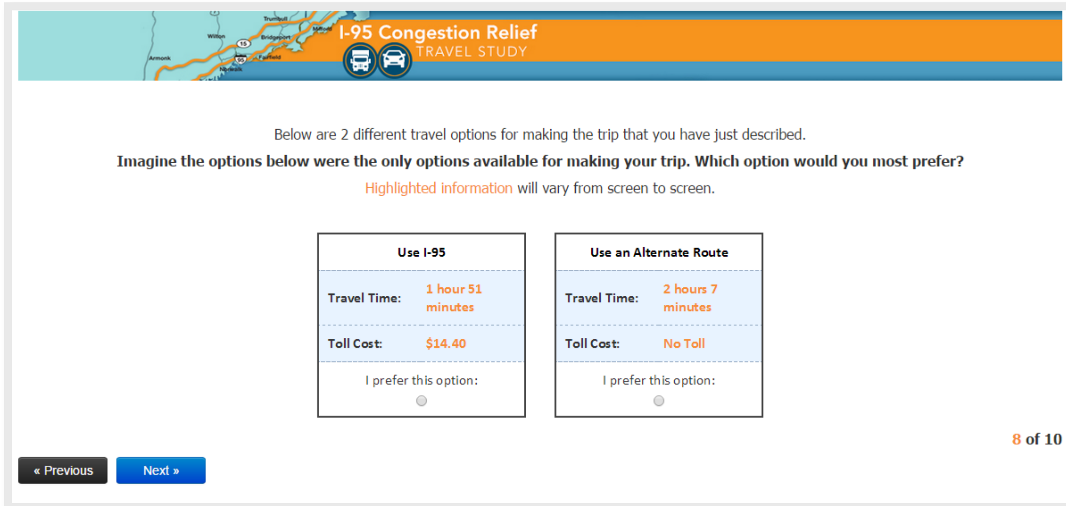


FIGURE 2-36: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 9

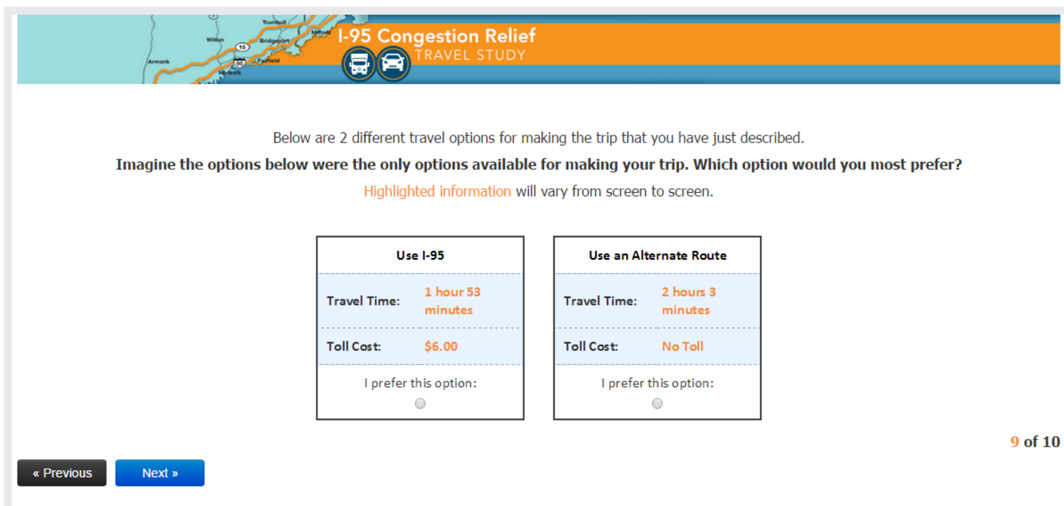
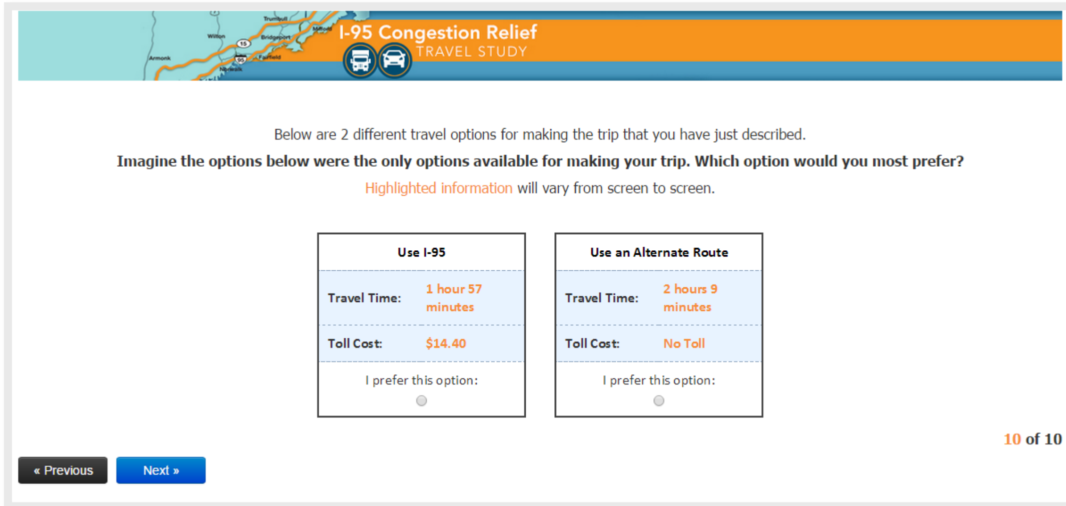
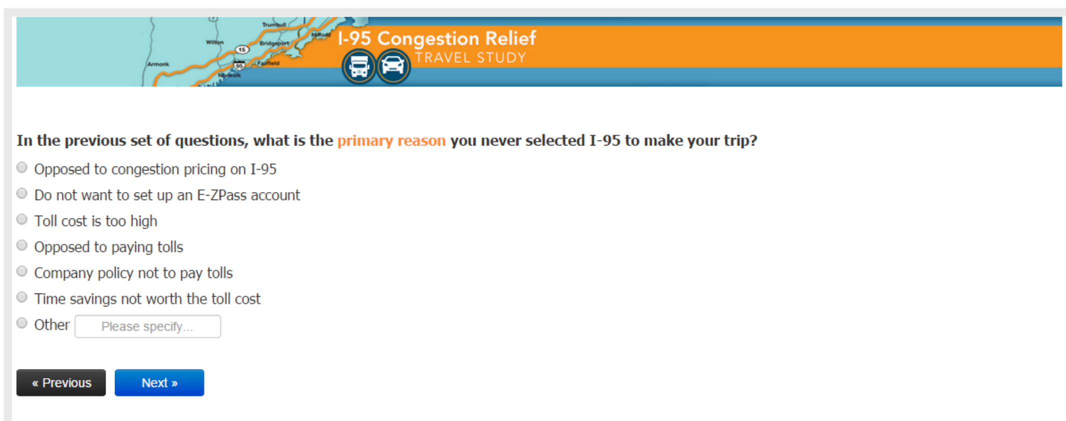


FIGURE 2-37: I-95 CONGESTION PRICING SP EXPERIMENT EXAMPLE 10



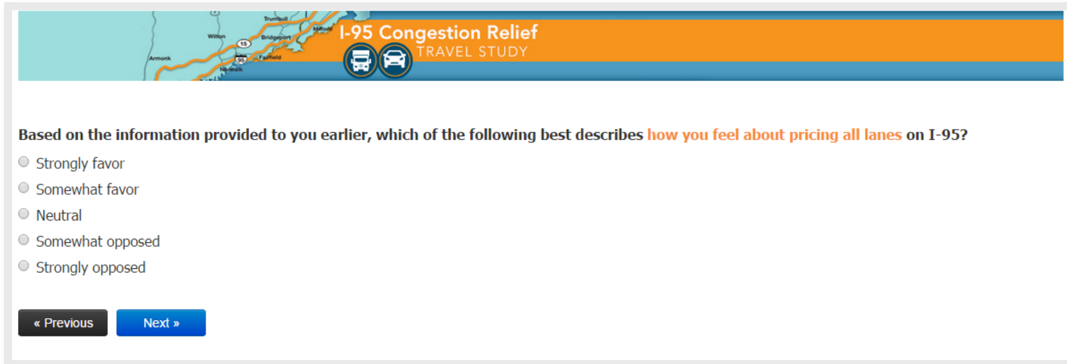
2.4 | DEBRIEF AND OPINION QUESTIONS

FIGURE 2-38: PRIMARY REASON FOR NEVER SELECTING I-95



If never selected tolled option in stated preference section.

FIGURE 2-39: OPINION OF CONGESTION PRICING ON I-95



I-95 Congestion Relief
TRAVEL STUDY

Based on the information provided to you earlier, which of the following best describes how you feel about pricing all lanes on I-95?

- Strongly favor
- Somewhat favor
- Neutral
- Somewhat opposed
- Strongly opposed

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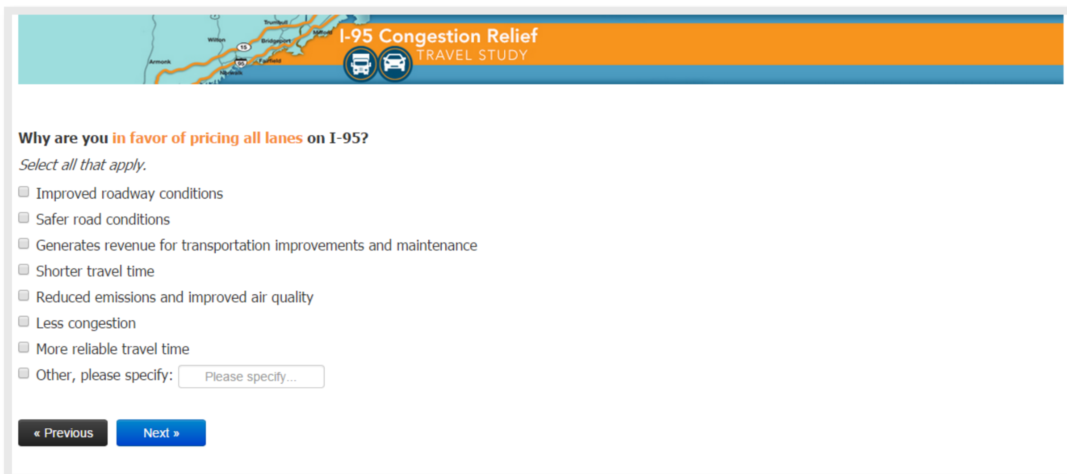
FIGURE 2-40: REASONS(S) FOR FAVORING CONGESTION PRICING ON I-95



I-95 Congestion Relief
TRAVEL STUDY

Why are you in favor of pricing all lanes on I-95?

Select all that apply.

- Improved roadway conditions
- Safer road conditions
- Generates revenue for transportation improvements and maintenance
- Shorter travel time
- Reduced emissions and improved air quality
- Less congestion
- More reliable travel time
- Other, please specify: Please specify...

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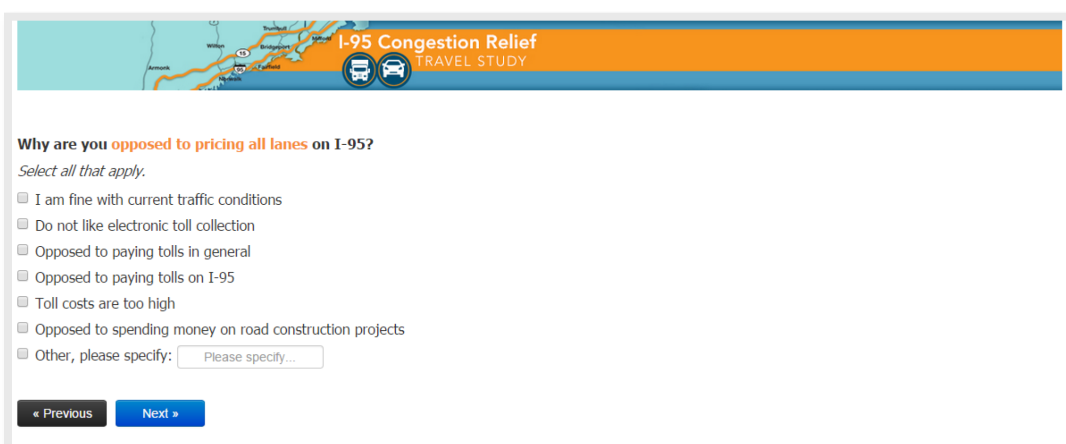
If somewhat or strongly favors congestion pricing on I-95.

FIGURE 2-41: REASONS(S) FOR OPPOSING CONGESTION PRICING ON I-95



I-95 Congestion Relief
TRAVEL STUDY

Why are you opposed to pricing all lanes on I-95?

Select all that apply.

- I am fine with current traffic conditions
- Do not like electronic toll collection
- Opposed to paying tolls in general
- Opposed to paying tolls on I-95
- Toll costs are too high
- Opposed to spending money on road construction projects
- Other, please specify: Please specify...

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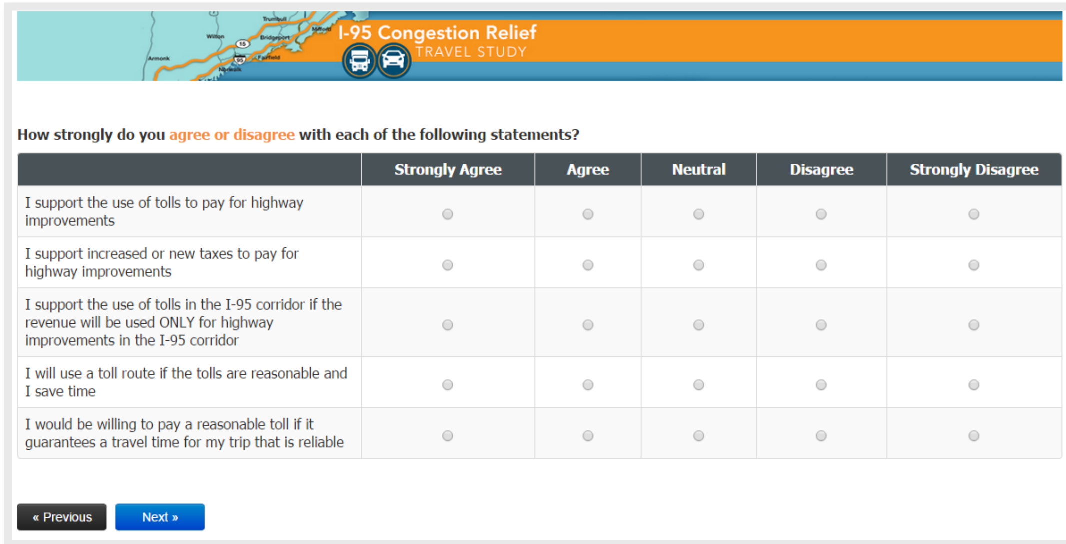
If somewhat or strongly opposes congestion pricing on I-95.

FIGURE 2-42: TOLL ATTITUDE STATEMENTS



I-95 Congestion Relief
TRAVEL STUDY

How strongly do you agree or disagree with each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I support the use of tolls to pay for highway improvements	○	○	○	○	○
I support increased or new taxes to pay for highway improvements	○	○	○	○	○
I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for highway improvements in the I-95 corridor	○	○	○	○	○
I will use a toll route if the tolls are reasonable and I save time	○	○	○	○	○
I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable	○	○	○	○	○

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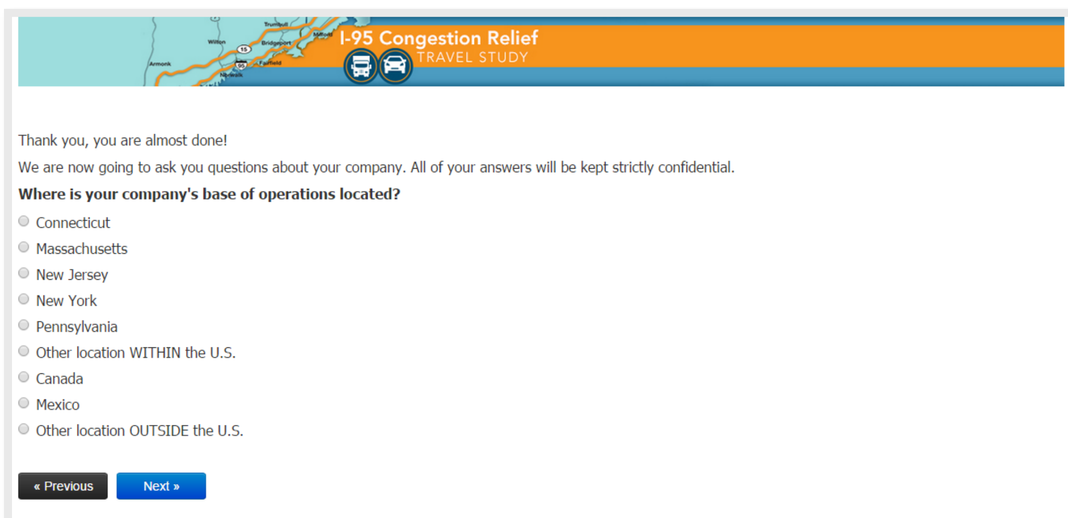
2.5 | COMPANY INFORMATION QUESTIONS

FIGURE 2-43: COMPANY HEADQUARTERS



I-95 Congestion Relief
TRAVEL STUDY

Thank you, you are almost done!

We are now going to ask you questions about your company. All of your answers will be kept strictly confidential.

Where is your company's base of operations located?

- ○ Connecticut
- ○ Massachusetts
- ○ New Jersey
- ○ New York
- ○ Pennsylvania
- ○ Other location WITHIN the U.S.
- ○ Canada
- ○ Mexico
- ○ Other location OUTSIDE the U.S.

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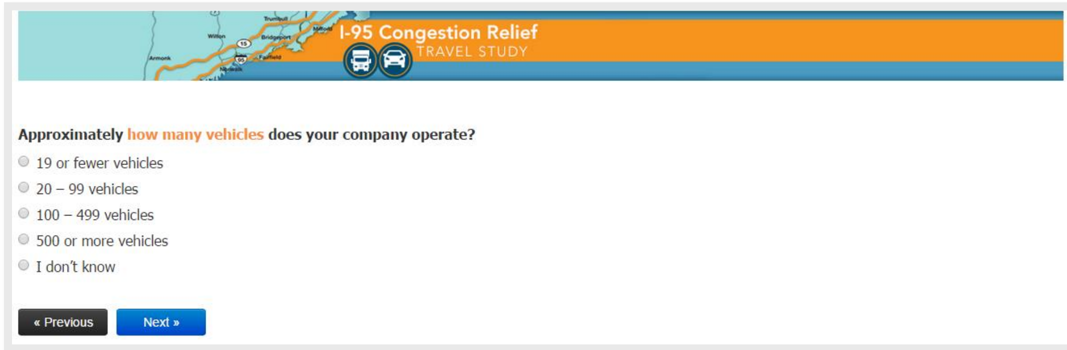
FIGURE 2-44: FLEET SIZE



Approximately how many vehicles does your company operate?

- 19 or fewer vehicles
- 20 – 99 vehicles
- 100 – 499 vehicles
- 500 or more vehicles
- I don't know

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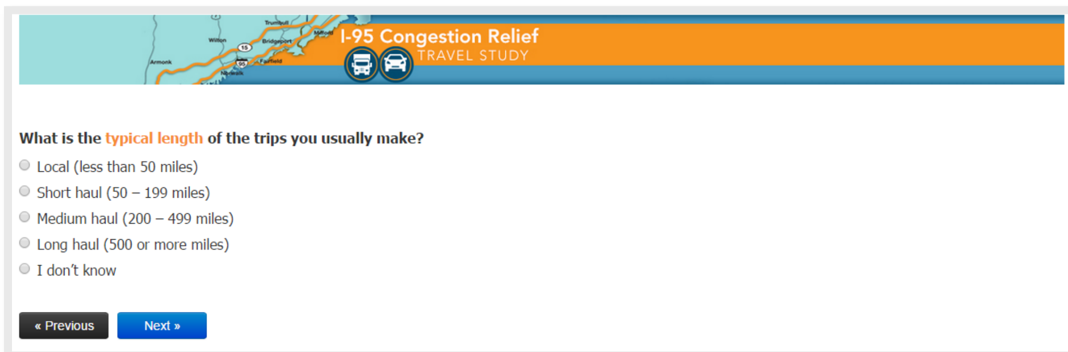
FIGURE 2-45: TYPICAL TRIP LENGTH



What is the typical length of the trips you usually make?

- Local (less than 50 miles)
- Short haul (50 – 199 miles)
- Medium haul (200 – 499 miles)
- Long haul (500 or more miles)
- I don't know

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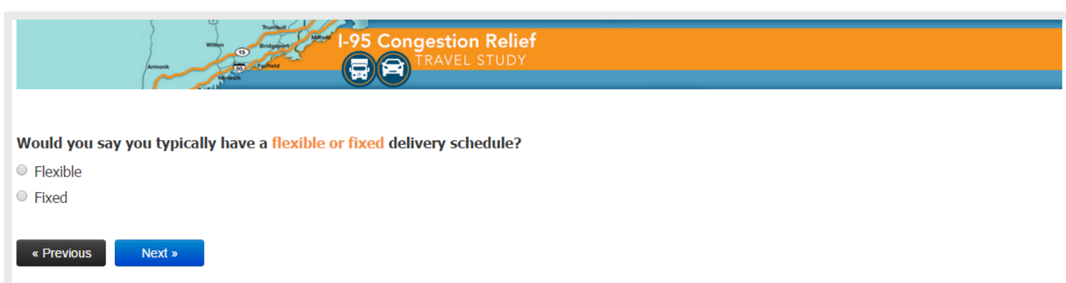
FIGURE 2-46: TYPICAL TRIP FLEXIBILITY



Would you say you typically have a flexible or fixed delivery schedule?

- Flexible
- Fixed

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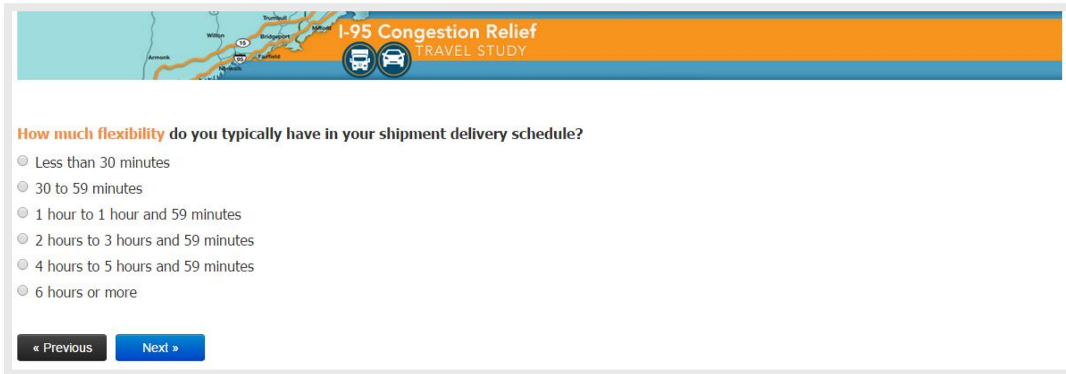
FIGURE 2-47: AMOUNT OF FLEXIBILITY


I-95 Congestion Relief
TRAVEL STUDY

How much flexibility do you typically have in your shipment delivery schedule?

- Less than 30 minutes
- 30 to 59 minutes
- 1 hour to 1 hour and 59 minutes
- 2 hours to 3 hours and 59 minutes
- 4 hours to 5 hours and 59 minutes
- 6 hours or more

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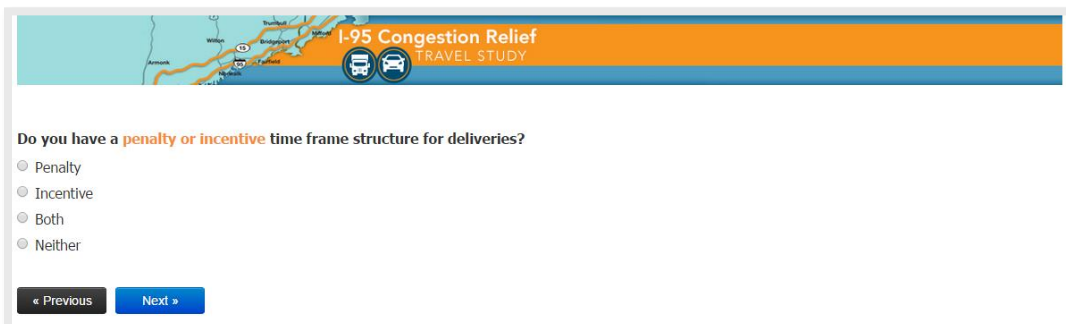
If has flexibility in delivery schedule.

FIGURE 2-48: DELIVERY PENALTY OR INCENTIVE


I-95 Congestion Relief
TRAVEL STUDY

Do you have a penalty or incentive time frame structure for deliveries?

- Penalty
- Incentive
- Both
- Neither

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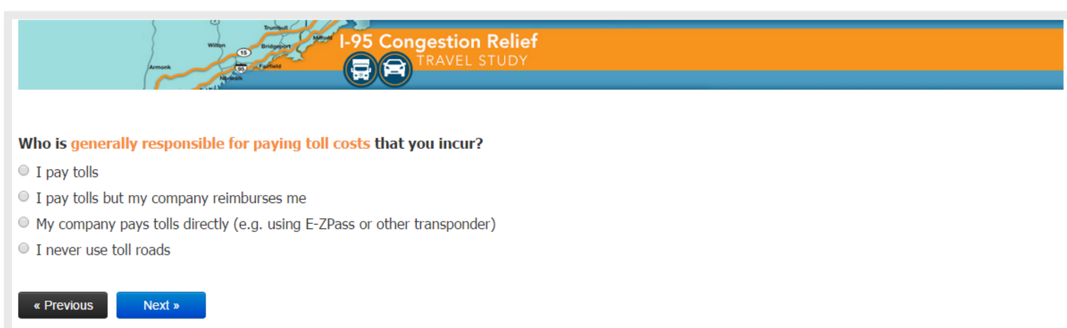
FIGURE 2-49: TOLL RESPONSIBILITY


I-95 Congestion Relief
TRAVEL STUDY

Who is generally responsible for paying toll costs that you incur?

- I pay tolls
- I pay tolls but my company reimburses me
- My company pays tolls directly (e.g. using E-ZPass or other transponder)
- I never use toll roads

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FIGURE 2-50: HOW TOLLS ARE CHARGED

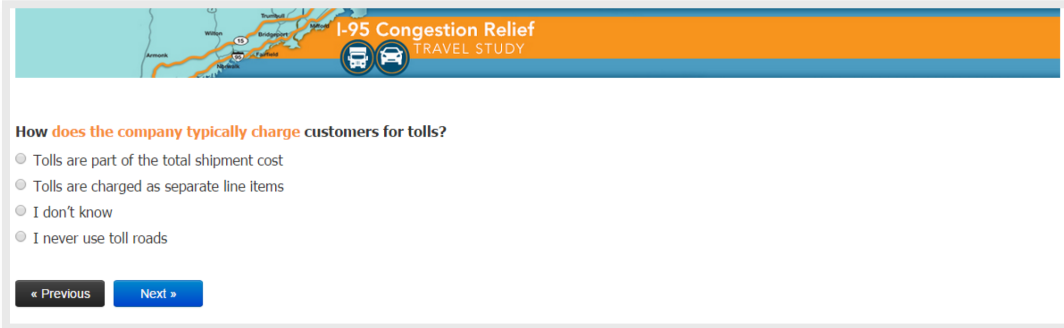


FIGURE 2-51: COMMENTS

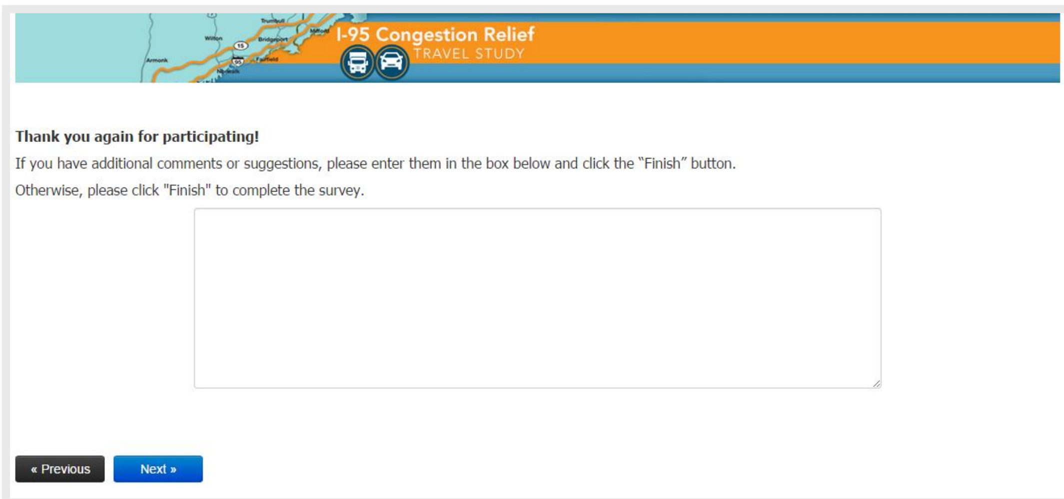
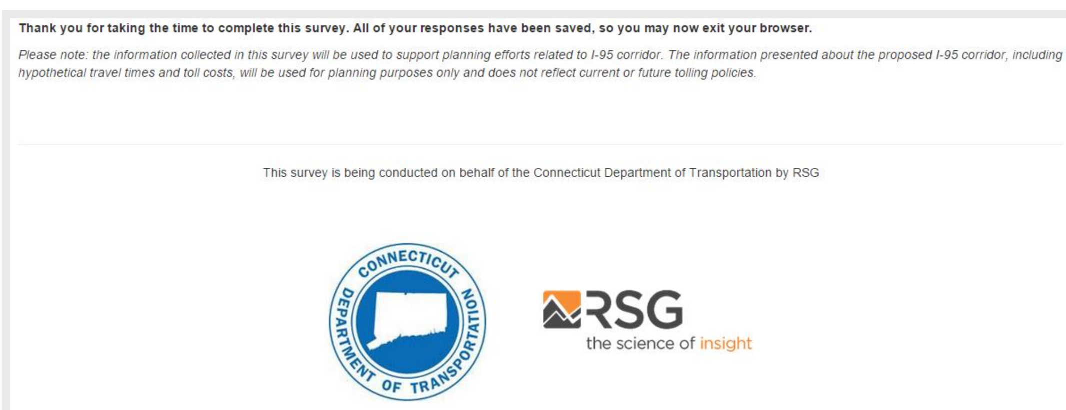


FIGURE 2-52: SURVEY END



APPENDIX B

CONNECTICUT CONGESTION PRICING STATED PREFERENCE SURVEY REPORT

10.2.2015

PREPARED FOR:
CONNECTICUT DEPARTMENT OF TRANSPORTATION

SUBMITTED BY:
RSG

IN COOPERATION WITH:
CDM SMITH

55 Railroad Row
White River Junction, VT 05001
802.295.4999
www.rsginc.com

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1.0 PASSENGER VEHICLE TABULATIONS

1.1 | TRIP DETAIL QUESTIONS

TABLE 1-1: RECRUITMENT METHOD

Recruitment method

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Research panel	130	19.2%	233	36.1%	18	15.9%	381	26.5%
Field intercept	199	29.4%	245	37.9%	52	46.0%	496	34.5%
Business recruit	349	51.5%	168	26.0%	43	38.1%	560	39.0%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-2: ROAD(S) USED

Which of the following roads did you use for your most recent trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
I used I-95 on my most recent trip	400	59.0%	356	55.1%	75	66.4%	831	57.8%
I used Route 15 (Merritt Parkway) on my most recent trip	165	24.3%	140	21.7%	16	14.2%	321	22.3%
I used both I-95 and Route 15 (Merritt Parkway) on my most recent trip	113	16.7%	150	23.2%	22	19.5%	285	19.8%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-3: POTENTIAL USE OF ROUTE 15 (MERRITT PARKWAY)

Could you have used Route 15 (Merritt Parkway) for this trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	264	66.0%	206	57.9%	37	49.3%	507	61.0%
No	136	34.0%	150	42.1%	38	50.7%	324	39.0%
Total	400	100.0%	356	100.0%	75	100.0%	831	100.0%

If respondent only used I-95.

TABLE 1-4: POTENTIAL USE OF I-95

Could you have used I-95 for this trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	141	85.5%	114	81.4%	14	87.5%	269	83.8%
No	24	14.5%	26	18.6%	2	12.5%	52	16.2%
Total	165	100.0%	140	100.0%	16	100.0%	321	100.0%

If respondent only used Route 15 (Merritt Parkway).

TABLE 1-5: DAY OF WEEK

What day of the week did you make your most recent trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Monday	166	24.5%	54	8.4%	16	14.2%	236	16.4%
Tuesday	108	15.9%	68	10.5%	21	18.6%	197	13.7%
Wednesday	99	14.6%	62	9.6%	15	13.3%	176	12.2%
Thursday	89	13.1%	87	13.5%	24	21.2%	200	13.9%
Friday	160	23.6%	94	14.6%	22	19.5%	276	19.2%
Saturday	34	5.0%	173	26.8%	4	3.5%	211	14.7%
Sunday	22	3.2%	108	16.7%	11	9.7%	141	9.8%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-6: TRIP PURPOSE

What was the primary purpose of your most recent trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Commute to/from work	540	79.6%	0	.0%	17	15.0%	557	38.8%
Business-related travel	138	20.4%	0	.0%	51	45.1%	189	13.2%
School related	0	.0%	46	7.1%	2	1.8%	48	3.3%
Go to/from the airport	0	.0%	37	5.7%	1	.9%	38	2.6%
Shop	0	.0%	96	14.9%	2	1.8%	98	6.8%
Social or recreational	0	.0%	347	53.7%	22	19.5%	369	25.7%
Other personal business	0	.0%	120	18.6%	18	15.9%	138	9.6%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-7: TRIP BEGIN LOCATION

	Where did your trip begin?							
	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	537	79.2%	569	88.1%	0	.0%	1106	77.0%
Workplace	125	18.4%	6	.9%	74	65.5%	205	14.3%
Another place	16	2.4%	71	11.0%	39	34.5%	126	8.8%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-8: TRIP END LOCATION

	Where did your trip end?							
	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	159	23.5%	128	19.8%	0	.0%	287	20.0%
Workplace	403	59.4%	9	1.4%	19	16.8%	431	30.0%
Another place	116	17.1%	509	78.8%	94	83.2%	719	50.0%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-9: I-95 ENTRANCE RAMP

Where did you enter I-95 for your trip?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
An Exit South/West of Delavan Ave (New York State or Points South)	40	7.8%	63	12.5%	16	16.5%	119	10.7%
Exit 2: Delavan Avenue – Byram	30	5.8%	32	6.3%	8	8.2%	70	6.3%
Exit 3: Arch St – Greenwich	20	3.9%	13	2.6%	8	8.2%	41	3.7%
Exit 4: Indian Field Rd – Cos Cob, Greenwich	28	5.5%	15	3.0%	10	10.3%	53	4.7%
Exit 5: US 1 – Riverside, Old Greenwich, Mianus	31	6.0%	29	5.7%	2	2.1%	62	5.6%
Exit 6: Harvard Avenue/West Ave	14	2.7%	11	2.2%	2	2.1%	27	2.4%
Exit 7: Route 137 North/Greenwich Ave	11	2.1%	13	2.6%	4	4.1%	28	2.5%
Exit 8: Atlantic Street-To Route 137/ Elm St	26	5.1%	28	5.5%	5	5.2%	59	5.3%
Exit 9: US 1 /Route 106 –Glenbrook	14	2.7%	12	2.4%	1	1.0%	27	2.4%
Exit 10: Norton Road, Ledge Ave – Norton	8	1.6%	1	.2%	1	1.0%	10	.9%
Exit 11: US 1 – Darien, Rowayton	4	.8%	6	1.2%	0	.0%	10	.9%
Exit 12: Route 136 (Tokeneke Rd) – Rowayton	1	.2%	4	.8%	0	.0%	5	.4%
Exit 13: US 1 (Post Rd)	6	1.2%	8	1.6%	1	1.0%	15	1.3%
Exit 14: US 1 (Connecticut Ave)	12	2.3%	9	1.8%	0	.0%	21	1.9%
Exit 15: US 7 – Norwalk, Danbury	29	5.7%	14	2.8%	5	5.2%	48	4.3%
Exit 16: East Ave – East Norwalk	19	3.7%	5	1.0%	0	.0%	24	2.2%
Exit 17: Route 33 /Route 136 – Westport, Saugatuck	5	1.0%	7	1.4%	1	1.0%	13	1.2%
Exit 18: Sherwood Island Connector (SSR 476)	5	1.0%	2	.4%	0	.0%	7	.6%
Exit 19: Center St /US 1–Southport	0	.0%	1	.2%	0	.0%	1	.1%
Exit 20: Bronson Rd – Fairfield	2	.4%	1	.2%	1	1.0%	4	.4%
Exit 21: Mill Plain Rd – Fairfield	5	1.0%	1	.2%	0	.0%	6	.5%
Exit 22: Route 135 (N. Benson Rd)/Round Hill Rd	6	1.2%	4	.8%	0	.0%	10	.9%
Exit 23: US 1 (Kings Highway) – Fairfield, Southport	2	.4%	3	.6%	0	.0%	5	.4%
Exit 24: Black Rock Turnpike (US 1)	10	1.9%	4	.8%	1	1.0%	15	1.3%
Exit 25: Commerce Dr, State St/Route 130 (Fairfield Ave)	3	.6%	0	.0%	0	.0%	3	.3%
Exit 26: Wording Ave	0	.0%	0	.0%	1	1.0%	1	.1%
Exit 27: Lafayette Blvd – Downtown Bridgeport	8	1.6%	4	.8%	7	7.2%	19	1.7%
Exit 27A: Route 25/Route 8 north – Trumbull, Waterbury	25	4.9%	23	4.5%	3	3.1%	51	4.6%
Exit 28: Route 127 (East Main St)	0	.0%	3	.6%	0	.0%	3	.3%
Exit 29: Route 130 (Stratford Ave)/Seaview Ave	5	1.0%	3	.6%	0	.0%	8	.7%

Where did you enter I-95 for your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Exit 30: Route 113 (Lordship Blvd)/Surf Ave	5	1.0%	2	.4%	0	.0%	7	.6%
Exit 31: Honeyspot Rd/South Ave	4	.8%	2	.4%	0	.0%	6	.5%
Exit 32: West Broad St – Stratford	12	2.3%	7	1.4%	0	.0%	19	1.7%
Exit 33: US 1 /Route 110 /Route 130 / Ferry Blvd – Devon	2	.4%	1	.2%	0	.0%	3	.3%
Exit 34: US 1 – Milford, Devon	4	.8%	6	1.2%	0	.0%	10	.9%
Exit 35: School House Rd, Bic Dr	4	.8%	1	.2%	0	.0%	5	.4%
Exit 36: Plains Rd	4	.8%	4	.8%	0	.0%	8	.7%
Exit 37: High St	6	1.2%	1	.2%	0	.0%	7	.6%
Exit 38: Route 15 (Merritt Parkway, Wilbur Cross Parkway)	10	1.9%	32	6.3%	1	1.0%	43	3.9%
Exit 39A/B: US 1 – Milford	6	1.2%	12	2.4%	2	2.1%	20	1.8%
Exit 40: Old Gate Lane (CT 62)/Woodmont Rd	5	1.0%	3	.6%	0	.0%	8	.7%
Exit 41: Marsh Hill Rd – Orange	8	1.6%	9	1.8%	0	.0%	17	1.5%
Exit 42: Route 162 (Saw Mill Rd) – West Haven	10	1.9%	12	2.4%	0	.0%	22	2.0%
Exit 43: Campbell Ave – Downtown West Haven/Route 122 (First Ave)	4	.8%	6	1.2%	0	.0%	10	.9%
Exit 44: Route 10/Kimberly Ave	2	.4%	4	.8%	0	.0%	6	.5%
Exit 45: Route 10 (Ella T. Grasso Blvd)	2	.4%	0	.0%	0	.0%	2	.2%
Exit 46: Long Wharf Dr, Sargent Dr	2	.4%	7	1.4%	1	1.0%	10	.9%
Exit 47: Route 34 West –Downtown New Haven	11	2.1%	15	3.0%	6	6.2%	32	2.9%
Exit 48: I-91 North – Meriden	9	1.8%	12	2.4%	5	5.2%	26	2.3%
An Exit North/East of I-91	34	6.6%	51	10.1%	5	5.2%	90	8.1%
Total	513	100.0%	506	100.0%	97	100.0%	1116	100.0%

If respondent used I-95 for the qualifying trip.

TABLE 1-10: I-95 EXIT RAMP

Where did you exit off of I-95 for your trip?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
An Exit South/West of Delavan Ave (New York State or Points South)	44	8.6%	80	15.8%	12	12.4%	136	12.2%
Exit 2: Delavan Avenue – Byram	20	3.9%	16	3.2%	2	2.1%	38	3.4%
Exit 3: Arch St – Greenwich	43	8.4%	9	1.8%	5	5.2%	57	5.1%
Exit 4: Indian Field Rd – Cos Cob, Greenwich	34	6.6%	4	.8%	4	4.1%	42	3.8%
Exit 5: US 1 – Riverside, Old Greenwich, Mianus	31	6.0%	8	1.6%	1	1.0%	40	3.6%
Exit 6: Harvard Avenue/West Ave	13	2.5%	7	1.4%	0	.0%	20	1.8%
Exit 7: Route 137 North/Greenwich Ave	13	2.5%	7	1.4%	1	1.0%	21	1.9%
Exit 8: Atlantic Street-To Route 137/ Elm St	29	5.7%	15	3.0%	2	2.1%	46	4.1%
Exit 9: US 1 /Route 106 –Glenbrook	8	1.6%	10	2.0%	1	1.0%	19	1.7%
Exit 10: Norton Road, Ledge Ave – Norton	8	1.6%	0	.0%	2	2.1%	10	.9%
Exit 11: US 1 – Darien, Rowayton	9	1.8%	6	1.2%	1	1.0%	16	1.4%
Exit 12: Route 136 (Tokeneke Rd) – Rowayton	5	1.0%	1	.2%	2	2.1%	8	.7%
Exit 13: US 1 (Post Rd)	10	1.9%	15	3.0%	0	.0%	25	2.2%
Exit 14: US 1 (Connecticut Ave)	2	.4%	18	3.6%	1	1.0%	21	1.9%
Exit 15: US 7 – Norwalk, Danbury	37	7.2%	24	4.7%	5	5.2%	66	5.9%
Exit 16: East Ave – East Norwalk	13	2.5%	11	2.2%	5	5.2%	29	2.6%
Exit 17: Route 33 /Route 136 – Westport, Saugatuck	5	1.0%	10	2.0%	2	2.1%	17	1.5%
Exit 18: Sherwood Island Connector (SSR 476)	4	.8%	1	.2%	0	.0%	5	.4%
Exit 19: Center St /US 1–Southport	10	1.9%	2	.4%	1	1.0%	13	1.2%
Exit 20: Bronson Rd – Fairfield	2	.4%	0	.0%	0	.0%	2	.2%
Exit 21: Mill Plain Rd – Fairfield	2	.4%	5	1.0%	0	.0%	7	.6%
Exit 22: Route 135 (N. Benson Rd)/Round Hill Rd	2	.4%	5	1.0%	0	.0%	7	.6%
Exit 23: US 1 (Kings Highway) – Fairfield, Southport	4	.8%	3	.6%	0	.0%	7	.6%
Exit 24: Black Rock Turnpike (US 1)	5	1.0%	2	.4%	1	1.0%	8	.7%
Exit 25: Commerce Dr, State St/Route 130 (Fairfield Ave)	1	.2%	3	.6%	0	.0%	4	.4%
Exit 26: Wording Ave	1	.2%	2	.4%	1	1.0%	4	.4%
Exit 27: Lafayette Blvd – Downtown Bridgeport	14	2.7%	4	.8%	1	1.0%	19	1.7%
Exit 27A: Route 25/Route 8 north – Trumbull, Waterbury	26	5.1%	15	3.0%	5	5.2%	46	4.1%
Exit 28: Route 127 (East Main St)	3	.6%	1	.2%	0	.0%	4	.4%
Exit 29: Route 130 (Stratford Ave)/Seaview Ave	8	1.6%	1	.2%	0	.0%	9	.8%

Where did you exit off of I-95 for your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Exit 30: Route 113 (Lordship Blvd)/Surf Ave	2	.4%	2	.4%	1	1.0%	5	.4%
Exit 31: Honeyspot Rd/South Ave	2	.4%	0	.0%	0	.0%	2	.2%
Exit 32: West Broad St – Stratford	2	.4%	5	1.0%	0	.0%	7	.6%
Exit 33: US 1 /Route 110 /Route 130 / Ferry Blvd – Devon	0	.0%	1	.2%	0	.0%	1	.1%
Exit 34: US 1 – Milford, Devon	1	.2%	5	1.0%	1	1.0%	7	.6%
Exit 35: School House Rd, Bic Dr	2	.4%	0	.0%	1	1.0%	3	.3%
Exit 36: Plains Rd	1	.2%	5	1.0%	0	.0%	6	.5%
Exit 37: High St	0	.0%	1	.2%	1	1.0%	2	.2%
Exit 38: Route 15 (Merritt Parkway, Wilbur Cross Parkway)	11	2.1%	15	3.0%	5	5.2%	31	2.8%
Exit 39A/B: US 1 – Milford	5	1.0%	14	2.8%	2	2.1%	21	1.9%
Exit 40: Old Gate Lane (CT 62)/Woodmont Rd	4	.8%	7	1.4%	2	2.1%	13	1.2%
Exit 41: Marsh Hill Rd – Orange	5	1.0%	9	1.8%	4	4.1%	18	1.6%
Exit 42: Route 162 (Saw Mill Rd) – West Haven	6	1.2%	4	.8%	4	4.1%	14	1.3%
Exit 43: Campbell Ave – Downtown West Haven/Route 122 (First Ave)	2	.4%	2	.4%	2	2.1%	6	.5%
Exit 44: Route 10/Kimberly Ave	2	.4%	3	.6%	2	2.1%	7	.6%
Exit 45: Route 10 (Ella T. Grasso Blvd)	0	.0%	3	.6%	0	.0%	3	.3%
Exit 46: Long Wharf Dr, Sargent Dr	3	.6%	13	2.6%	1	1.0%	17	1.5%
Exit 47: Route 34 West –Downtown New Haven	4	.8%	24	4.7%	5	5.2%	33	3.0%
Exit 48: I-91 North – Meriden	23	4.5%	35	6.9%	2	2.1%	60	5.4%
An Exit North/East of I-91	32	6.2%	73	14.4%	9	9.3%	114	10.2%
Total	513	100.0%	506	100.0%	97	100.0%	1116	100.0%

If respondent used I-95 for the qualifying trip.

TABLE 1-11: ROUTE 15 (MERRITT PARKWAY) ENTRANCE RAMP

Where did you enter Route 15 (Merritt Parkway) for your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
An Exit South/West of King St (New York State or Points South)	10	3.6%	25	8.6%	4	10.5%	39	6.4%
Exit 27: NY 120A/King St	15	5.4%	23	7.9%	0	.0%	38	6.3%
Exit 28: Round Hill Rd	6	2.2%	4	1.4%	1	2.6%	11	1.8%
Exit 29: Lake Ave	6	2.2%	5	1.7%	1	2.6%	12	2.0%
Exit 31: North St	32	11.5%	10	3.4%	3	7.9%	45	7.4%
Exit 33: Den Rd	13	4.7%	2	.7%	0	.0%	15	2.5%
Exit 34: Route 104/Long Ridge Rd	16	5.8%	15	5.2%	0	.0%	31	5.1%
Exit 35: Route 137/High Ridge Rd	10	3.6%	13	4.5%	2	5.3%	25	4.1%
Exit 36: Route 106/Old Stamford Rd/Hoyt St	8	2.9%	7	2.4%	1	2.6%	16	2.6%
Exit 37: Route 124/South Ave	3	1.1%	3	1.0%	0	.0%	6	1.0%
Exit 38: Route 123/New Cannan Ave	14	5.0%	4	1.4%	0	.0%	18	3.0%
Exit 39 A/B: US Route 7	14	5.0%	19	6.6%	2	5.3%	35	5.8%
Exit 40 A/B: Main Ave – Norwalk	13	4.7%	6	2.1%	4	10.5%	23	3.8%
Exit 41: Route 33/Wilton Rd	7	2.5%	7	2.4%	0	.0%	14	2.3%
Exit 42: Route 57/Weston Rd	10	3.6%	3	1.0%	2	5.3%	15	2.5%
Exit 44: Route 58 – Fairfield, Redding	7	2.5%	5	1.7%	0	.0%	12	2.0%
Exit 46: Route 59 – Fairfield, Easton	7	2.5%	7	2.4%	0	.0%	14	2.3%
Exit 47: Park Ave	4	1.4%	9	3.1%	0	.0%	13	2.1%
Exit 48: Route 111/Main St	9	3.2%	7	2.4%	0	.0%	16	2.6%
Exit 49 N/S: Route 25 – Monroe, Newtown, Bridgeport	7	2.5%	9	3.1%	0	.0%	16	2.6%
Exit 50: Route 127/White Plains Rd	3	1.1%	1	.3%	1	2.6%	5	.8%
Exit 51: Route 108/Nichols Ave	4	1.4%	8	2.8%	0	.0%	12	2.0%
Exit 52: Route 8 – Shelton, Derby, Bridgeport	18	6.5%	18	6.2%	3	7.9%	39	6.4%
Exit 53: Route 110/Main St – Stratford, Shelton	3	1.1%	11	3.8%	2	5.3%	16	2.6%
Exit 54: To I-95/US 1 – Milford, New London	13	4.7%	36	12.4%	4	10.5%	53	8.7%
Exit 55 A/B Wheelers Farms Rd/Wolf Harbor Rd	7	2.5%	3	1.0%	2	5.3%	12	2.0%
Exit 56: Route 121 – Orange, Ansonia	5	1.8%	6	2.1%	1	2.6%	12	2.0%
Exit 57/58: Route 34 East/West	2	.7%	6	2.1%	1	2.6%	9	1.5%
An Exit North/East of Route 34 East/West	12	4.3%	18	6.2%	4	10.5%	34	5.6%
Total	278	100.0%	290	100.0%	38	100.0%	606	100.0%

If respondent used Route 15 (Merritt Parkway) for the qualifying trip.

TABLE 1-12: ROUTE 15 (MERRITT PARKWAY) EXIT RAMP

Where did you exit off of Route 15 (Merritt Parkway) for your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
An Exit South/West of King St (New York State or Points South)	16	5.8%	32	11.0%	1	2.6%	49	8.1%
Exit 27: NY 120A/King St	17	6.1%	16	5.5%	6	15.8%	39	6.4%
Exit 28: Round Hill Rd	6	2.2%	3	1.0%	1	2.6%	10	1.7%
Exit 29: Lake Ave	7	2.5%	3	1.0%	0	.0%	10	1.7%
Exit 31: North St	34	12.2%	6	2.1%	1	2.6%	41	6.8%
Exit 33: Den Rd	7	2.5%	6	2.1%	0	.0%	13	2.1%
Exit 34: Route 104/Long Ridge Rd	12	4.3%	8	2.8%	2	5.3%	22	3.6%
Exit 35: Route 137/High Ridge Rd	13	4.7%	8	2.8%	2	5.3%	23	3.8%
Exit 36: Route 106/Old Stamford Rd/Hoyt St	2	.7%	7	2.4%	0	.0%	9	1.5%
Exit 37: Route 124/South Ave	4	1.4%	3	1.0%	0	.0%	7	1.2%
Exit 38: Route 123/New Cannan Ave	8	2.9%	4	1.4%	0	.0%	12	2.0%
Exit 39 A/B: US Route 7	19	6.8%	10	3.4%	2	5.3%	31	5.1%
Exit 40 A/B: Main Ave – Norwalk	12	4.3%	9	3.1%	0	.0%	21	3.5%
Exit 41: Route 33/Wilton Rd	6	2.2%	5	1.7%	4	10.5%	15	2.5%
Exit 42: Route 57/Weston Rd	12	4.3%	7	2.4%	1	2.6%	20	3.3%
Exit 44: Route 58 – Fairfield, Redding	9	3.2%	6	2.1%	1	2.6%	16	2.6%
Exit 46: Route 59 – Fairfield, Easton	2	.7%	1	.3%	1	2.6%	4	.7%
Exit 47: Park Ave	1	.4%	6	2.1%	1	2.6%	8	1.3%
Exit 48: Route 111/Main St	9	3.2%	11	3.8%	1	2.6%	21	3.5%
Exit 49 N/S: Route 25 – Monroe, Newtown, Bridgeport	8	2.9%	8	2.8%	0	.0%	16	2.6%
Exit 50: Route 127/White Plains Rd	0	.0%	2	.7%	0	.0%	2	.3%
Exit 51: Route 108/Nichols Ave	2	.7%	3	1.0%	1	2.6%	6	1.0%
Exit 52: Route 8 – Shelton, Derby, Bridgeport	23	8.3%	17	5.9%	3	7.9%	43	7.1%
Exit 53: Route 110/Main St – Stratford, Shelton	3	1.1%	6	2.1%	0	.0%	9	1.5%
Exit 54: To I-95/US 1 – Milford, New London	14	5.0%	51	17.6%	3	7.9%	68	11.2%
Exit 55 A/B Wheelers Farms Rd/Wolf Harbor Rd	2	.7%	2	.7%	0	.0%	4	.7%
Exit 56: Route 121 – Orange, Ansonia	3	1.1%	9	3.1%	0	.0%	12	2.0%
Exit 57/58: Route 34 East/West	6	2.2%	8	2.8%	3	7.9%	17	2.8%
An Exit North/East of Route 34 East/West	21	7.6%	33	11.4%	4	10.5%	58	9.6%
Total	278	100.0%	290	100.0%	38	100.0%	606	100.0%

If respondent used Route 15 (Merritt Parkway) for the qualifying trip.

TABLE 1-13: DEPARTURE TIME

What time did you start your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
12AM - 12:59AM	2	.3%	0	.0%	0	.0%	2	.1%
1AM - 1:59AM	0	.0%	1	.2%	0	.0%	1	.1%
2AM - 2:59AM	1	.1%	2	.3%	0	.0%	3	.2%
3AM - 3:59AM	0	.0%	2	.3%	0	.0%	2	.1%
4AM - 4:59AM	7	1.0%	2	.3%	0	.0%	9	.6%
5AM - 5:59AM	37	5.5%	7	1.1%	6	5.3%	50	3.5%
6AM - 6:59AM	112	16.5%	11	1.7%	6	5.3%	129	9.0%
7AM - 7:59AM	147	21.7%	35	5.4%	4	3.5%	186	12.9%
8AM - 8:59AM	92	13.6%	36	5.6%	7	6.2%	135	9.4%
9AM - 9:59AM	45	6.6%	81	12.5%	10	8.8%	136	9.5%
10AM - 10:59AM	22	3.2%	76	11.8%	9	8.0%	107	7.4%
11AM - 11:59AM	13	1.9%	54	8.4%	12	10.6%	79	5.5%
12PM - 12:59PM	16	2.4%	50	7.7%	13	11.5%	79	5.5%
1PM - 1:59PM	21	3.1%	54	8.4%	4	3.5%	79	5.5%
2PM - 2:59PM	21	3.1%	46	7.1%	9	8.0%	76	5.3%
3PM - 3:59PM	50	7.4%	46	7.1%	13	11.5%	109	7.6%
4PM - 4:59PM	38	5.6%	36	5.6%	10	8.8%	84	5.8%
5PM - 5:59PM	23	3.4%	53	8.2%	5	4.4%	81	5.6%
6PM - 6:59PM	15	2.2%	16	2.5%	3	2.7%	34	2.4%
7PM - 7:59PM	6	.9%	23	3.6%	1	.9%	30	2.1%
8PM - 8:59PM	2	.3%	4	.6%	0	.0%	6	.4%
9PM - 9:59PM	3	.4%	4	.6%	1	.9%	8	.6%
10PM - 10:59PM	3	.4%	1	.2%	0	.0%	4	.3%
11PM - 11:59PM	2	.3%	6	.9%	0	.0%	8	.6%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-14: PREFER DIFFERENT DEPARTURE TIME

Did you start your trip to specifically to minimize the impact of traffic congestion on your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	364	53.7%	301	46.6%	49	43.4%	714	49.7%
No	314	46.3%	345	53.4%	64	56.6%	723	50.3%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-15: PREFERRED DIFFERENT DEPARTURE TIME

If there was no traffic congestion, what time would you have preferred to start your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
12AM - 12:59AM	0	.0	0	.0	0	.0	0	.0
1AM - 1:59AM	1	.0	0	.0	0	.0	1	.0
2AM - 2:59AM	0	.0	0	.0	0	.0	0	.0
3AM - 3:59AM	0	.0	1	.0	1	.0	2	.0
4AM - 4:59AM	2	.0	2	.0	0	.0	4	.0
5AM - 5:59AM	9	.0	1	.0	5	.1	15	.0
6AM - 6:59AM	52	.1	12	.0	2	.0	66	.1
7AM - 7:59AM	103	.3	19	.1	5	.1	127	.2
8AM - 8:59AM	78	.2	48	.2	1	.0	127	.2
9AM - 9:59AM	16	.0	30	.1	2	.0	48	.1
10AM - 10:59AM	15	.0	31	.1	7	.1	53	.1
11AM - 11:59AM	2	.0	30	.1	2	.0	34	.0
12PM - 12:59PM	9	.0	19	.1	4	.1	32	.0
1PM - 1:59PM	4	.0	13	.0	1	.0	18	.0
2PM - 2:59PM	9	.0	14	.0	6	.1	29	.0
3PM - 3:59PM	16	.0	19	.1	3	.1	38	.1
4PM - 4:59PM	25	.1	19	.1	7	.1	51	.1
5PM - 5:59PM	15	.0	25	.1	2	.0	42	.1
6PM - 6:59PM	5	.0	8	.0	1	.0	14	.0
7PM - 7:59PM	0	.0	5	.0	0	.0	5	.0
8PM - 8:59PM	0	.0	2	.0	0	.0	2	.0
9PM - 9:59PM	1	.0	0	.0	0	.0	1	.0
10PM - 10:59PM	2	.0	2	.0	0	.0	4	.0
11PM - 11:59PM	0	.0	1	.0	0	.0	1	.0
Total	364	1.0	301	1.0	49	1.0	714	1.0

If preferred a different departure time.

TABLE 1-16: TRAVEL TIME

Approximately how long did it take you, door-to-door, to drive from <begin location> to <end location>?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than 20 minutes	34	5.0%	27	4.2%	3	2.7%	64	4.5%
20 to 39 minutes	199	29.4%	149	23.1%	23	20.4%	371	25.8%
40 to 59 minutes	164	24.2%	106	16.4%	24	21.2%	294	20.5%
60 to 119 minutes	185	27.3%	167	25.9%	36	31.9%	388	27.0%
Two hours or more	96	14.2%	197	30.5%	27	23.9%	320	22.3%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-17: CALCULATED TRAVEL DISTANCE

Google calculated travel distance

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than 20 miles	318	46.9%	226	35.0%	43	38.1%	587	40.8%
20 to 39 miles	209	30.8%	119	18.4%	29	25.7%	357	24.8%
40 to 59 miles	67	9.9%	94	14.6%	9	8.0%	170	11.8%
60 miles or more	84	12.4%	207	32.0%	32	28.3%	323	22.5%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-18: DELAY DUE TO TRAFFIC CONGESTION

Amount of delay experienced due to traffic congestion

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
No delay	204	30.1%	321	49.7%	38	33.6%	563	39.2%
Less than 15 minutes	114	16.8%	70	10.8%	17	15.0%	201	14.0%
15-29 minutes	175	25.8%	106	16.4%	19	16.8%	300	20.9%
30 or more minutes	185	27.3%	149	23.1%	39	34.5%	373	26.0%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-19: PERCEIVED LEVEL OF CONGESTION

How would you classify the level of congestion on I-95 corridor during your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Extreme congestion	142	20.9%	69	10.7%	26	23.0%	237	16.5%
Moderate congestion	314	46.3%	269	41.6%	51	45.1%	634	44.1%
Low congestion	166	24.5%	212	32.8%	24	21.2%	402	28.0%
No congestion at all	56	8.3%	96	14.9%	12	10.6%	164	11.4%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-20: VEHICLE OCCUPANCY

Including you, how many people were in the vehicle on your trip?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1 (I drove alone)	555	81.9%	228	35.3%	76	67.3%	859	59.8%
2 people	88	13.0%	284	44.0%	31	27.4%	403	28.0%
3 people	25	3.7%	78	12.1%	6	5.3%	109	7.6%
4 people	6	.9%	43	6.7%	0	.0%	49	3.4%
5 people	0	.0%	9	1.4%	0	.0%	9	.6%
6 people or more	4	.6%	4	.6%	0	.0%	8	.6%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-21: TRIP FREQUENCY

How often have you made this same trip, in this direction, between your origin and destination in the past month (30 days)?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
5 or more times per week	399	58.8%	24	3.7%	8	7.1%	431	30.0%
4 times per week	51	7.5%	21	3.3%	3	2.7%	75	5.2%
2-3 times per week	80	11.8%	59	9.1%	16	14.2%	155	10.8%
1 time per week	39	5.8%	69	10.7%	15	13.3%	123	8.6%
2-3 times per month	36	5.3%	134	20.7%	21	18.6%	191	13.3%
1 time per month	28	4.1%	123	19.0%	16	14.2%	167	11.6%
Less than 1 time per month	45	6.6%	216	33.4%	34	30.1%	295	20.5%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-22: USE OF METRO NORTH RAILROAD

Do you ever use Metro North Railroad to make this trip, or a portion of this trip, from your origin to your destination?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes	117	17.3%	93	14.4%	17	15.0%	227	15.8%
No	561	82.7%	553	85.6%	96	85.0%	1210	84.2%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

If uses Metro North Railroad.

TABLE 1-23: METRO NORTH RAILROAD FREQUENCY

How often do you use Metro North Railroad to make this trip, or a portion of this trip, from your origin to your destination?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
5 or more days per week	4	3.4%	3	3.2%	2	11.8%	9	4.0%
3-4 days per week	16	13.7%	3	3.2%	1	5.9%	20	8.8%
1-2 days per week	22	18.8%	10	10.8%	0	.0%	32	14.1%
1-3 days per month	22	18.8%	11	11.8%	6	35.3%	39	17.2%
Less than one day per month	39	33.3%	44	47.3%	6	35.3%	89	39.2%
Less than one day per year	14	12.0%	22	23.7%	2	11.8%	38	16.7%
Total	117	100.0%	93	100.0%	17	100.0%	227	100.0%

If uses Metro North Railroad.

TABLE 1-24: METRO NORTH RAILROAD PAYMENT METHOD

How do you pay the fare when you use Metro North Railroad for your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
I use a monthly pass	16	13.7%	9	9.7%	5	29.4%	30	13.2%
I use a weekly pass	5	4.3%	1	1.1%	0	.0%	6	2.6%
I use a 10-trip pass	24	20.5%	8	8.6%	0	.0%	32	14.1%
I pay per trip	72	61.5%	75	80.6%	12	70.6%	159	70.0%
Total	117	100.0%	93	100.0%	17	100.0%	227	100.0%

If uses Metro North Railroad.

TABLE 1-25: USE OF ALTERNATE ROUTES

Do you ever use roads other than I-95 or Merritt Parkway to make this same trip?								
	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I sometimes use other roads to make this same trip	332	49.0%	214	33.1%	51	45.1%	597	41.5%
No, I could use other roads for this same trip but I prefer taking I-95/Merritt Parkway instead	149	22.0%	182	28.2%	24	21.2%	355	24.7%
No, taking other roads is not a viable option for me to make this same trip	197	29.1%	250	38.7%	38	33.6%	485	33.8%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-26: USE OF I-84

Do you ever use I-84 to avoid using I-95 corridor to make this same trip?								
	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I sometimes use I-84 to make this same trip	18	41.9%	37	30.8%	9	47.4%	64	35.2%
No, I could use I-84 for this same trip but I prefer taking I-95/Merritt Parkway instead	7	16.3%	31	25.8%	2	10.5%	40	22.0%
No, taking I-84 is not a viable option for me to make this same trip	18	41.9%	52	43.3%	8	42.1%	78	42.9%
Total	43	100.0%	120	100.0%	19	100.0%	182	100.0%

If trip is greater than 100 miles in total distance.

TABLE 1-27: ETC OWNERSHIP

Do you currently have a transponder, such as E-ZPass, in your car for electronic toll collection?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I have an E-ZPass transponder or similar	392	57.8%	390	60.4%	69	61.1%	851	59.2%
No, I do not have a transponder but I plan to get one	59	8.7%	54	8.4%	13	11.5%	126	8.8%
No, I do not have a transponder and I do not plan to get one	227	33.5%	202	31.3%	31	27.4%	460	32.0%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

1.2 | DEBRIEF AND OPINION QUESTIONS—EXPRESS LANES ON I-95

TABLE 1-28: PRIMARY REASON FOR NOT SELECTING TOLLED I-95 EXPRESS LANES

In the previous set of questions, what is the primary reason you never selected the Tolled I-95 Express Lanes to make your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Toll cost on Express Lanes is too high	65	20.1%	48	18.0%	9	19.6%	122	19.2%
Opposed to Express Lanes	26	8.0%	18	6.8%	2	4.3%	46	7.2%
I am not sure if I understand the Express Lanes concept very well	2	.6%	7	2.6%	1	2.2%	10	1.6%
Time savings not worth the toll cost	165	50.9%	152	57.1%	26	56.5%	343	53.9%
Other, please specify:	66	20.4%	41	15.4%	8	17.4%	115	18.1%
Total	324	100.0%	266	100.0%	46	100.0%	636	100.0%

If never selected tolled I-95 Express Lanes alternative.

TABLE 1-29: EXPRESS LANES USE

Under what scenarios are you likely to use the Tolled Express Lanes on I-95? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Going to an important meeting or event	229	35.0%	239	38.5%	47	42.3%	515	37.2%
Worried about arriving somewhere on time like going to the airport, etc.	289	44.2%	335	54.0%	59	53.2%	683	49.3%
Running late for work	276	42.2%	158	25.5%	37	33.3%	471	34.0%
Running late for day care	49	7.5%	39	6.3%	9	8.1%	97	7.0%
Running late to an appointment or meeting	199	30.4%	219	35.3%	46	41.4%	464	33.5%
Other	49	7.5%	83	13.4%	15	13.5%	147	10.6%
I will never use the Express Lanes	139	21.3%	101	16.3%	25	22.5%	265	19.1%
Total	654	NA	620	NA	111	NA	1385	NA

TABLE 1-30: OPINION OF EXPRESS LANES

Which of the following best describes how you feel about Tolled Express Lanes on I-95?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly favor	74	11.3%	79	12.7%	14	12.6%	167	12.1%
Somewhat favor	135	20.6%	153	24.7%	23	20.7%	311	22.5%
Neutral	129	19.7%	133	21.5%	26	23.4%	288	20.8%
Somewhat opposed	103	15.7%	105	16.9%	21	18.9%	229	16.5%
Strongly opposed	213	32.6%	150	24.2%	27	24.3%	390	28.2%
Total	654	100.0%	620	100.0%	111	100.0%	1385	100.0%

TABLE 1-31: REASON(S) FOR FAVORING EXPRESS LANES

Why are you in favor of Tolled Express Lanes on I-95? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Faster travel times in the proposed Express Lanes	146	69.9%	177	76.3%	24	64.9%	347	72.6%
Easier driving in the proposed Express Lanes	98	46.9%	122	52.6%	16	43.2%	236	49.4%
More predictable/reliable travel times in the proposed Express Lanes	112	53.6%	129	55.6%	21	56.8%	262	54.8%
Safe road conditions	53	25.4%	75	32.3%	13	35.1%	141	29.5%
Reduced emissions and improved air quality	38	18.2%	55	23.7%	3	8.1%	96	20.1%
Fuel savings by traveling faster in the proposed Express Lanes	61	29.2%	66	28.4%	7	18.9%	134	28.0%
Other	20	9.6%	20	8.6%	9	24.3%	49	10.3%
Total	209	NA	232	NA	37	NA	478	NA

If somewhat or strongly favors Tolled Express Lanes on I-95.

TABLE 1-32: REASON(S) FOR OPPOSING EXPRESS LANES

Why are you opposed to Tolled Express Lanes on I-95? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Opposed to the Express Lanes concept	56	17.7%	40	15.7%	3	6.3%	99	16.0%
Impact of tolling on residents who can't afford it	131	41.5%	112	43.9%	18	37.5%	261	42.2%
Opposed to paying tolls on I-95 in general	179	56.6%	141	55.3%	27	56.3%	347	56.1%
Toll costs are too high on Express Lanes	114	36.1%	93	36.5%	16	33.3%	223	36.0%
Opposed to spending money on road construction projects	41	13.0%	21	8.2%	2	4.2%	64	10.3%
Would rather see more investments in alternative transportation options such as transit	76	24.1%	62	24.3%	7	14.6%	145	23.4%
Other	59	18.7%	42	16.5%	7	14.6%	108	17.4%
Total	316	NA	255	NA	48	NA	619	NA

If somewhat or strongly opposes Tolled Express Lanes on I-95.

1.3 | DEBRIEF AND OPINION QUESTIONS—CONGESTION PRICING ON ALL LANES

TABLE 1-33: PRIMARY REASON FOR NOT SELECTING TOLLED ROUTE

In the previous set of questions, what is the primary reason you never selected I-95/ Route 15 (Merritt Parkway) to make your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Toll cost is too high	80	22.5%	60	20.8%	6	11.8%	146	21.0%
Opposed to paying tolls	116	32.7%	89	30.9%	18	35.3%	223	32.1%
Opposed to congestion pricing in the I-95 corridor	36	10.1%	31	10.8%	7	13.7%	74	10.7%
Time savings not worth the toll cost	86	24.2%	75	26.0%	16	31.4%	177	25.5%
Do not want to set up an E-ZPass account	4	1.1%	1	.3%	1	2.0%	6	.9%
Other, please specify:	33	9.3%	32	11.1%	3	5.9%	68	9.8%
Total	355	100.0%	288	100.0%	51	100.0%	694	100.0%

If never selected tolled I-95 or Merritt Parkway alternative.

TABLE 1-34: DIRECTION OF DEPARTURE TIME SHIFT

Would you be more likely to travel before peak period start time or after peak period end time?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Travel before the peak period	72	48.0%	52	36.1%	2	11.8%	126	40.5%
Travel after the peak period	52	34.7%	54	37.5%	10	58.8%	116	37.3%
Not sure	26	17.3%	38	26.4%	5	29.4%	69	22.2%
Total	150	100.0%	144	100.0%	17	100.0%	311	100.0%

If selected to shift departure time in stated preference section.

TABLE 1-35: PRIMARY REASON FOR NOT SELECTING ALTERNATE DEPARTURE TIME

In the previous set of questions, what is the primary reason you never chose to change the departure time of your trip?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Do not have flexibility in arrival time due to work, school schedule, etc.	80	25.0%	25	17.9%	3	9.1%	108	21.9%
Do not have flexibility in departure time due to work, school schedule, etc.	90	28.1%	24	17.1%	11	33.3%	125	25.4%
Parking cost or availability	3	.9%	4	2.9%	1	3.0%	8	1.6%
Time savings not enough	34	10.6%	15	10.7%	4	12.1%	53	10.8%
Cost savings not enough	28	8.8%	17	12.1%	2	6.1%	47	9.5%
Time required to shift current trip is too great	11	3.4%	6	4.3%	2	6.1%	19	3.9%
Other appointments prevent changing travel time	8	2.5%	9	6.4%	3	9.1%	20	4.1%
Prefer my current departure time	46	14.4%	35	25.0%	4	12.1%	85	17.2%
Other, please specify	20	6.3%	5	3.6%	3	9.1%	28	5.7%
Total	320	100.0%	140	100.0%	33	100.0%	493	100.0%

If never selected to shift departure time in stated preference section.

TABLE 1-36: POTENTIAL CHANGE IN FUTURE TRIP RATES

In the future, would you change the number of trips you make by car if the toll cost to use the I-95 corridor was <toll cost> and the door-to-door travel time was <travel time> minutes?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Yes, I would make fewer trips	185	27.3%	267	41.3%	44	38.9%	496	34.5%
Yes, I would make more trips	38	5.6%	49	7.6%	4	3.5%	91	6.3%
No, I would make the same number of trips	455	67.1%	330	51.1%	65	57.5%	850	59.2%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-37: FACTORS TO INCREASE USE OF METRO NORTH RAILROAD

What improvements to Metro North Railroad would make you more likely to consider it for your trips in the region? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
More station parking	145	26.5%	106	22.5%	19	23.8%	270	24.6%
Better connecting feeder bus service to the stations	101	18.5%	74	15.7%	16	20.0%	191	17.4%
More frequent Metro North Railroad service	118	21.6%	99	21.0%	13	16.3%	230	20.9%
More reliable Metro North Railroad service	127	23.2%	97	20.6%	16	20.0%	240	21.8%
Faster Metro North Railroad service	107	19.6%	86	18.2%	18	22.5%	211	19.2%
Longer operation hours	44	8.0%	45	9.5%	5	6.3%	94	8.6%
Lower cost	180	32.9%	156	33.1%	22	27.5%	358	32.6%
Other, please specify	116	21.2%	92	19.5%	17	21.3%	225	20.5%
None of the above	148	27.1%	134	28.4%	23	28.8%	305	27.8%
Total	547	NA	472	NA	80	NA	1099	NA

If respondent never selected to travel on the Metro North Railroad in stated preference section.

TABLE 1-38: OPINION OF CONGESTION PRICING ON ALL LANES

Based on the information provided to you earlier, which of the following best describes how you feel about pricing all lanes in the I-95 corridor?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly favor	34	5.0%	37	5.7%	15	13.3%	86	6.0%
Somewhat favor	83	12.2%	99	15.3%	9	8.0%	191	13.3%
Neutral	113	16.7%	132	20.4%	18	15.9%	263	18.3%
Somewhat opposed	117	17.3%	137	21.2%	24	21.2%	278	19.3%
Strongly opposed	331	48.8%	241	37.3%	47	41.6%	619	43.1%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-39: REASON(S) FOR FAVORING CONGESTION PRICING ON ALL LANES

Why are you in favor of pricing all lanes in the I-95 corridor? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Shorter travel time	62	53.0%	67	49.3%	11	45.8%	140	50.5%
More reliable travel time	49	41.9%	58	42.6%	6	25.0%	113	40.8%
Less congestion	62	53.0%	74	54.4%	11	45.8%	147	53.1%
Improved roadway conditions	47	40.2%	49	36.0%	8	33.3%	104	37.5%
Safer road conditions	33	28.2%	32	23.5%	5	20.8%	70	25.3%
Generates revenue for transportation improvements and maintenance	55	47.0%	66	48.5%	14	58.3%	135	48.7%
Reduced emissions and improved air quality	30	25.6%	27	19.9%	3	12.5%	60	21.7%
Other	5	4.3%	9	6.6%	1	4.2%	15	5.4%
Total	117	NA	136	NA	24	NA	277	NA

If somewhat or strongly favors the project.

TABLE 1-40: REASON(S) FOR OPPOSING CONGESTION PRICING ON ALL LANES

Why are you opposed to pricing all lanes in the I-95 corridor? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Opposed to paying tolls in general	188	42.0%	152	40.2%	19	26.8%	359	40.0%
Opposed to paying tolls on the I-95 corridor	196	43.8%	152	40.2%	30	42.3%	378	42.1%
I am fine with current traffic conditions	51	11.4%	45	11.9%	4	5.6%	100	11.1%
Toll costs are too high	217	48.4%	188	49.7%	29	40.8%	434	48.4%
Do not like electronic toll collection	32	7.1%	33	8.7%	7	9.9%	72	8.0%
Opposed to spending money on road construction projects	36	8.0%	33	8.7%	0	.0%	69	7.7%
Would rather see more investments in alternative transportation options such as transit	89	19.9%	74	19.6%	11	15.5%	174	19.4%
Other	95	21.2%	74	19.6%	16	22.5%	185	20.6%
Total	448	NA	378	NA	71	NA	897	NA

If somewhat or strongly opposes the project.

TABLE 1-41: IMPROVEMENTS TO CORRIDOR FROM CONGESTION PRICING REVENUE

If congestion pricing were implemented, what type of improvements would you like to see using the revenue generated from pricing in the I-95 corridor? (Select all that apply)

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Improvements to I-95	426	62.8%	420	65.0%	78	69.0%	924	64.3%
Improvements to Route 15 (Merritt Parkway)	253	37.3%	221	34.2%	37	32.7%	511	35.6%
Improvements to Metro North Rail road service and parking	220	32.4%	213	33.0%	34	30.1%	467	32.5%
Improvements to bus service (including Express Bus service)	85	12.5%	82	12.7%	10	8.8%	177	12.3%
I don’t have a preference	108	15.9%	118	18.3%	14	12.4%	240	16.7%
Total	678	NA	646	NA	113	NA	1437	NA

TABLE 1-42: PREFERRED CONGESTION RELIEF ALTERNATIVE

Which of the two alternatives do you prefer more to relieve congestion on the I-95 corridor?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
I prefer tolling all lanes on I-95 and/or Merritt Parkway	62	9.5%	73	11.8%	12	10.8%	147	10.6%
I prefer adding Express Lanes on I-95	283	43.3%	307	49.5%	48	43.2%	638	46.1%
I am neutral to both alternatives	85	13.0%	85	13.7%	16	14.4%	186	13.4%
I do not like either of the alternatives	224	34.3%	155	25.0%	35	31.5%	414	29.9%
Total	654	100.0%	620	100.0%	111	100.0%	1385	100.0%

TABLE 1-43: TOLL ATTITUDE STATEMENT I

How strongly do you agree or disagree with each of the following statements?: I would be willing to pay a reasonable toll if it guarantees a travel time for my trip that is reliable

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	111	16.4%	131	20.3%	27	23.9%	269	18.7%
Agree	225	33.2%	233	36.1%	31	27.4%	489	34.0%
Neutral	114	16.8%	107	16.6%	26	23.0%	247	17.2%
Disagree	81	11.9%	74	11.5%	10	8.8%	165	11.5%
Strongly Disagree	147	21.7%	101	15.6%	19	16.8%	267	18.6%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-44: TOLL ATTITUDE STATEMENT II

How strongly do you agree or disagree with each of the following statements?: I will use a toll route if the tolls are reasonable and I save time

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	121	17.8%	156	24.1%	28	24.8%	305	21.2%
Agree	236	34.8%	232	35.9%	32	28.3%	500	34.8%
Neutral	109	16.1%	111	17.2%	26	23.0%	246	17.1%
Disagree	70	10.3%	60	9.3%	10	8.8%	140	9.7%
Strongly Disagree	142	20.9%	87	13.5%	17	15.0%	246	17.1%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-45: TOLL ATTITUDE STATEMENT III

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls to pay for highway improvements

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	98	14.5%	112	17.3%	27	23.9%	237	16.5%
Agree	193	28.5%	199	30.8%	29	25.7%	421	29.3%
Neutral	134	19.8%	148	22.9%	26	23.0%	308	21.4%
Disagree	89	13.1%	70	10.8%	9	8.0%	168	11.7%
Strongly Disagree	164	24.2%	117	18.1%	22	19.5%	303	21.1%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-46: TOLL ATTITUDE STATEMENT IV

How strongly do you agree or disagree with each of the following statements?: I support increased or new taxes to pay for highway improvements

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	52	7.7%	47	7.3%	17	15.0%	116	8.1%
Agree	116	17.1%	128	19.8%	20	17.7%	264	18.4%
Neutral	123	18.1%	143	22.1%	24	21.2%	290	20.2%
Disagree	152	22.4%	130	20.1%	26	23.0%	308	21.4%
Strongly Disagree	235	34.7%	198	30.7%	26	23.0%	459	31.9%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-47: TOLL ATTITUDE STATEMENT V

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls to pay for transit improvements

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	82	12.1%	100	15.5%	19	16.8%	201	14.0%
Agree	166	24.5%	161	24.9%	32	28.3%	359	25.0%
Neutral	146	21.5%	154	23.8%	20	17.7%	320	22.3%
Disagree	112	16.5%	95	14.7%	13	11.5%	220	15.3%
Strongly Disagree	172	25.4%	136	21.1%	29	25.7%	337	23.5%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-48: TOLL ATTITUDE STATEMENT VI

How strongly do you agree or disagree with each of the following statements?: I support increased or new taxes to pay for transit improvements

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	58	8.6%	43	6.7%	12	10.6%	113	7.9%
Agree	92	13.6%	139	21.5%	23	20.4%	254	17.7%
Neutral	125	18.4%	122	18.9%	27	23.9%	274	19.1%
Disagree	167	24.6%	145	22.4%	18	15.9%	330	23.0%
Strongly Disagree	236	34.8%	197	30.5%	33	29.2%	466	32.4%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-49: TOLL REVENUE ATTITUDE STATEMENT I

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for highway improvements in the I-95 corridor

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	96	14.2%	85	13.2%	23	20.4%	204	14.2%
Agree	187	27.6%	156	24.1%	23	20.4%	366	25.5%
Neutral	148	21.8%	186	28.8%	26	23.0%	360	25.1%
Disagree	100	14.7%	98	15.2%	19	16.8%	217	15.1%
Strongly Disagree	147	21.7%	121	18.7%	22	19.5%	290	20.2%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-50: TOLL REVENUE ATTITUDE STATEMENT II

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for transit improvements in the I-95 corridor

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	58	8.6%	43	6.7%	12	10.6%	113	7.9%
Agree	102	15.0%	94	14.6%	20	17.7%	216	15.0%
Neutral	170	25.1%	195	30.2%	26	23.0%	391	27.2%
Disagree	142	20.9%	157	24.3%	22	19.5%	321	22.3%
Strongly Disagree	206	30.4%	157	24.3%	33	29.2%	396	27.6%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-51: TOLL REVENUE ATTITUDE STATEMENT III

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls in the I-95 corridor if the revenue will be used for BOTH highway and transit improvements in the I-95 corridor

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Strongly Agree	85	12.5%	74	11.5%	24	21.2%	183	12.7%
Agree	181	26.7%	187	28.9%	29	25.7%	397	27.6%
Neutral	151	22.3%	169	26.2%	21	18.6%	341	23.7%
Disagree	93	13.7%	93	14.4%	12	10.6%	198	13.8%
Strongly Disagree	168	24.8%	123	19.0%	27	23.9%	318	22.1%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

1.4 | DEMOGRAPHIC QUESTIONS

TABLE 1-52: GENDER

What is your gender?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Female	350	51.6%	324	50.2%	46	40.7%	720	50.1%
Male	328	48.4%	322	49.8%	67	59.3%	717	49.9%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-53: AGE

Which category best indicates your age?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
16–24	31	.0	51	.1	7	.1	89	.1
25–34	147	.2	97	.2	18	.2	262	.2
35–44	149	.2	101	.2	26	.2	276	.2
45–54	172	.3	142	.2	31	.3	345	.2
55–64	139	.2	142	.2	23	.2	304	.2
65–74	35	.1	92	.1	7	.1	134	.1
75 or older	5	.0	21	.0	1	.0	27	.0
Total	678	1.0	646	1.0	113	1.0	1437	1.0

TABLE 1-54: EMPLOYMENT STATUS

What is your employment status?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Employed full-time	537	79.2%	307	47.5%	80	70.8%	924	64.3%
Employed part-time	63	9.3%	55	8.5%	5	4.4%	123	8.6%
Self-employed	52	7.7%	64	9.9%	17	15.0%	133	9.3%
Student	0	.0%	26	4.0%	2	1.8%	28	1.9%
Student and employed	11	1.6%	24	3.7%	2	1.8%	37	2.6%
Homemaker	1	.1%	30	4.6%	1	.9%	32	2.2%
Retired	9	1.3%	105	16.3%	3	2.7%	117	8.1%
Disabled and unable to work	0	.0%	9	1.4%	0	.0%	9	.6%
Unemployed and looking for work	5	.7%	22	3.4%	3	2.7%	30	2.1%
Unemployed and not looking for work	0	.0%	4	.6%	0	.0%	4	.3%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-55: HOUSEHOLD SIZE

How many people live in your household?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1 (I live alone)	97	14.3%	100	15.5%	20	17.7%	217	15.1%
2 people	226	33.3%	258	39.9%	42	37.2%	526	36.6%
3 people	147	21.7%	136	21.1%	19	16.8%	302	21.0%
4 people	131	19.3%	92	14.2%	14	12.4%	237	16.5%
5 or more people	77	11.4%	60	9.3%	18	15.9%	155	10.8%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-56: HOUSEHOLD VEHICLES

How many vehicles are there in your household?	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
0 (no vehicles)	4	.6%	7	1.1%	2	1.8%	13	.9%
1 vehicle	137	20.2%	175	27.1%	31	27.4%	343	23.9%
2 vehicles	343	50.6%	300	46.4%	47	41.6%	690	48.0%
3 vehicles	128	18.9%	107	16.6%	21	18.6%	256	17.8%
4 vehicles	48	7.1%	40	6.2%	8	7.1%	96	6.7%
5 or more vehicles	18	2.7%	17	2.6%	4	3.5%	39	2.7%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

TABLE 1-57: INCOME

What category best indicates your household annual income before taxes?

	Home-Based Work		Home-Based Non-Work		Non-Home-Based		Total	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Less than $24,999	25	3.7%	37	5.7%	7	6.2%	69	4.8%
$25,000-$34,999	26	3.8%	22	3.4%	3	2.7%	51	3.5%
$35,000-$49,999	34	5.0%	53	8.2%	9	8.0%	96	6.7%
$50,000-$74,999	84	12.4%	85	13.2%	15	13.3%	184	12.8%
$75,000-$99,999	86	12.7%	80	12.4%	11	9.7%	177	12.3%
$100,000-$124,999	89	13.1%	80	12.4%	8	7.1%	177	12.3%
$125,000-$149,999	64	9.4%	28	4.3%	9	8.0%	101	7.0%
$150,000-$199,999	75	11.1%	50	7.7%	9	8.0%	134	9.3%
$200,000-$249,999	39	5.8%	23	3.6%	5	4.4%	67	4.7%
$250,000-$299,999	12	1.8%	21	3.3%	5	4.4%	38	2.6%
$300,000 or more	25	3.7%	33	5.1%	9	8.0%	67	4.7%
Prefer not to answer	119	17.6%	134	20.7%	23	20.4%	276	19.2%
Total	678	100.0%	646	100.0%	113	100.0%	1437	100.0%

2.0 COMMERCIAL VEHICLE TABULATIONS

2.1 | INTRODUCTION AND QUALIFICATION QUESTIONS

TABLE 2-1: ROLE

What is your primary type of work?

	Count	Percent
Owner-operator	64	27.2%
Contract owner-operator	39	16.6%
Fleet driver	121	51.5%
Other	11	4.7%
Total	235	100.0%

TABLE 2-2: ROUTING DECISIONS

Who makes the routing decisions for your vehicle?

	Count	Percent
I make all routing decisions	141	60.0%
I make some routing decisions	62	26.4%
Someone else makes all routing decisions	32	13.6%
Total	235	100.0%

2.2 | TRIP DETAIL QUESTIONS

TABLE 2-3: DEFINITION OF QUALIFYING ONE-WAY TRIP

Are you currently making a trip that uses I-95?

	Count	Percent
Yes	232	98.7%
No	3	1.3%
Total	235	100.0%

TABLE 2-4: SINGLE OR MULTI-DAY TRIP

Did/Will you complete your most recent trip in one day or less?

	Count	Percent
Yes	200	85.1%
No	35	14.9%
Total	235	100.0%

TABLE 2-5: TRIP DURATION IN DAYS

If trip took more than one day: How many days <did/will> it take you to make your trip in one direction?

	Count	Percent
2 days	20	57.1%
3 days	8	22.9%
4 days	2	5.7%
6 days or more	5	14.3%
Total	35	100.0%

If trip was not completed in one day or less.

TABLE 2-6: DISTANCE

How long was your trip/will your trip be?

	Count	Percent
Less than 50 miles	13	5.5%
50-99 miles	25	10.6%
100-199 miles	29	12.3%
200-299 miles	45	19.1%
300-399 miles	32	13.6%
400-499 miles	22	9.4%
500-599 miles	11	4.7%
600-699 miles	15	6.4%
700-799 miles	7	3.0%
800 miles or more	36	15.3%
Total	235	100.0%

TABLE 2-7: DEPARTURE TIME

What time did you start your trip?

	Count	Percent
12AM - 12:59AM	9	3.8%
1AM - 1:59AM	3	1.3%
2AM - 2:59AM	5	2.1%
3AM - 3:59AM	8	3.4%
4AM - 4:59AM	9	3.8%
5AM - 5:59AM	20	8.5%
6AM - 6:59AM	21	8.9%
7AM - 7:59AM	16	6.8%
8AM - 8:59AM	19	8.1%
9AM - 9:59AM	20	8.5%
10AM - 10:59AM	19	8.1%
11AM - 11:59AM	19	8.1%
12PM - 12:59PM	19	8.1%
1PM - 1:59PM	8	3.4%
2PM - 2:59PM	18	7.7%
3PM - 3:59PM	8	3.4%
4PM - 4:59PM	5	2.1%
5PM - 5:59PM	4	1.7%
6PM - 6:59PM	2	.9%
7PM - 7:59PM	1	.4%
11PM - 11:59PM	2	.9%
Total	235	100.0%

TABLE 2-8: TRAVEL TIME

How long did it take you, door-to-door, to travel from beginning location to end location?

	Count	Percent
30-59 minutes	8	3.4%
60-119 minutes	6	2.6%
120-179 minutes	16	6.8%
180-239 minutes	23	9.8%
240-299 minutes	17	7.2%
300-359 minutes	19	8.1%
360-419 minutes	17	7.2%
420 minutes or more	129	54.9%
Total	235	100.0%

TABLE 2-9: DELAY DUE TO TRAFFIC CONGESTION

Amount of delay experienced due to traffic congestion

	Count	Percent
No delay	64	34.4%
15 to 29 minutes	12	5.3%
30 or more minutes	137	60.4%
Total	227	100.0%

TABLE 2-10: TOLLS PAID

How much did you pay in tolls on your trip?

	Count	Percent
Did not pay a toll	56	23.8%
Less than $10.00	7	3.0%
$10.00-19.99	10	4.3%
$20.00-39.99	39	16.6%
$40.00-59.99	36	15.3%
$60.00 or more	87	37.0%
Total	235	100.0%

TABLE 2-11: AXLES

How many axles did your vehicle have for your trip/does your vehicle have?

	Count	Percent
2 axles	18	7.7%
3 axles	10	4.3%
4 axles	11	4.7%
5 axles	170	72.3%
6 axles	11	4.7%
7 axles	4	1.7%
8 or more axles	11	4.7%
Total	235	100.0%

TABLE 2-12: TRIP FREQUENCY

How often do you make this same trip, in this direction?

	Count	Percent
6 or more times per week	12	5.1%
4-5 times per week	32	13.6%
2-3 times per week	56	23.8%
1 time per week	43	18.3%
2-3 times per month	37	15.7%
1 time per month	15	6.4%
Less than 1 time per month	33	14.0%
I don't know	7	3.0%
Total	235	100.0%

TABLE 2-13: USE OF ALTERNATE ROUTES

Do you ever use I-84 or other alternate routes to avoid using I-95 to make this same trip? (Select all that apply)

	Count	Percent
Yes, I sometimes use I-84 to make this same trip	152	64.7%
Yes, I sometime use I-684 to make this same trip	48	20.4%
Yes, I sometimes use local or city streets to make this same trip	13	5.5%
No, I do not use any alternate routes	69	29.4%
Total	235	100.0%

TABLE 2-14: ETC OWNERSHIP

Do you currently have transponder, such as E-ZPass in your vehicle for electronic toll collection?

	Count	Percent
Yes, I have an E-ZPass transponder or similar	171	72.8%
No, I do not have a transponder	64	27.2%
Total	235	100.0%

2.3 | DEBRIEF AND OPINION QUESTIONS

TABLE 2-15: PRIMARY REASON FOR NEVER SELECTING I-95

If never selected I-95 in previous screens: Which of the following best describes the reason you never chose the I-95 option in the previous section?

	Count	Percent
Toll cost is too high	26	28.3%
Opposed to paying tolls	15	16.3%
Company policy not to pay tolls	4	4.3%
Opposed to congestion pricing on I-95	17	18.5%
Time savings not worth the toll cost	20	21.7%
Other	10	10.9%
Total	92	100.0%

If never selected tolled option in stated preference section.

TABLE 2-16: OPINION OF CONGESTION PRICING ON I-95

Based on the information provided in this survey, which of the following best describes how you feel about pricing all lanes on I-95?

	Count	Percent
Strongly favor	15	6.4%
Somewhat favor	26	11.1%
Neutral	48	20.4%
Somewhat opposed	32	13.6%
Strongly opposed	114	48.5%
Total	235	100.0%

TABLE 2-17: REASON(S) FOR FAVORING CONGESTION PRICING ON I-95

Why are you in favor of pricing all lanes in the I-95 corridor? (Select all that apply)

	Count	Percent
Shorter travel time	18	43.9%
More reliable travel time	17	41.5%
Less congestion	23	56.1%
Improved roadway conditions	17	41.5%
Safer road conditions	14	34.1%
Generates revenue for transportation improvements and maintenance	14	34.1%
Reduced emissions and improved air quality	4	9.8%
Other	1	2.4%
Total	41	100.0%

If somewhat or strongly favors congestion pricing on I-95.

TABLE 2-18: REASON(S) FOR OPPOSING CONGESTION PRICING ON I-95

Why are you opposed to pricing all lanes in the I-95 corridor? (Select all that apply)

	Count	Percent
Opposed to paying tolls in general	53	36.3%
Opposed to paying tolls on the I-95 corridor	33	22.6%
I am fine with current traffic conditions	65	44.5%
Toll costs are too high	8	5.5%
Do not like electronic toll collection	8	5.5%
Opposed to spending money on road construction projects	6	4.1%
Other	28	19.2%
Total	146	100.0%

If somewhat or strongly opposes congestion pricing on I-95.

TABLE 2-19: TOLL ATTITUDE STATEMENT I

How strongly do you agree or disagree with each of the following statements?: I will use a toll route if the tolls are reasonable and I save time

	Count	Percent
Strongly Agree	59	25.1%
Agree	102	43.4%
Neutral	32	13.6%
Disagree	20	8.5%
Strongly Disagree	22	9.4%
Total	235	100.0%

TABLE 2-20: TOLL ATTITUDE STATEMENT II

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls to pay for highway improvements

	Count	Percent
Strongly Agree	46	19.6%
Agree	85	36.2%
Neutral	36	15.3%
Disagree	29	12.3%
Strongly Disagree	39	16.6%
Total	235	100.0%

TABLE 2-21: TOLL ATTITUDE STATEMENT III

How strongly do you agree or disagree with each of the following statements?: I support increased or new taxes to pay for highway improvements

	Count	Percent
Strongly Agree	27	11.5%
Agree	60	25.5%
Neutral	34	14.5%
Disagree	49	20.9%
Strongly Disagree	65	27.7%
Total	235	100.0%

TABLE 2-22: TOLL ATTITUDE STATEMENT IV

How strongly do you agree or disagree with each of the following statements?: I support the use of tolls in the I-95 corridor if the revenue will be used ONLY for highway improvements in the I-95 corridor

	Count	Percent
Strongly Agree	51	21.7%
Agree	89	37.9%
Neutral	33	14.0%
Disagree	28	11.9%
Strongly Disagree	34	14.5%
Total	235	100.0%

2.4 | COMPANY INFORMATION QUESTIONS

TABLE 2-23: COMPANY HEADQUARTERS

Where is your company's base of operations located?

	Count	Percent
Connecticut	27	11.5%
Massachusetts	12	5.1%
New Jersey	34	14.5%
New York	10	4.3%
Pennsylvania	21	8.9%
Other location WITHIN the U.S.	127	54.0%
Canada	2	.9%
Other location OUTSIDE the U.S.	2	.9%
Total	235	100.0%

TABLE 2-24: FLEET SIZE

If not owner-operator: Approximately how many vehicles dose your company operate?

	Count	Percent
19 or fewer vehicles	34	19.9%
20-99 vehicles	48	28.1%
100-499 vehicles	35	20.5%
500 or more vehicles	49	28.7%
I don't know	5	2.9%
Total	171	100.0%

TABLE 2-25: TYPICAL TRIP LENGTH

What is the typical length of the trips you usually make?

	Count	Percent
Local (less than 50 miles)	8	3.4%
Short haul (50-199 miles)	28	11.9%
Medium haul (200-499 miles)	69	29.4%
Long haul (500 or more miles)	128	54.5%
I don't know	2	.9%
Total	235	100.0%

TABLE 2-26: TYPICAL TRIP FLEXIBILITY

Would you say you typically have a flexible or fixed delivery schedule?

	Count	Percent
Flexible	176	74.9%
Fixed	59	25.1%
Total	235	100.0%

TABLE 2-27: AMOUNT OF FLEXIBILITY

If has flexible schedule: How much flexibility do you typically have in your shipment delivery schedule?	Count	Percent
Less than 30 minutes	13	7.4%
30 to 59 minutes	38	21.6%
1 hour to 1 hour and 59 minutes	37	21.0%
2 hours to 3 hours and 59 minutes	30	17.0%
4 hours to 5 hours and 59 minutes	11	6.3%
6 hours or more	47	26.7%
Total	176	100.0%

If has flexibility in delivery schedule.

TABLE 2-28: DELIVERY PENALTY OR INCENTIVE

Do you have a penalty or incentive time frame structure for deliveries?	Count	Percent
Penalty	48	20.4%
Incentive	14	6.0%
Both	49	20.9%
Neither	124	52.8%
Total	235	100.0%

TABLE 2-29: TOLL RESPONSIBILITY

Who is generally responsible for paying toll costs that you incur?	Count	Percent
I pay tolls	19	11.1%
I pay tolls, but my company reimburses me	29	17.0%
My company pays tolls directly (e.g. using EZ TAG or other transponder)	123	71.9%
Total	171	100.0%

TABLE 2-30: HOW TOLLS ARE CHARGED

How does the company typically charge customers for tolls?	Count	Percent
Tolls are part of the total shipment cost	84	35.7%
Tolls are charged as separate line items	30	12.8%
I don't know	120	51.1%
I never use toll roads	1	0.4%
Total	235	100.0%

APPENDIX C

CONNECTICUT CONGESTION PRICING STATED PREFERENCE SURVEY REPORT

10.2.2015

PREPARED FOR:
CONNECTICUT DEPARTMENT OF TRANSPORTATION

SUBMITTED BY:
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IN COOPERATION WITH:
CDM SMITH

CONTENTS

1.0 PASSENGER VEHICLE SURVEY COMMENTS

Before clicking the "End Survey" button on the last page of the survey, respondents had the opportunity to leave open-ended comments. These comments have been grouped into the following categories and presented below, edited only for extremely profane remarks:

1. Positive and neutral comments about the project or congestion pricing
2. Negative comments about the project or congestion pricing
3. Comments about the survey
4. Comments about transit and non-auto modes
5. Miscellaneous comments

1.1 | POSITIVE & NEUTRAL COMMENTS ABOUT THE PROJECT OR CONGESTION PRICING

- consideration should be given to having tolls at the state boarders at least-- out of state drivers use the roads too, but we are the only ones paying for their upkeep, and some CT residents hardly ever even use these roadways
- CT residents should be exempt from paying tolls. The EZ-pass should not charge them but allow them to pass through the tolls. The tolls should only charge those who use CT roads that are from out-of-state. We have been paying for these roads with the income tax we have been paying and everyone else has been using the roads for free. I agree with tolls on state lines.
- CT. is need of Tax Revenue and Tax Relief for it's citizens! Tolls just need to be brought back already, it's been far too long and far too much talking about it - get it done already!!
- For many years now, I have been frustrated by the congestion and delays on I 95. The situation has only gotten worse. I use I 95 a lot. This is the single, largest negative lifestyle factor in being a Greenwich resident. I think express tolled lanes are the best way of dealing with it. Such lanes exist in the Washington, DC area. It is a good way of providing choice - enabling those who want to minimize travel time to pay, but not requiring everyone on the road to do so. Tolling all lanes is not as good an idea, because of the travel diversions it would incentivize onto local community streets.
- Generally I am opposed to tolling the roadways entirely/mandatory fees for travel. The idea to have optional tolled express lanes is an interesting option. If the cost is low and it greatly reduces travel time, it is more practical or people feel as if they are getting something for their money. I feel that type of option will be better received by the public. Otherwise people will be opposed to a new fee for something that is

currently free (i.e. travel on 95 and route 15) Simply adding a toll won't solve congestion issues. It seems like nearly as many cars will still be on the roadway.

- I also suggest higher toll rates at peak times, much like train tickets. If you use I-95 between 8am and 10am or 4pm and 6pm the tolls double!
- I am in favor of the express lanes only for the people who have and want to spend the money to be in these lanes. For those of us who cannot afford to pay for tolls on a daily, weekly or even monthly basis, we should have the option to choose these lanes or continue to drive in the free lanes. If a circumstance comes up and we have to use these toll lanes at least we know ahead of time that we will need to scrap up some extra money for the trip. Not everyone is in a position to pay for tolls, I would rather leave my house a little earlier and sit in a bit of traffic then to spend money that I don't have.
- I disagree with any extra add ons which takes more money out of the working class households. but like anybody else we want positive results, if this have to be done. As long as there is a choice if you want to pay or not, it shouldn't be a real problem.
- I required toll is just as good as taxing those that live in the area and need to commute on a regular basis. Fairfield County is expensive enough. How about a discounted toll just for Fairfield County residents? The Verrazano Bridge has this for Staten Island residents.
- I strongly support tolling on 95 and the Merritt!
- I use 95 to get into NYC frequently and the current NY tolls are already prohibitive, so if there are tolls on 95 as well I will probably not drive at all.
- I would be in favor of tolls at all state lines entering CT from NY, MA, RI. I would be in favor of discounted toll prices for in-state residents
- I would like to see express lanes as an opinion.
- I would only use the toll lanes if it was inexpensive enough and I absolutely needed to get somewhere in little time.
- I would support a toll at the New York border into CT but not just on Fairfield county roadsnd
- If express lanes are to be implemented there needs to be at least 2 of them and 3 normal travel lanes. Main reason people don't use the Express lane in Hartford is because they get stuck behind a bus going 35 and are unable to pass leading to congestion in normal lanes. Also a toll to use the highway means that I will be spending $10 a week coming down to $40 a month if it is a dollar both ways. That is a bit much for something we were able to do for free. I would say for easier use put a toll booth at each entrance of the state of 95.
- If tolls are implemented it is a good idea to have people enter and get a ticket for payment and pay at the exit ramp to reduce further traffic.

- If tolls are implemented on I-95 charge more for out of state vehicles than for CT residents. I-95 from New Haven on down to Mass. State Line is a mess in the Summer months. I would be in favor of anything which would lessen the congestion in that area.
- If you make the tolls too high it will affect working people with limited choices. You could make rich person (privileged)highways because they can afford the tolls regardless of costs.
- I'm curious to know where the express lanes would go in 95 given that it's only three lanes on each side. Would one of those lanes become express or would a new lane be built?
- interesting
- It is time to place tolls on all lanes of I-95 and I-84. I strongly favor that the tolls on commercial trucks be significant, as in New Jersey, to cut the truck congestion on I-95. I also favor tolls that are placed at or near the state line.
- Just want to make the monies going where it's supposed to be going.
- Make one round trip commuter trip free for CT residents per day and you might have some support.
- Make tolls revenue neutral! Pls cut gas taxes as an offset
- Nice concept..
- NO tools unless voluntary. CT already has too high taxes but what they have collected is not used well. Use what you have better rather than taxing more through tolls.
- paying tolls is another tax...CT has too high taxe for what we get. Lots of waste and overpaid... if tolls, need to be able to net against income tax collected...
- Please hurry! Both routes have grown exponentially worse over the past 10+ years. Enough to consider moving out of state.
- Probably not too realistic, but adding a third toll/express lane to the Merritt would be pretty awesome...
- Put tolls at state borders. Do not force CT residents to pay tolls to go to work in CT. Put tolls at the state borders only. Get your money from the New York and New Jersey drivers who constantly use our highways to get to casinos, RI, and Cape Cod. If you make CT residents exempt if they work at a CT place of employment, then I don't care. I can't afford to get whacked by tolls just to drive to and from work. That is ludicrous. Make NY and NJ people pay before making CT people pay!
- Putting tolls on all lanes of the ONLY two roads that connect the towns of these two counties is unacceptable when wages are already too low, with taxes, gas prices,

and all other living expenses are too high. If the all lanes are tolled, I will be definitely looking to relocate to another state.

- the additional of express shouldn't elimited any existing lanes
- The DC area has toll express lanes. It seemed to help traffic flow. I used the free lanes.
- The I-95 corridor does not have sufficient capacity to support it's traffic volume. I do not believe tolls will correct this because there is no other way for people to get to their destinations. Tolls will increase revenue, but I do not believe they will relieve congestion.
- the toll amount needs to be 1-3 dollars
- Tolls should be charged with ct state residents able to deduct all or a large portion from ct state income tax. Right now far too many out if state cars are using ct roads and highways for free. Not cool! Check out the number of out of state license plates on any given Friday afternoon. Ugh.
- Tolls should be paid by all users, not just by a few using the express lanes. When making road improvements, design/build for future expansion.
- We are close to being the highest taxing state in the US. Before we impose new taxes, we have to eliminate a tax. Taxing only express lanes does seem more like paying for a service rather than placing the burden on everyone. Giving that choice makes it a more acceptable option..
- You may add reasonable tolls if you in turn reduce the gas tax. The state already collects a large amount of tax on each gallon of fuel sold in the state. Tolls would be an additional tax on automobile users.
- i think this is a great idea. The people helping with this survey were teriffic.
- Please publicize this survey on all the social media outlets as possible. and also at this point in the completion of the survey provide a "share" feature by way of one click buttons to the social media of the surveyed parties choice. And allow out of state people to chime in on the survey, do not constrict it to CT residents only as it is heavily used by out of state drivers. The express lane @ $1.50 would be the best option but only if it wouldn't take up one of the existing 3 lanes on i-95.
- I use I-95, the Hutch and Merritt parkways every day for either work, family needs or errands. I have lived here since 2000, and was a Metro-North commuter for 6 years. If I go into Manhattan, i never drive, but take the train instead. So i have plenty of exposure to all forms of transport in the area (except the bus). Tolls are a great fundraiser; the notion of freeways should go the way of the dinosaur! Maintenance is too costly, and we use our roadways heavily. If the states are unwilling to raise the gas tax to generate funds for highway maintenance, then tolls should be allowed. With the current low gas prices, one would think that it's the

perfect time to raise the gas tax - less painful! It would be best to get some of the weight off I-95 by using more rail. Is there any effort on the state's part to increase freight rail and reduce trucking? I have been eased to see the Weigh Station open more often. Finally, whenever i need to travel north/east, i generally choose to hse the Merritt because of the congestion between Stamford and Norwalk. It means more miles, but it's faster. One last thing: what happened to all the signs on the Merritt indicating 'Left lane only to pass'?? In the last few years, there has been a marked increase in L lane travel (even if no one is in the R lane), resulting in increased passing on the right. This is a very dangerous trend; i believe the practice is causing more accidents than ever. People get impatient, passing on the right and often cutting others off. It's especially a problem with MA tag holders, where R passing is allowed...

- I would be in favor of additional lanes on both the Merritt and I-95. It is totally impractical to use busses or trains to carry grocery shopping. Carpooling for shopping makes a lot of sense.
- My husband usually uses Metro-North Railroad to commute to his job in Norwalk because of congestion on I-95 in the morning (and often coming home). Because he has a Disabled rate the tickets are not prohibitively expensive, but one has to add parking at the new West Haven station to that, and he has to get to his job from the East Norwalk Station (not too far, but he has Parkinson's, so he has to keep a car in Norwalk at the commuter lot off Exit 16). There are times the job really isn't worth what he earns because of the hassle. I worked in Devon (exit 31) for almost 20 years and often had to get off I-95 at Woodmont (exit 40) on the way home because of congestion. However, while I think that the Express Lanes are a good idea, I am VERY opposed to tolling the entire highway and/or raising taxes. People are already struggling. The Express Lanes allow you to choose to pay more if you'd like, but you aren't forced to do so. Also, the "reasonability" of a toll is of course debatable. The 75 cent toll was reasonable. $6.75 is a bit harsh - people do not have that kind of money to commute to work, and the BPR will become ever-more congested, as will the Merritt. You will understand if skepticism is evident in my spiel here. We are very used to paying a lot to live in CT and receiving very little in return. I am sure that if people like me say a reasonable toll in an express lane is okay by us that will transmogrify to an exhorbitant toll in all lanes. As a result I'm a bit reluctant to agree to anything...but I would support the express lane with a reasonable toll as described in this survey..nothing else. Also, there are so many out-of-state buses and trucks on I-95, jacking down the air quality (which we end up paying for with the ridiculous emissions program - a true boondoggle and already agreed to accomplish very little if anything) and tearing up the roads without paying - first thing is that all commercial vehicles over a certain tonnage (semis, buses) should be going through special toll lanes already when they enter the state, one in Byram and one in Clarksville (or whatever that R.I. terminus is). Or use the already

extant and sorely underutilized weigh stations to collect a toll from them. Be amazing how those $$$ would add up.

- The state needs to accept that major improvements to highways are needed. For many of us, use of mass transit is not an option. I am paid to drive my own car at work, and frequently start or end my day in different locations, many of which are no where near any transit line (rural). I am not against a reasonable toll, provided that the funds are used only for transportation - and paid equally be everyone at all times of day.
- Congestion on i-95 in Fairfield County is not always caused by commuters. There is a lot of local traffic at all times of the day. Local roads are not much better and the addition of a mall to South Norwalk (x15 area) will only exacerbate the situation. Express lanes would help people traveling through the area, but are not realistic for people only traveling a few exits within the area. How the Express lane is implemented is another factor - there is very little room to add a new lane to 95 through most of the lower Fairfield County corridor. Millions have been spent in Norwalk alone to expand existing exit lanes around x14 and to reconstruct the overpasses. Adding a brand new lane would probably mean redoing those overpasses again... seems wasteful. Adding tolls to BOTH 95 and the Merritt would eliminate a low cost option for travelers. There's enough economic pressure on residents in CT already, forcing people to pay to get to work is absurd. Many people cannot afford to pay tolls on a daily basis. If better public transit options existed, that would be a welcome alternative for many. I live and work in Norwalk and although it's only a 10 min drive to work on local roads, I would love to have a viable public transit option. There is a bus stop near my house, but the flow of the routes would require me to go to a local hub, transfer to another bus and take that to my office... the entire trip would take over 40 min. That is not a realistic alternative. Better transit planning, not just adding more lanes or more buses, is necessary.
- CT is highly taxed already, I support tolls at state lines for out of state travelers to pay to use our roads but I do not feel I need to pay more when I pay enough as is and our roads are filled with all out of state cars paying nothing to use and ruin out roads.
- CTDOT needs to stop this nonsense about tolls without laying out exactly what will be done. The Merritt has a 300-foot wide Right of Way the entire way but is too scared of the nut jobs at the Merritt Parkway Conservancy to add a lane in either direction. The bridges are falling apart; replace them with wider bridges since the work needs to be done anyway. Add a 4th or 5th lane to I-95, and if the people who live around it don't like it - tough! You bought a house right next to a highway! What did you expect? A bucolic setting? And build the Super 7 already - there is no viable method for traveling north-south in the Norwalk to Danbury area. The improvements to the Local 7 are nice but we need high-speed options that don't

depend on a 100-year old catenary wire system that sags whenever it gets too hot or too much snow collects on it.

- First of all Id like to say using tolls for EXPRESS LANES is a good idea, but allowing use of tolls on every lane would simply make myself and thousands of others stick to back roads, causing even worse congestion, damages, more accidents, etc. Also the idea of taking taxes and tolls to improve the highway is good and all, but only if you implement ideas like UK and Germany are doing, take the use of all the free space along side the highway and create solar panels to run the lights, tolls, and possibly even nearby companies. Use the money these tolls will generate to actually do something for the community instead of just for certain people who can afford things like 12 dollar tolls. seems like you are only trying to accommodate a richer america, when in reality the 203 area code (new haven county) where all my friends and family reside, are not in fact rich, and will not be paying such high tolls. thank you for your time, if you in fact read this.
- For the most part, from what I see on the I-95 and Merritt Parkway corridor roads from New York to Rhode Island are many out of state vehicles so why penalize the CT. state drivers with toll or travel fees. It would make CT. residents very satisfied to see a free pass with our registration and proof or residency here in CT. The amount of out of state cars would take care of the expense of repairs and upkeep of our roads. There is also a major concern about the the roads between New Haven and New York on I-95 and the Merritt Parkway being congested because there aren't enough lanes available. Please make more lanes especially on the Merritt parkway. The Merritt parkwayand I-95 is a joke at rush hours Monday through Friday at 8am and 5pm. You end up sitting there for hours trying to get anywhere at these times from New Haven to New York border, it is worse if there an accident, because the state police do not know how to direct traffic when they have a emergencies going on, as they need more training in this area of traffic control and easing up traffic. Thank you for having this survey.
- Hurry up! Seriously. People travel through Connecticut frequently going to New York and Massachusetts and they don't have to pay - We're paying! It's not fair to the people of Connecticut. And if we're planning a t rip we have to leave at 3am in order not to deal with the mass quantity of people in cars.
- I object to any NEW taxes for transportation projects - because the transportation fund has been raided and is not used for the purpose it was intended. If a mandatory toll is enacted on RT95, transponders should be provided free to all CT residents or in the alternative - be required to be purchased by EVERY motor vehicle in the State. Further, should tolls be enacted on only RT 95 or RT 15 in the State - I would probably move to avoid them.
- I strongly feel that people who commute more than 10 or 15 miles should be required to pay tolls. I am also in favor or widening I95 and added express lanes.

Also the exit ramp at Exit 3 should have its own exit lane. Traffic for this exit gets backed up onto the highway and is sometimes causing a backup all the way to exit 4.

- I strongly oppose any new taxes or tolls to deal with the congestion on I95 unless said revenues where used to expand the highway to relieve congestion.
- I think express lanes either toll or non toll would help I-95 congestion considerably. Another option would be to make the Merritt a toll road and keep I-95 non toll so people have a choice. I think some lanes on I-95 should be non-toll with toll express lanes or HOV lanes
- I wish lawmakers realized the gold mine we are sitting on. Connecticut is the gateway to New England and we suffer from it. Our children suffer from asthma and other ailments due to the vehicle emissions on this heavily traveled corridor. Massachusetts taxes us to use their highway, so does New York and New Jersey. Connecticut residents must battle with out of state commerce and travelers on our roadways 12 months out of the year, and it gets worse in the summer. Can you please not tax us any more then we have already been. Can we please set up tolls at our borders???!!!! Can we please tax the millions of out of state trucks and cars that clog up our state roadways? I understand the concept of the express lane and it's a good one. I say toll the borders and provide an express lane at an affordable and reasonable cost to CT residents.
- I would like to see a change in hours of commuting rather than pay for tolls on the highways. There was once talks of staggered start times for companies to help alleviate traffic congestion without additional costs to the public. I would gladly leave my house an hour earlier and leave the office an hour earlier to help with traffic congestion. I'm sure many would like to sleep in an hour and work an hour later too avoid traffic and should balance things out. Perhaps a study into that option should be considered before jumping to a paid option like tolls.
- I would recommend tolls/construction improvements to I-95 exclusively, the Merrit Parkway should be left as it is, furthermore, the areas on I-84 through Waterbury and Danbury are especially slow and if improved would significantly reduce traffic on I-95 and the Merrit.
- If tolls will significantly cut down on travel time and they are affordable, I think they are a good idea. I am extremely worried about some of the pricing scenarios presented in this survey. If the prices are too high, most of the traffic will be diverted to the parkway where there are very few breakdown lanes and areas available for traffic to go around accidents. I currently pay a toll from NY to CT every day on my commute and it is an appropriate fee for my travel time.
- Night construction on Merritt Parkway (approx. exits 34-37) seems to be taking a long time, causing closing of 1 lane. I generally take I-95 because of this, though I prefer the Merritt to avoid trucks. Thank you for any improvements, without exorbitant tolls.

- The money state residents pay in gas and DOT taxes are the highest in the nation. Not to mention our state tax and state income tax, too. Why not put tolls at the state borders, like other states do? This should also include tolls implemented on local roads which cross the state line, as well. And what happened to all the money that's collected every year from our paid taxes and what the Federal government gives the state? Maybe better financial management is what we need, not more taxes or tolls.
- The toll costs seemed to be excessive-- more that NYC bridge crossing tolls! Many of us have jobs that do not have flexible hours and this "all toll lanes" system would be punitive. I noticed that were no questions about carpooling. That has been a life saver for my carpool friend and I. There are so few cars that have more that one person-- do we need better matching systems for carpooling???
- Tolling is especially needed for two reasons: One, to cut down on short trips using the highway. Because of the huge amounts of onramps and offramps, people use I-95 to go one or two exits, causing congestion at each entrance and exit as people enter the highway, merge to the left lanes, then an exit later cut across two lanes to exit the highway. Tolls would force most of those people to take local roads for their trip, allowing I-95 to function better while also decreasing the chance of crashes (I call them crashes because they are never accidents- someone is always at fault). Second, during peak travel times on the weekend, the road is filled with out-of-state drivers, who are not able to anticipate the design of the road (curves, etc) as a Connecticut resident and thus slow down traffic through constant braking. Driving on Sundays, there are times when I have been surrounded by drivers from New York, Massachusetts, New Jersey, and Pennsylvania, without a Connecticut license plate in sight. These drivers tend to never stop in Connecticut, and due to the small size of the state, can make it through without even stopping to buy gasoline, meaning the state doesn't even collect gas tax on these drivers. Tolls would rectify this.
- Trucks should be limited on 95 N and S based on hours of travel. There should be more lanes added, and instead of a tolled express lane, there should be 1-2 express lanes with no local access to keep the crazy speeders out of the way and just let them pass through. Better policing should help to ticket the crazy, unsafe, bad drivers, and more attention should be paid to texting drivers. Also, the corridor between exit 8 and 9 northbound is very curvy and prone to accidents.

1.2 | NEGATIVE COMMENTS ABOUT THE PROJECT OR CONGESTION PRICING

- Where is the tax money already collected to improve our highways ?
- 95 and Merritt need additional lanes....not tolls.
- A genuine look at money saving rather than new revenue hitting the taxpayer again.

- As already mentioned, deviding existing lanes will create more congestion. It will just benefit rich adding burden on middle and lower class. Connecticut is already collecting higher tax on gas for not collecting tolls on roads plus tax on vehicles. Charging tolls is unfair to CT residents.
- can not continue to pay for things we pay enough taxes
- congestion tolls sound good. But it would take many, many years to build (look at the length of time the Q bridge and Stratford bridges are taking) during which time the congestion would GREATLY increase. It would cost zillions of dollars. And, assume it starts as a 'small' toll - 2 or 3 dollars perhaps. What do you think it would be after 5 years? Look at the cost of the GW Bridge tolls today.
- CT taxes are already higher. its too bad that the planning on I-95 wasn't done right. Just because of bad planning the State cannot penalize people and collect more taxes. Add tolls I don't believe will reduce the congestion. The state needs to look at creating more lanes
- Cut social services to pay for tolls.
- Cut spending to cover road improvements
- do away with toll roads
- DO NOT CHARGE FOR COMMUTING - WILL LEAVE THE STATE!!! - ANGRY COMMUTER
- Don't add tolls!!!!
- don't think tolls would help the congestion situation
- Electronic tolls that force a person to purchase and use a device that is tied to bank, credit cards and their personal information is an invasion of privacy. I would rather take Route 1 than allow the state to track where I go and when I go there.
- Express Lanes (tolled or non-tolled) may increase the number of wreck less drivers on the roads (as many are fairly wreck less drivers at current). The roads have many "pot-holes", poorly-defined line separations, insufficient merging space and time and I feel that needs to be rectified before considering even adding MORE "Express" lanes and then to charge more...I feel poor driving will increase, thereby leading to more accidents and more "slow downs" in regular and possibly "express" lanes.
- HOV & express lanes can be added without charging. We already pay taxes for improvements not sure why we need an additional tax/ fee
- I am a manufacturers representative, I drive all over. I could modify my trips to avoid toll roads sometimes, changing my itinerary. I think that's absolutely wrong that we should do it. They are going to do it anyway - just raise the taxes. I see them using tolls as a way that they can get more money out of us. People who

drive less or don't drive much think that the drivers should pay for it, but we already are (because we have higher incomes and pay more taxes).

- I am opposed to any new tolls, especially along the I-95 corridor from New Rochelle, NY to Hampton, NH.
- I am strongly against any tolls in Connecticut!!!
- I am strongly opposed to tolls in general. They cause accidents and we should not have to pay any more tolls or taxes
- I do not believe in tolls because there is no guarantee from this state that the $$ will be used for improving train or roads.
- I do not trust the state with any tax money. They are wasteful and in general not very knowledgeable about any the legislation they approve. They constantly throw away money on things that "sound good" or "feel good" Why do they think I95 is so congested during certain times ??? Maybe it's because that's when people are going to/from work. Something people have no control over...GET IT. Now you're proposing to screw them over even more by charging them to travel during those times. This whole thing is just a state scam to make us the #1 Taxed state in the country.
- I don't think its worth the investment to bring back tolls on 95 or merritt. Tolls will add congestion to the road with the stop and go; it will add additional conditions for potential car accidents. Plus its more a waste of time waiting to pay tolls; if electronic, there is another check to write each month. Plus standing cars is a waste of fuel and adds to environmental pollution. The tolls were taken down for good reason. Keep them down. If you need to generate revenue, add to the gas tax like you are doing now.
- I hope this travel study will certainly be used and taken in deep consideration for those of use that oppose tolls on I-95 or on the Merritt Parkway. Tolls do not guarantee our safety, reliability, effectiveness nor does it mean drivers will arrive at their destinations on TIME!. Tolls are too expensive, it's the careless drivers that rubber neck to see accidents, it's the distracted drivers, it's the flashy cars with electronic devices that are unnecessary causes of accidents and waste our travel time and gas. THE STATE OF CONNECTICUT DOESN'T NEED TOLLS THE COST OF LIVING IS TOO HIGH NOW!
- I oppose tolls on the roads in Connecticut. Revenue from the Lottery and Casinos should be used to improve our roads. Good roads and swift road repair will ease congestion.
- I owuld quit my job and work in NY before I pay tolls on top taxes to the state of CT
- I strongly oppose the tolling of lanes on I-95

- I would be opposed to any tolls. we already pay enough tax in CT
- I would take an alternate route if tolls were implemented.
- If the current funds allocated to road improvements was actually used for road improvements then you wouldnt need this survey. Connecticut just increased taxes and now you want to assess more??? Good luck with that!!!! You are opening a can of worms that starts with malfeasance and misappropriation of funds and ends with jail time for somebody.
- If tolls are implemented I will not use those roads. I will stay closer to home or travel back roads to avoid them unless I absolutely have no other alternative.
- If you were to apply tolls during peak times, the secondary roads around town would be poorly affected as a result of that.
- In general, I have concerns with regards to a HOV toll lane because it collapses the traffic on the remaining lanes without ensuring that the desired HOV usage will offset the loss of the lane(s) in the general traffic. So if it comes to tolls, I would prefer the all lanes toll to a separate approach.
- Its a way for the government to steal money from the people once again
- Keep tolls out of CT
- My concern about additional fee for I-95 is there are already so many toll road/bridge between CT and New York City, the sum of the cost is frustrating... especially when you do not have a E-Z pass.
- Next are you going to tax the air we breathe?!???!! Enough already!!!!!!!!!!!!!!!
- no new tolls, this is not new york... we pay too many taxes as is..
- No to any tolls or congestion pricing or increase in gas tax or any other tax. Fairfield County is overtaxed and you are driving people out of Connecticut.
- NO TOLLS ... Taxes are too high already... This is just another sneaky way to tax the middle class.
- No Tolls in CT!!!
- NO TOLLS IN CT!!!!!!!!!
- No tolls on 95 or merritt. Are you crazy? We already have high taxes and now I would have to pay to go to work?
- No tolls! We had them in the past & eliminated them. Think out side the box: create jobs, not higher taxes or tolls!
- NO TOLLS!!!
- Only an idiot would want to bring back the highway tolls, under any circumstances. Yeah to express buses.

- Only legislators too spineless to raise taxes would consider a regressive tax like tolls.
- Please do not put tolls on the roads!   This state is expensive enough to live in as it is.
- please do not toll I-95!!!!
- Relieve congestion completely and then charge the tolls to pay for all of it and keeping it maintained. People are tired of the traffic and adding tolls now is just like you saying, " Now you can all pay for the congestion with tolls while we make more congestion with construction . Ha ha ha ..ha ha.........................."
- Special toll lanes will greatly increase congestion on the remaining toll free lanes, and most people will not be able to afford to routinely pay tolls. So a very affluent minority will have the option of driving in a low traffic lane while everyone else is slowed down. This is grossly unfair, as the road was built with federal tax dollars paid by every citizen. Furthermore, many people can't buy transponders.... They don't have credit cards! You are privatizing a public good.... A modern version of the English enclosure laws.
- The idea of all lanes having electronic tolls only is outrageous! What if you are traveling from say Mass. to NJ? Why would an out of state person have a CT electronic pass?? If that happens the traffic through back roads & neighborhoods is going to be out of control & they will be a lot of very angry CT residents!! What a truly STUPID concept! Whoever thought it up should be fired for incompetence!!!
- There should be no tolls
- There will never be congestion pricing with Express lanes on I-95 or Merritt as CT Gov will never be able to build lanes in our lifetime. Stop kidding yourselves about this, Politicians never met a new tax they did not like. Adding tolls to road again will create new ways for Politicians to "further" price business out of the state.
- this toll proposal will hughly be to disadvantage of stamford residents and others wholive near ny borders . it is lazy effort by ct politicians to raise tax revenues on back of fairfield folks
- tolls do not relieve traffic congestion - look at NYC - there are alternatives - please figure out another way
- Tolls on 95 will lead to people leaving the highway and further congesting route 1 in Greenwich. I oppose adding tolls in this area due to already overly congested and unsafe conditions on Route 1 in Greenwich. Residents often use 95 to bypass Rt 1 because of the horrible conditions and traffic on 1.
- tolls will increase high way accidents and will cost people a lot more time and unnecessary time delays... Just look at New York Traffic!
- Tolls will not get rid of all the traffic congestion.

- We are taxed ENOUGH in CT don't add tolls to the mix too. Need to think about getting out of this state.
- we cant afford paying anything else in this state
- we got rid of tolls once so don't bring them back
- We had tolls on I-95 for many years while the rest of the State had none. the State never did anything to improve the infrastructure then, what makes anyone believe that new tolls will improve things now. It is unfairly charging local Fairfield County residents, who already pay more than their share to the State, to get around where they live. This State is getting worse and worse to live in, and I for one can't wait to leave it and take all the taxes I pay with me. New tolls would be just another reason to leave.
- WE have been asleep for too many years over fixing the I 95 route . too little too late now
- We have lived with I-95 Q bridge construction for years-----I hesitate to think how many more years I-95will be a mess getting electronic tolls up and changing exits/entrances to allow express lanes.
- We pay enough in car tax, please do not toll the roads.
- With how much more REVENUE CT collects in gasoline and diesel fuel tax i cant belive that there is going to be a toll on the hyway or parkway to slow things down and cost the taxpayers of this state even more than it already dose to live here.
- With the high amount of taxes we pay in CT both state and federal I really don't think the taxpayers should be forced to pay for tolls too
- you are wasting your time and the public office.
- You had tolls before and did nothing about maintaining roads, i.e. the Mianus bridge and generally poorly maintained roads. It is bad enough that those of us in Fairfield County support the rest of the state, now you want us to pay for awful commute as well?
- I agree to have tolls to decreae taxes overall. I feel it is crazy to even consider placing tolls on that part of 95. Place tolls north of New Haven.
- I believe the toll cost for using the express lanes are too expensive for someone that would use the i95 often.   If there is an EZPass implemented it would help tremendously.
- I disagree with the use of tolls unless they put tolls around for a set amount of time and then remove them wants a set amount of money is made for improvements otherwise the tolls just keep going up, the traffic remains the same and it's harder on the pockets of working people. We pay enough in taxes that they can use on roads and the improvements never seem to come. Example: The George Washington Bridge

- If tolls are implemented CT residents should have the ability to purchase plates for the year at a reasonable cost of between $15 -$25, any out of state vehicle should pay a fee of $3 with semi's paying between $5-$10 and it should include all borders such as 95,15,84,91. If out of state vehicles are using are highways they should pay as does NY,NJ,Del,MD,VA, especially the semi's.Why put the burden on CT residents!!!!!
- If tolls are needed they should be place in and around Hartford and our honorable law makers should pay their own tolls from their pockets and stop trying to suck the life blood from the working class.
- Mandatory tolls is a recipe for disaster because motorists come through Ct without transponders and there are people who object to their use. They will cause problems with this system. I object to tolls on I-95. If they were enacted for express lanes, I would not use them, but having them for long-distance travelers may reduce some congestion in the remaining lanes. As it is, I plan trips on I-95 carefully and when a trip is optional and the road is congested, I wait for another time. Putting tolls on I-95 will have a major impact on Route 1.
- This is a bad idea on so many levels. CT residents should not have to pay one thin dime to travel on CT roads. We already pay extremely high taxes and have paid for the roads over and over. The only way this scenario is palatable is if you only toll/tax out-of-state drivers (even if they work in CT). Out-of-state drivers should be taxed to use our roads. If you are driving a ct registered vehicle you have already been taxed out the ying-yang. Tax out-of-staters and use the money any way you want for transit/traffic improvements.
- Tolls are a new form of taxes. Connecticut has too many and too high a tax rate as it is. I think if you moved all the truck, commercial and combination plate vehicles to an HOV or Express lane it would do more for relieving congestion and improving commute times than having regular drivers carry the burden of additional tolls/taxes/costs. And, it wouldn't involve any new costs.
- While I agree tolls would be beneficial I believe that as a state we are already paying taxes such as the highest gas tax that should pay for transportation improvements.
- 1. I live near I95 (between Exit 5 and 6) we really need sound barriers. Curious that they are common on I-95 in many towns and cities but in Greenwich only between exits 2 and 3 the private Belle Haven section. 2. I suggest congestion (rush hours) only tolls all lanes of I-95 and Merritt. This might encourage greater public transit use and reduce congestion during peak hours. 3. Exit 6 northbound on ramp is short and very dangerous. Needs changes. 4. During rush hours On I-95 Consider limiting tractor trailers to right hand lane only between I-91 and New York state line. Trucks also need more parking spaces at rest areas - perhaps this along with above? Consider exempting trucks to congestion tolls if right hand only lane change introduced. Another idea no truck tolls between 8 pm and 5 am. 5. Car

train service with stops in D.C. / New York City(suburb) / Stamford / New Haven / Providence / Boston (suburb) 6. HOV lanes on I-95 with reduced or no tolls

- This survey appears to be skewed to elicit answers that support adding tolls to the highways in CT. I am opposed to any tolling on our roadways particularly electronic tolls that can be raised sereptiously avoiding any great public outcry
- A very big concern that I have with any "improvements" to I-95 in Fairfield County is that it may negatively impact the already congested area by slowing traffic even more during construction efforts. This area of the state is a nightmare of a commute. Metro-North trains are not a viable option due to lack of access, lack of reliability, lack of reasonably priced station to workplace transporatation. I was enthusiastic to take the train to work in Stamford when I first moved to Fairfield County. My early rise time was turned back on hour more to accommodate the mile walk to the train station and increased commute time, all while hoping that the trains were running on time. During troublesome weather there is the concern of trains not running and being stranded thirty miles from home without a vehicle. Much too anxious of an environment to be a viable option for a thirty mile commute.
- CT gas taxes are intended for the improvement of our highway and infrastructure and should be directed towards those things, not towards the general fund. Transit/bus improvements are a waste of time; the flexibility afforded by having a car is essential, particularly for those who work more than one job or have obligations that are not in the same town in which they live. Public transit is unreliable, expensive, and does not allow one to go outside of a major metropolitan area (let alone do things like grocery shopping, moving, etc. easily.) I-95 needs more lanes (free, not tolled), and so does the Merritt. The volume of traffic will not decrease because of tolls, and people don't have flexibility in their schedules to deal with surge pricing. If someone has the option to not drive in rush hour, they will do so in order to avoid the congestion already - adding a toll penalty to those who cannot shift their schedules is incredibly unfair, since those are most likely the people working several jobs who cannot afford a toll.
- Express lanes would not solve the traffic problem. It will just allow the privelaged people (who can afford) to travel faster. The rest of us will be jamed in two lines that would entirely stop the traffic from moving. I have seen the express landes in CA. During the traffice hours these lanes are not moving at all so there is no incentive to pay for being there. It is even worst, a single lane would not allow you to pass so you are dependent on a slow moving vehicel on the front of you. I have been living in this area for over 20 years. The traffic on I-95 got to the point that is not moving, everyday I have to enhale toxic air which comes out of all the cars for 45 minutes. My cost of gass is twice higher when my vehicle is not moving. On the top of it you are proposing to further pinalize me and make me to pay tolls. This is not resolving the issue, this is bad planning and reacting to a problem which had

been growing on the front of the government for many years. Their ignorance should not result in us being punished with addtional taxes. Living in this area is expensive enough and for us who has to commute to work everyday without any room for felxibility is just very unfair. With poor transportation system there is no alternative. Taking the train is not fuisible. Parking coast and ticket plus I have to use my car anyway to drove to the station (one exit further on I-95). So how this could help? Maybe the out of controlled development in Stamford (addtional 3,000) appartemtns which have been just completed (approved under Molloy mayership) should be evaluated int erms of traffic congestion prior to their approval. Yes these addtioanl 3,000 cars on I-95 everyday has been making things worst. I think you should go a bit deeper and study Stamford or other larger cities along this corridor. Stamford doesn't have atraffic engineer so the road system has not been improved or studied for ages. Is you think that directing traffic from I-95 on local roads through the city will help, your are wrong. This will paralize the city and your tolls would do just this. Before you drow your conclusion you should conduct more thorough study. RT -1 is not passible during the traffic hours so there are no alternatives other than introducing heavy traffic to residential streets. Again from planing perespective this is not a solution, but invonvininece and imact on the life style of people who had been suffering enough because of the inability of addressing this problem a long time ago. Good luck with your conclusions, so far the proposed solutions are not the right ones.

- I am strongly opposed to tolls and the ridiculous costs suggested to travel 2 exits on a regular basis! Additionally, it will present a hardship for small business owners who regularly travel these routes, multiple times per day, providing goods and services for lower Fairfield County. Lastly, I am not naive enough to believe that any tax increase or congestion pricing will ultimately be used for the purpose of maintenance/upkeep of the the Merritt/ I-95. I am also wondering why Metro North- a company in the business of making a profit- would further benefit from taxpayer dollars! Wrong on many levels. No wonder people want to leave Connecticut!
- Most of my I95/Merritt travel is under 30 miles I would be EXTREMELY upset paying tolls to run errands or go to a movie. I would probably stay off the road if tolls were implemented and spend my time clogging up the PostRoad and other back roads. I would STRONGLY prefer paying more in taxes to improve the roads and Metro North. Train Station parking is terrible all along the corridor. As a single female I am extremely uncomfortable with the distance I have to walk in the dark when I come back on the train in the evening. It is not safe at many of the stations so I will drive on many trips where the train might normally be an option.
- As a former commuter to New Jersey from CT for many years, both by train and by car, I continue to believe that tolls and congestion pricing do not relieve congestion and actually increase it, even with electronic toll collection and "non-stop" toll lanes. The trouble areas on I-95--Exits 42 through 51 in New Haven, exits 10-14 in

Darien/Norwalk, are always congested at any time of day and well into the night. Although it is not the only explanation, Connecticut's uniquely unreliable and inadequate commuter and freight train service forces traffic, both commercial and individual, onto CT highways. And as for nonpeak travel, the fact that I-95 and the Merritt are constantly under construction, with random lane closures, produces congestion most off peak hours. In other words, the driver can't win, however carefully he or she plans the trip.

- I took Metro North for 15 years at great inconvenience to me time wise but took work with me on the train to do and saved money by not even owning a car. Unfortunately, once I had a child I had to have a car but continued to take the train, with my baby, for another four years. We had to stop and make different child care arrangements in the end because the commute was killing us. There are too limited a number of connections and the train was totally unreliable. In order to have a good "on time" record everyone was regularly kicked off the train before our final stops so that they could skip all the local stations and be at the last stop on time. Local buses are too few and far in between. It's a travesty what is being done to the Merritt. What was once a beautiful scenic route is now decimated and will be mudslides and the trees that are left will not have the support system they had and will be falling easier. The owners adjacent to 15 & 95 have no visual or noise barriers as it is. If 95 gets widened it will be impossible to keep it wide all the way from New Haven to NY so there will still be congestion and the widened areas will negatively impact the surrounding residents. We need more trains/tracks, faster trains, more local connections, more incentives for work places to allow flex time... Even with limited flex time I was having to leave my house at 6:30 am and didn't get home until 7:00 pm in order to work 8:30 to 4:00 - not good. Unfortunately, there are many people in my financial situation where we make too much to qualify for any aid but not enough to be able to afford to keep our homes. Adding to the cost of commuting will bankrupt those of us on the edge. Believe me, I believe in mass transit but being a single mother/head of household and having to have the flexibility to get home to care for a sick child precludes car pooling and the train/bus takes too damn long - even worse than the car commute.
- If congestion is such a problem, we should evaluate how taxes are being spent and put them towards this more pressing problem instead of charging CT residents even more. We pay some of the highest taxes in the country already, including gas taxes. I drove along 15, sometimes taking I-95 for part of the drive and would rather sit in the 2+hours of traffic every day than deal with the complications and cost of tolls. I already spent over $150/week in gas and would not want to have to spend almost twice that much for tolls. I would barely be making any money at that point. Additionally, there is already constant construction that lasts for years and holds up traffic. Adding tolls would probably be another case of years-long construction. A toll expanding all lanes is bad enough, but having to create an entire lane for express tolls brings up the question of whether a lane would have to be added or if the

highway would become 2 lanes. Either option would create more congestion. And I don't trust the state to finish any projects concerning the roadways. Wasn't there supposed to be an express connector to Route 7 built years ago? That never happened. Several other questions are also raised: How frequent would tolls be? (i.e., would I be paying $3 for each trip or every 10 miles?) Would there be clear and frequent entrance and exit options from express lanes? What happens if someone breaks down, has an accident, or decides to drive very slowly in the express lanes? As far as public transportation goes, that's not an option for most people. There are simply not enough train stations and useful connections. When I worked in Stamford, it was nowhere near the metro north station. I started in Wallingford. To take trains I would have to take Amtrak, switch in New Haven, get off in Stamford, and then find a bus to get to my destination. It's just not worth it. And since I've moved, I'm at least 30 minutes away from any train stations. Public transportation certainly needs to improve for that to be a viable option. Tolls are a horrible idea for so many reasons.

- Taking the train is not a good option for me. Besides having to change trains in Stamford, there is no transportation available (except for a taxi) to get to my job. I leave very early in the morning and have no traffic issues, so travel time is good (getting to work). Time would more than triple if I took the train. Where would the tolls be located? Would the prices be incremental, depending on distance traveled? I also think that tolls would increase local traffic. Construction of Express Lanes would be a nuisance and would create congestion for a very long time. There also isn't a guarantee that people driving in special lanes would be responsible drivers -- Travel time being reduced can't be guaranteed, but once you pay the toll, you can't recoup the cost if the special lanes don't flow as predicted.
- Unreal! People, stop taxing us to death. This cow is about to die and your are still trying to milk it. Just create bussines areas, re-locate all comapnies there (they do not pay much taxes anyway so they should not complain) and provide more than adequate public transportation to employes. It will reduce stress, obesity, and keep more money in our pocket for spending on necessary items.
- Worried that adding express lanes will just add headaches. Roads and rail need to be expanded. Entrance/Exit lanes need to be lengthened and fixed if they are causing traffic. The Merrit should be widened - if fixing exits/entrances does not alleviate the ridiculous traffic. I consider myself a New Yorker instead of a Connecticutan because driving on the Merrit to Wallingford, Hartford etc... is too impossible and too risky of an undertaking.
- As a young professional with many years ahead of me I find commuting on 95 dreadful. I do not agree with adding tolls, I think the highway needs expanded or multiple alternate routes need added to alleviate the awful congestion.
- Car pool lanes would be better than paying tolls.

- congestion pricing is not viable for most people since they have to be at their destination at a particular time; gasoline taxes should be used only for road and mass transit improvements
- Connecticut is an incredibly corrupt state. Our governor has used the monies voted by Congress to help flood victims of Sandy on political pork. I have not faith that any monies collected from tolls would be used honestly on road improvements. Also, tolls disproportionately hurt the poor, many of whom are trying to get to two and three jobs a day to make ends meet. Most people have to drive to distant stores in my neighborhood, because local stores are a rip off, so it isn't simply an issue of people commuting back and forth every day. If tolls are instituted it may be the last straw (on top of Malloy's higher taxes) that will make us move, as our daily living expenses will further increase. The tolls will not decrease traffic, they will just increase congestion on our local roads as people try to avoid the tolls.
- CT. has the highest gas taxes in the country and high income tax. The state was successful for years without an income tax and had a balanced budget until Wykert came in. The state has become a terrible place for business and the taxes are way too high; people leave the state to avoid the inheritance tax. The idea of introducing tolls is just another way of raising revenue to cover up bad fiscal management. The congestion on our highways only exists around the areas where jobs exist. Tolls and express lanes aren't going to fix what should be obvious to anyone.
- I accept that a small increase in the tax on auto/truck fuels is the fairest way to support highway & road improvements ... the more you drive, the more you contribute. Don't make it only convenient for people with more money to travel faster at the cost of the rest traveling slower than now. Train & bus transit is fine for commuting if walking distances from stops are reasonable, but otherwise & when carrying many purchases (groceries, household items, etc) a car is necessary.
- I am 100% against tolls in our tiny state. I don't need another TAX foisted upon me because I WORK. And that's ALL that a toll is - another tax on people who commute... And people who commute are people who work. Why don't you tax video games and X-boxes so people who sit around all day playing video games and DON'T CONTRIBUTE TO SOCIETY can pay a little bit instead of waiting for their EBT card to arrive every month. If I thought for one second that this state could be trusted to collect a road related tax and utilize the revenue to improve my commute - I might "buy-in". But we all KNOW... the revenue will be SQUANDERED... my commute will continue to be horrible... And I will retire and leave the state and not have to worry about any of it. P.S. Please tell the wonderful men and women who are rebuilding the Moses -Wheeler Bridge (I-95 Stratford/Milford line) they are doing an AWESOME job... I see the progress almost daily and I wish there was a way I could stop and thank them myself !
- I am concerned that toll money would not be used for the designated highway improvements but might be diverted by the State legislature to fund other financial

obligations in our state. I am also very concerned that traffic would divert to local streets (especially Route 1), impede local residential traffic and hurt businesses along the way. I remember how difficult it was to travel in the Greenwich/Stamford area when the Mianus River bridge was down many years ago and how clogged Route 1 is when there is a traffic accident on I-95 or the Merritt.

- I don't think congestion pricing will control the traffic as much as you think it will. People are going to go where they want when they want, and I-95 is heavily traveled by many non-state drivers who need to get "through" the state. It is also very difficult to get businesses to stagger their employees' hours when our culture is still so heavily tied to the 9-5 mentality.
- I don't want to pay tolls on I-95. As a car driver I'm already paying taxes at the gas pump, and personal property tax. Business need to be forced to keep trucks off I-95 during rush hours 6am-9am and 3pm-7pm. We need to ship goods on rail or water. Additional lanes on I-95 are warranted. State government needs to stop wasting money and stop raising taxes.
- I have lived in CT for many years. I used to have a commute that was 120 miles a day. I think CT has truly some of the dumbest ideas and implementation for highway work. Not long ago, I used to try to get on the Merritt Parkway at exit 33 heading (East/north). Do you remember how someone decided it was a good idea to make it impossible to have a clear line of vision to ongoing traffic because they put up barriers and if you were a driver in a reasonable car, you literally could not see if a car was about to crash into you because of the total lack of quality engineering for that entrance ramp. I am tired of the terrible choices made and the lack of effective long term designs. CT truly has some of the worst roads, with insane drivers, as it is. How about charging for SUVs? Who pollute more than a reasonable sized car and having them pay more because their larger, heavier cars cause more wear and tear on the roads? I do not want any kind of electronic device in my car. I believe this is an invasion of my privacy and I believe that if there was an error that there would be no reasonable way to resolve a problem. Maybe some of the international businesses should actually have to pay for their share of taxes? Maybe businesses should have ways to get their employees off the roads. I am in the education sector and need flexibility to work with kids before and after school. I need flexibilty in my time to support school functions. I WOULD support a program where teachers who actually got to school early and stayed late to help kids out of the goodness of their hearts were not made to pay tolls! I am barely even able to live where I do. The rent is more than half of my take home pay already! I really cannot afford to pay tolls. I would end up not using the money to support local businesses. So it's a vicious cycle. I 100% do not support tolls, electronic or otherwise, because I do not think that they will improve traffic flows and I am certain that they would not be taken away if they didn't work as promised!

- I usually take the Merritt because there are no trucks and its a more pleasant drive than I-95. I prefer that they don't install tolls.
- I would like to think that CT is as willing to help its residence by doing something about the 95, however a toll is not going to accomplish anything but get people angry. I would make the speed limit higher so people aren't crawling everywhere they go and then redo the signs (all road signs)!
- I-95 has basically sucked for all the years I've been driving that corridor. You have basically a 15 year project going just to redo the New Haven area of I-95, and that has been a total rip-off to the taxpayers. Why in the world would I agree to pay to drive on that crappy road, and on top of that, contribute even more of my pay to a state that taxes every time they need money - instead of good fiscal management?
- I-95 has become a de facto local road as well as serving as a major regional highway. It is really the only way to travel from one town to the next because of the inadequacy of route 1 which should be handling local traffic. Both are far inferior to the highways that feed other parts of the country. We need adequate highways here and we have already paid for these through past tolls and high taxes, including one of the highest gasoline taxes in the country. Face the truth, that we need major improvements first to Rte. 1 to get the local traffic off the highway. Add left turn lanes! Limit access! Change the flow at the box stores along the way! Widen the road! Then address the primary issue -- that I95 was built for traffic in the 1950's and cannot begin to meet the needs of the 21st century. How can you expect people to pay to use this broken down system? Especially people who have to commute long distances during peak periods because they cannot afford to live closer to their jobs. This is not a solution.
- If we could collectively learn how to merge into traffic, stop the relentless tailgating, and pull over and ticket reckless drivers, that would help a lot and be cheaper. I would like to see cameras at the exits and entrances to the highways. Raise revenue and fix bad driving through enforcement. Neither of these plans has been discussed with enough detail. I don't think for a second either one of them will make my commute any shorter or any better. You could change my mind but more specific information would be required.
- Implementing tolls on I-95 and Merrit Parkway would be an absolute disaster. I am not trying to turn this political but Connecticut is already in rough shape. Job creation and growth has been stagnant at best. Part of Connecticut's problem is a date infrastructure including roads and rail systems. In addition technology has made it possible to work remotely and thus other areas, with a lower cost of living, are favorable for companies looking to expand. Connecticut's only saving grace is the proximity to NYC coupled with the typical suburban living (ie. House and dog for the nuclear family). I am not vain enough to think that I am special in any way, but I will say this: I am 30 years old living with my girlfriend of 6.5 years. We own a house and each make over $125k a year. We pay our taxes and support our

local businesses. Connecticut needs to find a way to attract more people like me. Adding tolls (read a TAX) on CT roads is not the answer.

- Installing tolls on I95 will greatly increase traffic on Route 1 in Greenwich. Right now anytime I95 is backed up with traffic, movement on Route 1 grinds to a halt making it impossible to move from one part of town to another. If tolls are installed, that local traffic will become much worse. The worst traffic I encounter is when heading southbound and exiting at #3. Much of the hold up would be eliminated if that exit ramp was improved. Traffic actually backs up onto I95.
- It is really important that there is a legal requirement that funding for transportation is used only for transportation. It should not be used to pay for other state projects having nothing to do with transportation. Because CT has a poor track record for this, I do not trust that toll revenue would be spent for transportation.
- My biggest concern is that tolls might be applied only at the borders instead of consistently throughout the entire state. We should not be punished simply for living where we do relative to other state residents. We should also consider how to solve the excessive use of I-95 by truck traffic. The tunnel proposed for freight trains under the Hudson at New York City had the potential to significantly reduce truck traffic and thus reduce congestion since more freight could enter New England easily without having to go almost to Albany to enter New England. Could truck traffic be banned during rush hours - enforced rest stops and inspections of all trucks? Funds from trucking fines should also go toward road repairs since the trucks destroy the highway, but now those funds go into the general funds as I understand it. I also question why we need such wide I-95 shoulders in the center when we could potentially fit four lanes where there are currently only three.
- My feeling is that this survey is justification for new taxes, new tolls or both. I do not believe that the State Government has used the "highway use only" funds that have previously been earmarked, but rather has raided those funds to offset their deficit. So forgive me if I do not trust them to utilize new taxes or tolls for highway or transit use only. Pretty soon our traffic congestion will likely go down because many people will be leaving this overtaxed inefficient state. I will simply sit in traffic or find an alternate route rather than paying tolls, until such time that I retire and don't have to commute any more
- Please don't make my commute to work more expensive! I generally travel opposing traffic and aside from getting around the back up at Exit 14/15 would not be willing to pay for an express lane.
- Rebalance the current budget to fit the needs of the populous. We do NOT need more taxes/tolls to do this. We need innovate ideas for allocating expenditures. If all else fails, Hold a bake sale!

- Taxes in this area are already WAY TOO HIGH to expect people to pay MORE, and/or also pay tolls! This state also collects stupid "property taxes" on motor vehicles - where does all THAT money go??? Whenever there is a new tax or toll, it NEVER goes away or decreases - it only increases and lingers for eternity. Adding more "revenue" (which is, in reality, simply money confiscated from citizens by various means) only leads to more waste by government.
- Taxing in state commuters is not the way to go. 95 has been deplorable my entire life don't pretend this will help anything. CT residents already pay way too many taxes. If tolls have to be implemented, put them on the state borders and charge people coming and going from CT. GEt money from all those NY, NJ, MA, and RI people that are reckless on our roads. OR have a larger number of state troopers out to ticket them.
- The governor does not need an excuse for more taxes. Cut the bloat in government wages and benefits and support the highways. The "toll" is nothing more than a tax on lower and middle class folks and another example of the not getting it atttitude in Hartford
- The reason the New Haven corridor is congested is because the Q Bridge is in the wrong place. Going north on I95 approaching Long Warf I95 should go straight across the harbor. A low bridge with a high place over the channel for shipping. Similar to the Tappenzee Bridge or the I95 bridge over the Connecticut river. Taxes are already too high. The gas tax was supposed to pay for these improvements. Tolls will be no different. The Money will end up in the general fund to fund programs we don't need. People leave this state and businesses don't come here because taxes are too high. The toll is just another hand in our pockets. Enough already!
- The State of CT needs to increase its revenues (through DRS) so as to be able to support its infrastructure maintenance needs without such mickey-mouse gambits as collecting tolls, and without stiffing local governments' school system funding to "save" money. Local governments are already over-committed financially paying for far more than they -- or their property-tax-paying residents -- can afford, and need far better state support for their financial obligations (schools, police, fire departments, city services, infrastructure maintenance, garbage, parks, water treatment services, etc.).
- The state should not toll the citizens for revenue... They should increase the mariginal tax rates on those in the state that make over 250,000. Tax the rich, not the real people.
- The suggested toll costs just do not justify the limited travel time savings. Further I do not trust that the money would go towards improvements on I95 and/or the Merritt. Even if it did, construction is a MAJOR cause of delays on both roadways. The state, itself, does not have a reliable record for promising tax increases and

keeping the money earmarked for what the original intent was promised. I am leery of where the funds would go and the inevitable hikes in fees.

- The taxes in the states are already too high. Raising them or adding tolls is not the answer, fixing spending is.
- There are so many other options than paying toll or taxes. How about building lanes above I95 and kepp them free. Make lower lanes for vehicles and upper lanes for trucks. Using boat to go allong our cost and into manhattan. If you continue to tax people in ct they will leave. Business is already paying high priceses to stay here. Use your intelligence to keep people here.
- There are ways to help with congestion. In many places, exit lanes can begin much further from current locations allowing cars to get off the highway sooner. An example would be to combine exit 5 and exit 6 northbound or exit 3 southbound. The only real fix in this area would be an express second level and/ or widening the many bridges that get in the way of adding additional lanes or exits. Tolls will never end and they will be unfair to local residents.
- This is an outrageous proposal!! Develop greater efficiencies and accountability for those who have highway improvement contracts now and these additional dollars would not be necessary
- To sum up, CT is already a hard state to live in - high taxes, high gas prices due to taxes, and you try to claim that we have to pay more in order for you to improve roads!! If other states can do it, what's wrong with CT? Put the tolls at the state lines and stop killing residents with taxes and fees for everything we do as part of our daily lives. And now we'll owe $35 more each month to the UI. Come on people - we're not made of money!
- tolls will only add more congestion to the highways. ct is an expensive state, they get enough money from us. if tolls go up, i will avoid the highway for most trips and take back roads. i would rather jump off an exit before and get back on an exit after just to avoid the tolls. we pay enough in taxes now and roads in bpt and stratford are terrible! when they do pave, its the same roads over and over!
- Using the express lane gimmick to introduce tolls on I-95 won't work. Tolls will increase congestion . The problem is that there are not enough lanes in city areas like Stamford. Look at the New Haven model and you will realize that more lanes equals less traffic problems. You should have listened to Gov. Ella Grasso years ago.
- Very concerned about the future of transportation on I-95. Volume is on the increase as the economy improves and the entire span is taking a beating from heavy transport and out of state business travel. We should take advantage of these travelers to help defray the cost of upkeep, snow removal and ongoing improvements. Higher taxes on the Conn population will only force many workers and retired citizens to consider a move out of the state - we are overtaxed as it is

today and the state budget is way out of control due to poor control by unqualified politicians looking to spend, spend spend.

- Why not call it what it is - a complicated, perhaps somewhat convoluted tax. Rather than couch this in all that cost benefit jargon, raise the gas tax.
- You are focused on the wrong solution except a toll or permit for large commercial trucks that slow everything down between drive time. Restrict large trucks one hour at AM and PM drive time so commuters can use lanes 'free; of charge. Like in California, install timed traffic lights at a half-dozen or dozen 'choke' points to control oncoming ramp traffic - timed from 1-5 minutes to allow flow at those drive times. The cost or investment here is so minimal for time saved - that it is ridiculous it has never been done! The management of I-95 in lower Fairfield County is a disgrace of our elected and appointed govt employees after so many years of complaint and no tax dollars being returned by DOT to this important part of the state.
- You know the majority of traffic on 95 is generated by out of state commerical travel. Toll them not residents of the State.
- People who travel a "reasonable local" distance on 95/15 for home to work and back should not be subject to daily tolls. My daily milage is approx 30 miles/day on 95 round trip, approx 40 miles/day on route 15. What is the percent of travelers and truckers using the roads vs locals? If you can prove minimal distance of daily travel for work, perhaps no tolls or a greatly reduce toll would be affordable to many. I dont like the idea of limited usage paying the same rates as commuters/companies traveling from out of state through CT (at a higher rate) and are using the entire stretch of CT roads.

1.3 | COMMENTS ABOUT THE SURVEY

- Asking about the most recent trip only is misleading. My most recent trip occurred in the morning (Fairfield to Greenwich at 6am.) While the traffic this morning was not terrible, this afternoon, leaving around 3:30 or 4, the traffic could be a nightmare. The same trip that takes 35-45 minutes in the morning often takes 1-1.5 hours in the afternoon. The term "rush hour" no longer applies to the evening hours. I often hit "rush hour" traffic at 3:30 in the afternoon, especially between Stamford (exit 8) and Norwalk (exit 14).
- Enjoyed doing the survey
- excellent survey
- Great survey (and I don't always say that). It directly affects our driving to/from NYC and was easy to take. Thank you
- i like this survey

- I think you should specify this survey so that rather than describing the "last time" someone used I-95, it should ask for you to describe the trip you take most often or regularly.
- I wish I did not open the survey on a Sunday night, when my last usage was for pleasure and not commuting. I use it much more for work than pleasure and I would rather have documented a more frequent use. This Survey should have been in my email inbox on a week night. If you want good data, you need to do better planning
- In answering questions, very difficult to envision transport time frames as being accurate as some of greatest travel time is on local roads.
- interesting survey
- interesting survey.
- it was good
- keep doing surveys
- Make survey shorter
- Make Survey Shorter
- Most of the questions asked if I would like to commute during an alternate time then the one I stated. That is not going to change so it eliminates many of the options.
- Survey questions excluded the option to not make the trip at all. This is a glaring omission because within the context of the scenarios, there were instances where I would have changed my behavior to not making the trip at all. My most recent trip was to get coffee at my favorite coffee shop as I do not travel I-95 to commute to work, but this is exactly the kind of trip that contributes to congestion. My decision to not make the trip would have a positive impact on highway congestion, and a negative impact on either local congestion (if I made the trip using alternative routes) or local economy (if I chose not to get the coffee).
- Survey should have included commuting miles. A person that travels 30 or more miles may be willing to pay a higher toll to arrive at their destination in a more timely manner than a person that travels 10 miles or less.
- takes took long.
- There appears to be an error in your survey with regard to the selection options for entry/exit from I-95; if I am not mistaken, while there was an option to designate entrance to I-95 south of Byram, there was no option to designate exiting I-95 prior to the same (so, for example, if you took a route to/from NYC that partly used 95 and then crossed over to Hutch/Merritt south of CT border, this could not be correctly recorded).

- There presently is no toll charge for the trip taken on the Merritt in this survey.
- This survey is too complicated and too long!
- This survey is WAY too long
- this survey was interesting relevant and a good use of my time it was enjoyable
- this was fun
- very interesting helps to find the improvement needed for i-95/merit
- I have a problem with this survey in that it only addressed commutation in one direction. So my last trip was to work. It's my return trip from Westport to Riverside that presents the biggest problem- you can't get through Stamford. Also, the Exit 5 is a total mess, poorly designed and very dangerous.

1.4 | COMMENTS ABOUT TRANSIT & NON-AUTO MODES

- Connecticut needs more reliable bus connections, too many single-occupant cars such as myself - would love to not use the car but no/few/infrequent connections to other population centers (Waterbury/Hartford/New Britain/Torrington/Danbury).
- For Metro North to be used to reduce highway congestion between New Haven and the state line, it needs to be seen as a true option for local commuting, not just as an option for NYC. The "intermediate fares" are excellent, but the almost constant transfers in Stamford are an impediment. For my commute from Norwalk to Cps Cob, there are only about five trains a day that do not require a transfer.
- I am a teacher and I take the train most days between Bridgeport and Riverside. This is becoming increasingly more difficult because so many trains are express to Grand Central and not local. We need more frequent LOCAL trains so people can take the train within CT. I feel like Metro North is catering to express trains with fewer local trains and that is a mistake. If we want to encourage people to take alternate routes, options need to be made available. Please fix that bridge that gets stuck open too. Thank you for giving us this opportunity to express our needs and concerns.
- I am a very strong supporter of mass transit. However, how do you get people to and from the mass transit hubs? How frequent, for example, could you have a bus come by my house to take me to the train station or the express bus station in downtown Greenwich, so that I'll be on time to my appointment? How long would all that take? Probably 2-3 times as long as going by car, even with traffic delays. Also, like most people, I combine trips. The Thursday afternoon weekly trip I take includes going to my writing group, stopping at Trader Joe's and/or Whole Foods in Darien, plus maybe mailing letters or going to the ATM. A car is the only way to accomplish all that in our suburban setting. Alas.

- I believe that improvements in both CT Transit and Metro-North RR services are necessary. Limited services to the Waterbury, CT branch, numerous technical / mechanical deficiencies create a horrendous commute for the working individual. A 40 min. commute quickly becomes an 1hour to 1 1/2 hours...That's not fair to a commuter who pays their fare and receives less than satisfactory transportation services. Thank you.
- I believe we should look at the use of ferries to reduce some of the congestion. However, the fees for the ferries must be reasonable not like when they looked at that a few years back.
- I commuted to Greenwich for over 30 years and endured countless delays whether I took the Metro-North trains, I 95 and I 15. DOT should consider a van pool system whereby some groups of people (8-10) could commute together to common or close by employers. Incentives should be provided to encourage use of the van pools. This would reduce single occupant vehicles during rush hour. It would provide jobs as well. During the 1970s gas shortages, employers took advantage of programs to purchase vans and encouraged employees to use this transit, using flex hours, arranging for commuter parking lots for the vans to meet at, etc. It worked well until human behavior reverted to its convenience mode once gas became plentiful again.
- I strongly support efforts for better rail service including high speed trains.
- I think if tolls were added I would be more likely to use metro north, which would be a good thing for the environment. however, I would probably only use it if it cost less to take the train than the tolls.
- I would love to see Direct off peak train service Danbury to NYC. this will also allow for Off peak direct train service to Stamford from Danbury. I hate transferring in South Norwalk to another train so I end up driving Stamford to Danbury a lot.
- If you make the mass transit inexpensive I will take it. It costs to drive, but we own cars. So the mass transit cost can't be $30 to get 30 miles, an hour away, and $15 from my destination. The $120 train is completely out of the question.
- Improving bus and train connections in northern Fairfield county would improve ridership. I have to drive 25 minutes to get to a train, find a parking place, pay for parking and a train, or drive 40 minutes to work (on a good day). I would like to take the train, but it is not really feasible either time or money wise.
- It is important to try and get folks off the roads in CT and into mass transit in an economical way that does not burden those of limited means.
- Lower bus & train fares would encourage more ridership if people would save money over using their car. to take Metro North for a family of four to Grand

Central on the weekend is $120. Lower fares would also make it easier for low income Americans to get to work.

- Mass transportation that is reliable esp to Stamford is the key to lowering congestion. Most cars are single occupant because transportation from train station to place of employment is poor.
- Metro North stations are located along I-95. We need to leave home at least 30 minutes before train time and drive to the station, park, and purchase train tickets. Add a schedule with 2 trains an hour and that's not a reasonable alternative to travel by automobile, which typically takes no more time in total than just the drive to the train station.
- My issue is that there is no bus service to the train at midnight from my workplace.
- Rebuild, electrify, signal and improve the Waterbury Metro-North line to allow two daily express trains (morning and evening) from Waterbury to Grand Central Terminal. Between Waterbury and Grand Central, stop only in Bridgeport and Stamford with no changing of trains. Depart Waterbury at 7:00am for a 9:00am arrival at Grand Central. Department Grand Central at 6:00pm for a 8:00pm arrival in Waterbury.
- The biggest reason I don't take the rail line is because there is no train from east norwalk to riverside (greenwich). I have to waste significant time switching trains. A true local training running down the coast would be helpful, instead of having to switch off in stamford. Even if it ran irregularly it would be helpful...
- The reason I never checked train as an option is because for the specific trip we took, the inconvenience of driving to a station to begin the trip, and then taking a bus or cab to the store at the end of the trip would be an insurmountable obstacle. Trains are a viable option into New York City or perhaps downtown Bridgeport or New Haven where one can walk from the station to a store or business. I cannot image taking the train from Riverside to, say a Yale football game because to rely on a bus from the station to the field would be excrutiatingly long - if even possible.
- we have to figure out a way to make metro north quicker option for those of us traveling from the the eastern part of the state. The train stops too much from New Haven to NYC.
- We Metro North Railroad all the time. The trip from Milford to Woodbridge is our return from the train station.
- We need convenient parking at train stations at LOW parking rates
- While my answers may not reflect this, I do think better public transportation would improve traffic congestion, however, my route to work doesn't have any good direct connections to get me to work and I would spend so much time commuting that I'd never be home. Better transportation between NY and CT, not just north south between the city, but also places in NY west of CT would be helpful.

- Would like express busses to airports
- Please add additional trains or cars because trains are very congested during the morning and evening commutes.
- I was traveling from the airport to home so my answers in response to fare prices and tolls was weighing the cost of parking which I estimated at about $25/day so the cheap express bus, if it indeed resulted in arrival at the airport was a strong contender. I discounted the Metro north option because of higher fares and the known lack of any connection to LGA airport that may never materialize.
- - how would trucks be priced? - a plan to reduce truck traffic (increase freight trains? shift trucks to nights?) is necessary. - Metro North should run every 20 minutes to all local stops to make it more useful. - accidents are a major problem. How
- Current transit projects take an excessively long time and costs are out of control. Better management of existing budget resources without increasing taxes will better serve the public good. Transit alternative and improvement of existing transit systems would be appropriate and necessary. The I-95 corridor is the economic life blood of the Northeast. All available resources should be dedicated to proper planning and implementation of this vital transportation artery. The cost of improvements should be born by everyone who benefits from transported goods and services as well as use of the road.
- I very strongly support highway tolls with the funding used to support Metro North. Metro North's service level has dropped precipitiously over the past 2 years and the terrible service jeopardizes CT as a state where commuters to NYC and even within CT can live. Trip times on MNR keep getting longer and longer such that it is barely tolerable for those who live in the outer band.
- Many of my answers were reflective of the trip that I was thinking about - i.e. a trip I make to visit family. I'm a great supporter of public transit and wouldn't own a car if I didn't have to even though I got my first car at 16. After having lived in NYC and other cities (San Francisco, London), and traveled to other cities with great public and cheap public transit (e.g. Paris), as well as the availability of bike and car-share schemes (Paris), I can only wish that we had such options here - both because of cost savings, the environmental benefit, the social interaction, and the ability to do other things than sit in traffic (like read on the train for longer travel e.g. commuting to work in NYC, or traveling for leisure to NYC. I support tolls for express lanes as well as tolls for people who are not carpooling during the morning commute e.g. I think a free express lane for those who are carpooling in the morning should also be an option in addition to an express lane for lone driver who is willing to pay a toll for being able to get to work faster.
- Our current income taxes should be used to pay for improvements in transit and highways. If better public transportation and carpooling was available, I believe

more people would take advantage of it and there might be less cars on I-95. I would not want tolls on the Merritt. We need at least one highway in our corridor without tolls otherwise people will use other major roads to avoid tolls which will cause congestion on those roads too.

- Possibility of having higher toll rates for those who are traveling through the state for business or pleasure. Is it possible to provide reduced rates for those commuting to work? Some sort of incentive for using the toll roadways/lanes more often. I am also interested in having more public transportation options for those who live North of the I-95/Merritt Parkway corridor. The Danbury and Waterbury Metro North lines take too long to get to Greenwich. Also there should be more investment in public bus transportation.
- Toll through travelers. It already costs too much to live in CT. I would take train to work if SLE stopped in Madison EB in AM. I work 24 hour shifts. I can get to work using SLE and MN in AM but can't get home the next. Too costly and inconvenient to drive to and park in NH to catch MN.
- you should ask why you can't take the train or bus ,
- Survey does not make clear how express bus works. Where are the stops in relation to highway and transfers to final destination from the stop? What is planned frequency of buses? Are additional local buses planned in coordination? I rely on my car to make stops on the way home; if I lived in a more walk-able neighborhood I'd be happy to use more public transportation. This is difficult to do in the suburb as configured.
- The price scale you have in this, reflecting barely any time savings, is caaaaraaaazy. The bus and train will add even more time, because you have to get there and get the schedule, PLUS pay additional, PLUS have someone get you on the other end. I use the train to the city maybe half the time and that is based solely on how annoying it is to PARK there, not even how long it takes to get there. And that is because the city has a half decent subway system. Hamden will not have a subway system to my friends house. Thankfully we have WAZE now, and that app can tell me how to go places FASTER. I am sure it will tell me if it takes into account a $16 exorbitant charge. It would have to save A LOT of time and be VERY convenient. This is not the NJ Turnpike.
- I took this survey in the morning when traffic is at its lightest because the survey was clear that I was to use my most recent trip. I wish that I had taken the survey in the afternoon - I think my answers would have been much different. The afternoons are horrible. I did take MetroNorth for about 5 years. I am a teacher in the Greenwich Public School system. At one time we had a van (Easy Street) that we drove back and forth from the school and Cos Cob station. That van was eliminated due to budget cuts. We attempted to continue with MetroNorth by carpooling from the station, but that was dropped when MetroNorth became very

unreliable. We would get stuck on the train for hours due to bridges getting stuck or for other reasons. After there were train incidents (ie: derailings) I decided to drive my car. I enjoyed taking the train but I just feel it is not reliable nor safe.

- No trucks should be allowed during rush hour (both directions) We need more parking spaces,at stations, or incourage people to use bike to go to the station.
- Please improve transit in Bridgeport. INSTALL LIGHT RAIL ON MAIN STREET.
- Something has to be done about the transportation infrastructure in our state. For one of the wealthiest states, we have an antiquated, crummy system. Other countries invest in more earth friendly systems (like Tokyo's magnetic train system), and are able to save the planet and accommodate many more people on their public transportation system than we do in Connecticut. How many times does MetroNorth have to break down before we realize that our system needs revitalization? I believe that the monies should be reallocated from other areas because taxes are high here in Connecticut and there must be a way to put the tax payer's dollars into transportation infrastructure so we can all enjoy a more prosperous economy by being able to get to our work, daycare, appointments, gym clubs, etc.
- The insistence on highway dependency in lower Fairfield County is confusing to me, both as a frequent rail commuter, and a millenial who is tired of owning a car. If we have to have these highway surveys, could there also be a study that gathers data on the potential economic impact of improving the state's commuter rail infrastructure? Any improvements that are finally occurring on the New Haven Line are about a century overdue, and as the U.S. and regional populations increase, highway options will become increasingly implausible. As a state, we need to have other transit options, and we need to know what the cost and benefit of those options will be.
- The State of Ct owns the property along the souther side of the Merritt Parkway. Put in a light rail system, like Portland Or, or Disney. They are quiet, can be elevated away from animals, can be hidden by shrubs, And would move traffic away from the I-95 corridor. You already have outlying parking areas. Construction can be done with little to no impact on current traffic, as all construction would be off the roadway. Upon completion this may reduce ridership upon Metro North, which would reduce the number of trains, allowing the potential for one track to be utilized for Fright train traffic again potentially reducing truck traffic along the I-95. You guys should talk to the Transportation people at Disney, they seem to have their act together. Oh and by the way, those people along the Merritt Parkway that would oppose this plan, to bad. The State of Connecticut should declare a State of Emergency, and build it. It will create jobs, and maybe even pull business into the area. Keep it simple. You already own the land, will most of the cost of the project would come from.

- There is a need for better State police presence along the I-95 corridor. Any improvements that are made in rail transit should include the upgrading of the rails for use to transport of goods and take some of the trucks off of the highway.
- Unfortunately public transportation is not an option for some people. If you work in towns or cities and are close to public transportation, this is not a problem. If you work far away from the train or there is no bus service once you get to the town where you are employed, then you have to use a taxi service to get to your workplace. This is more expensive than paying a toll.
- We need to do something to improve the corridor. i don't know where you'll fit new lanes - I don't see any room. Metro North needs a serious upgrade, it is disgraceful.

1.5 | MISCELLANEOUS COMMENTS

- 3 more lanes in each direction Bpt to NY, or, preferably, beltways around Bpt/Fairfield, Norwalk, Stamford.
- The DOT has shown a total disregard for the interests of the community in how they've conducted themselves re: their planned development of the Stamford train station. See comments at the public forum Zoning Board meeting on Nov 24 2014 re: the potentially serious negative consequences of the TOD project in Stamford if the DOT were to have their way. This promotes a lack of trust in how the DOT operates.
- A break down lane over the Q-Bridge near New Haven would be nice...
- add LANES!!!! I-95 Tax incentives for companies that have car pool programs and various work hours. Movable center barriers. More efficient post accident procedures. high speed ferries add LANES!!! route 15
- adding more aux lanes or adding an addition lane would help I-95 and fixing out dated interchange design.
- Ban trucks from I95 during peak hours. This would fix it all for free!
- BE HAPPY
- Block certain on ramps during peak traffic hours. Add additional lanes to I-95.
- Career firefighter, I commute to work on off hours to get here on time. Have to use congested hours once in a while. Tired of continuous repair of Thruway and Parkway. No forward thinking, most construction is reactive not pro-active.
- Comments. I commute from Bridgeport to Greenwich 5 days per week. I usually travel to Greenwich on the Merritt Parkway and return from Greenwich on I 95. If it is raining or snowing I will use I 95 instead of the Merritt Parkway. I have done this commute since 1979.
- Construction projects should not take so long put the right number of workers and the jobs would get done faster they built the Empire State buiding in less time than

one year , its taken to complete 4 years the Norwalk exit 14 work and it's notdone yet that is what causes half of the delays

- Construction that is now in progress on both highways, at the same time, is causing extensive traffic delays.
- Create an additional mode of transportation such as a tunnel near or under the Merritt of I-95.
- Ct has failed to fairly distribute highway funds across the state. Fairfield county has always been short changed. The state needs to redirect funds to southwestern CT.
- Deport all the illegals
- Develop a system to clear accident scenes faster and improve the system of road construction to eliminate the ridiculous traffic delays that occur with the current system.
- Doing road maintenance & construction should be done @ night , not during the day. Espcially during high traffic hours. The employees performing this work should also be paid regular hourly rates not premium rates. If they don't agree to the rates there are plenty of people out there that would jump @ the oppurtunity for employment.
- downtown NH is a nightmare, free up the on ramps and off ramps where the contrustion areas.
- Eliminate congestion as much as possible to avoid accidents
- fix bad roads
- fix the traffic
- For many of us, the fact that the I-95/Merritt Corridor is the only viable way to commute to/from work is an issue. In most parts of the country, I-95 or highways like it are more for truck and commercial traffic. Here it is a dual purpose highway creating a great deal of congestion. It's too bad there isn't another truck-free local option other than the Merritt. There also needs to be consideration of the fact that there are no good links between the two south of Norwalk, and Route 7 is only a good connector from north/south within Norwalk itself.
- General comments - I avoid Merritt when under construction - too terrifying. Otherwise like it as no trucks. I take all back roads given Merritt and I-95 congestion when I drive. I would love to see more Danbury line action.
- get it fixed soon please! too much congestion!
- Getting from Greenwich to New Haven on weekdays between the hours of 3:30 p.m. and 5:30 p.m. is OUTRAGEOUS-- it easily takes me TWO HOURS to get to New Haven. And it's not just because of construction, either. It is because the exits for Rte 8 (Bridgeport) and I-91 (New Haven) are just horrible and create

unmanageable back ups. Get the trucks up to I-84; there's NO ROOM for them on I-95. And just what about those weigh stations that are NEVER open?? Why not collect some revenue off all of those overweight trucks? I travel the length of I-95 twice a weekend, and trust me, I've only seen those weigh stations open maybe 5 times in 5 years.

- How about starting with tolls for trucking only? They put the most wear and tear on our roads and it costs them nothing to cross our state!
- How can you guarantee no congestion?
- I 95 is an aggressive driving environment. The commercial vehicles have no regard for private vehicles. I 95 is the wild west of mass transportation......I avoid I 95 at at any cost....
- I agree that something has to change, and I applaud the state for looking into options. I hate driving on 95 because of the congestion, trucks, and general crazy driving I observe there. The Merritt is much nicer, but please hurry up and remove the dangerous concrete barriers before another rough winter. They are hazardous.
- I am a school teacher so my hours are very proscribed. It would be very hard to travel outside of the normal commuter hours unless school systems change their hours of operation which I doubt very highly.
- I am glad this issue is being addressed. travel time to people I visit in Ct can be anywhere from 30 mins to 2 hours-for the same trip!!
- I believe strongly that you should look into congestion/toll pricing for trucks and out-of-state vehicles that use CT highways - they should bear the bulk of the tolls, particularly trucks during rush hour.
- I favor a gas mileage tax. It is the truest measure of how much you are using the road.
- I feel VERY STRONGLY that distracted driving (especially cell phone use) is a major contributor to traffic congestion and should be addressed before any tolls are imposed.   If drivers paid proper attention to operating their vehicles there would be fewer accidents, fewer injuries and deaths, less wear and tear on the roads and vehicles, less pollution from emmissions and less congestion. Distracted drivers should face license suspension or revokation. Some measures must be taken. Enforcement should be the first step.   There are too many drivers, irresponsible operators should lose their priviledges. THAT's how you ease congestion.
- I have a strong theory on how to alleviate congestion in Norwalk. However, I would be prefer to be paid as a consultant. Mechanical engineering degree and my idea is theoretically sound, and would need only some traffic velocity technology combined with signage at the choke points. My email is included in this survey. I would love to hear from you, I have been thinking about this for a long time!

- I have an electric car and would like to see express lanes be free for alternative fuel vehicles like hybrids and electric cars.
- I recognize that congestion is an important problem and I support your efforts to ameliorate it.
- I think if you are going to add toll lanes, I would keep 15 completely toll free. There will be times of the month when I will be unable to afford toll lanes.
- I think it is great you are addressing this issue. Traffic on I-95 is unacceptable during computing times.
- I think the concrete bunker barriers erected on the Merritt during construction are very dangerous and should be removed as soon as possible, especially as we are coming into snowy and icy conditions.
- i would like to improvement to make better travel
- I-95 four lanes in Fairfield and N Haven counties. Double Merritt Complete the Super 7 spend all gas tax on roads remove all trees over or near the Merritt, like is done on The Hutch in NY
- I-95 has to be one of the most dangerous roadways in the continental US.
- improvements are needed in Stamford on entrance ramps and the S turn going towards exit 9. going through Norwalk with the route 7 connector is so congested everyday at anytime. Extra lane and shoulders is needed for most of I95.
- it will be nice to do something about the junction on route 8 to I-95 both ways . in the morning between 6 a.m. and 9 a.m junction from route 8 to I-95 north is very bad always traffic bumper to bumper. In the afternoon from I-95 North to route 8 always traffic bumper to bumper all the way to exit 24 this always happens between 5 and seven and once you are on route 8 is bumper to bumper all the way to Waterbury sometimes more. we really need a new improvement on route 8
- Learn to say no. If you say no enough time, the cost of doing work on any road will comes down. Any economy based on anyone but the consumer setting the price is illegal.
- Less taxes, less spending on non-productive people, and direct current monies on road improvements. Also: Reduce the number of entrances and exits on I-95. When it was built, it was supposed to be a thru-way, not an alternative to local travel. They built is wrong!
- Let private commuter buses operate on the Merritt Parkway and I-95.
- Make another lane for cars not all these bike lanes also put lights on merritt parkway improvement needs to be done need construction at a more reasonable time not during rush hour and late at night or early in the am need people to do there projects more faster

- Make I95 wider. 4 lanes going south and north
- Make more lanes on the Merritt, especially between Trumbull and Stamford. Plan out lane closures better on the I-95, especially around Norwalk.
- Many of the answers to this survey are based on my perception of the State of Connecticut's inept management of the current and ongoing I-95 Exit 14/15 work.
- Most recent trip described in first part of survey was shorter than usual commute due to dentist appointment at beginning.
- My first time using this highway in a while. So far the travel time has not been too bad.
- My suggestion would be to do, at a big expense, but would be worth it, a double deck on I-95, trucks up top, and cars below. Double decks work in California, and they have to deal with earthquakes. Splitting trucks and cars would make it safer for both.
- need an upper deck
- One of the main reasons I plan to retire is because of the traffic - bad rude drivers - on the Merritt Parkway. Speed limits are NOT enforced. I cannot take public transportation because my job takes me to several schools each day, all across lower Fairfield County. I waste lots of time on the road!
- One thing you don't ask about is traffic enforcement - speeding, trucks in left lanes, weaving. Where is the traffic enforcement on I-95. Hardly ever see.
- open up the break down lane for the rush hour traffic from exit 30 to exit 17
- Please improve I-95
- Please make the highways wider between Stamford and Norwalk. The congestion is terrible there.
- put in fillers and put another highway above just like interstate 678 in NY
- Somehow, I95 needs to be expanded or build a seperate truck route.
- something must be done to improve congestion on both roads
- Staff the semi-trailer truck weigh stations at exit 2 in Greenwich, CT 24/7 and any other routes entering the state to ensure trucks are not overweight and have proper licenses.
- Stop spending the gas tax other places before you put tolls on the highway. Also ship 18 wheelers from NY harbor up Long Island sound. It works just need to get a Jones Act exemption.
- thank you
- thanks

- Thanks for allowing me to take the survey. Hope it helps. Cheers and God bless
- Thanks for your concern
- Thanks!
- The cost of living here is too high for the amount of traffic and congestion.
- The current continual never ending construction on the Merritt is neither improving the road nor reliving congestion. It achieves only the opposite. The only way to improve congestion is widening the Merritt . Also stop replanting the tree along the road and the median, they only die or if lucky live long enough to fall on the road or car and cause an even larger traffic jam. Maybe just charge out of state drivers who pay no taxes. Also changing my time of commute only leads to a longer delay as that is when all the road construction, tree trimming etc is done. Which has an even longer congestion
- The electronic traffic signs on I 95 cause more traffic when in use. I drive on I 95 every day and ever time those signs are on warning of a traffic problem traffic slows while people read the sign. Warning of a slow down in 6 miles is a waste of time. The signs should only be used in an emergency.
- The gas tax both federal and state was supposed to attend toward road and transit improvements. Where is the accountability of those funds? Given the amount of cars on the roads and passengers on Metro North, I find it difficult to understand how this revenue hasn't been efficiently distributed.
- the inevetable problem wiht tolls and taxes is that the money always gets diverted for other things. Connecticut also has high taxes in general (being a former resident) and should consider other options to get these road problems adresses.... what about using the gas taxes already in place.
- The issue with I-95 is the highway is too small for the amount of traffic. It needs to be enlarged. But to start, choke points should be fixed. Exit 3 for instance. North bound entrance - the entrance lane is not long enough. Southbound entrance needs to have own lane starting at exit 4. Between Exit 5 and Exit 9 there should be lanes added on both sides. Eminent domain applies! I could go on but you get the idea. Good luck and hopefully in my life time! Phil
- The problem I encountered on the trip described had nothing to do with the Merritt. I was caught in a huge line-up on the Route 7 connector to Main St. Norwalk..all 3 lines stalled at the lights (3 sets before getting to Main St.) Congestion was specific to central Norwalk.
- The State of CT is ruining the Merritt Parkway with all those horrible dangerous concrete barriers and the desecration of the trees. You'd never know that the Parkway is rich in history and landmarked. And forget about the bikepath. Totally ridiculous and a waste of money.

- The traffic bottle necks are worse for me on the return trip. There are not enough lanes to keep the traffic moving. The extra lanes work in new jersey because there are three of them and the whole road is tolled. Trucks are also restricted for part of the trip where the congestion is bad. The merit doesn't allow trucks which helps but it is a windy 2 lane road. Are you going to put tolls back on the merit also?
- the traffic is CRAZY
- The traffic is horrible on I95 daily. All we hear is we are looking at ways to make improvements but nothing ever gets done. When will you actually do something.
- There are way too many cars/trucks on I-95. There are too many exits too close together. SW CT is becoming strangled by extremely heavy traffic, diminishing quality if life in this region.
- To ease congestion on Rt. 15....eliminate the "combination plate" so that there will be less trucks on the road.....The only combination vehicles are mini-vans and SUV/s 6 wheel vehicles are trucks and should not be on a road made for automobiles. The cause problems because they stay in the left lanes and crowd automobiles into barriers. Also by eliminating the "combination plate" the state would make more money to repair and properly maintain the highways
- Traffic congestion on 1-95 and the Merritt pkwy dictates where I shop and when; who we visit and when, and when and where we travel. All of which is absolutely ridiculous. Our freedom of movement should not be based upon traffic congestion - but if we don't take it into consideration, we end up sitting in traffic for hours. It is also unacceptable that when traffic backs up on I-95 and the Merritt Pkwy (particularly on Thursday & Friday afternoons and the afternoon before holidays) that our local roads become impassable due to the traffic trying to escape both highways. I worry about the response time of local police, ambulance & fire personnel during these times. Tractor trailers are a particular menace and concern on I-95. It seems they are involved in a majority of accidents - and there is an accident at least 2-3 times per week - at least it feels like it. (I can hear the sirens responding from my house miles away.) And who pays for the cost of our fire, police & EMS responding to accidents on I-95 (and not being available to the citizens of the town whose taxes support these services?) The situation has gotten out of control and is a real "quality of life" issue in our town (Greenwich).
- TRAFFIC IS AWFUL!!!!!!!!!!!!!!!!!!!!!!!!
- Traffic on I95 and the Merritt threaten to ruin our Fairfield County economy. I have lived her for 60 years and the situation has become untenable.
- traffic usually start because of exit 14 going north on the I95 and also exit 27a
- Travel on the Merritt Parkway is extremely dangerous on rainy days. The pavement on that road needs to be examined immediately to find out why it is so slippery just in the rain.

- Until Ct. drivers change their driving habits anything you propose will not be very effective. 75% of drivers can't merge right or left when a lane is closed and wait til the last possible second even with a electronic sign flashing notice 2 miles earlier. This isn't Florida.
- We have traveled I 95 since our college days. It has always been a "wild card". The worst part is that when the traffic starts to move, we often wonder what caused the back up to begin with. It is one of the least desirable roads, however we often have little choice.
- we need to fix all pot holes and the speed should go up to 70.
- We travel 150 miles round trip on I-95 every weekend from April to Nov. Departing Friday afternoon returning on Sun night. It is a horrible frustrating and stress-filled experience. The constant never ending construction is a nightmare. On Friday afternoons what should be an hour and a half is often two and a half to three our stop and go trip.
- What about restricting the use of commercial traffic on I-95 to certain times? Truck travel has increased greatly in the 5 years I have been commuting to Greenwich. Have their been studies done about the effect of limiting trucks to certain time windows?
- You did not ask why I entered the Merritt Parkway at Exit 40 rather than at Exit 42 which is closer to where I live. There was congestion between Exit 42 ad Exit 40 and that is why I chose to enter there
- You should address the congestion on I-95 and Merritt in Fairfield County due to construction at night. You can't have construction projects on both highways in the same area at the same time. I also don't like the construction of short addtional lanes like in Norwalk and Stamford on I-95. These lanes make congestion worst during the rush hours because many thru cars use the exit only lanes to advance 1/4 mile and don't exit.. It is like creating a 2nd enterance.
- Again our great Gov. doesn't want to up taxes do to almost not getting reelected . So his alternative is to toll us. This money will eventually go into the general fund, just like lotto, etc. They all lie or change it to make them look better....I am moving out of the state even though i was born here and love it...but you know what he and the rest of the politicans in this state are doing to the average worker....They have all the money and don't care....look at how much each one has...Millions?????
- Have you considered paving everything between the Merritt Parkway and I-95. That would reduce congestion! Seriously, one of the largest contributing factors to congestions is the number of long haul trucks which are on i-95 during commuting hours. They should be limited to non-commuting hours. One of the flaws with this survey is that this focussed on the most recent trip I took. I leave at 6:30 in the morning so that I have only one horrible commute each day. My morning commute takes about 25-30 minutes. My commute in the afternoon is normally 45-60

minutes and often longer, with the record being 4 hours! I know all of the local roads between my workplace and my home and know multiple routes. I've even driven up into Bedford to 172 and over to Pound Ridge and then back down into Norwalk, which is often faster than taking I-95 or the Merritt on holiday weekends as it only takes 90 minutes.

- I do not use I-95 to commute. However, I use it often to visit family, shop, etc. My decision to go anywhere outside of cos cob revolves completely on I-95 traffic. My family won't visit as often as they like,from Middletown, because of the traffic. The traffic is always the first comment when driving to/from greenwich is discussed. This is a major problem and this survey is long overdue. Also, If metro north ran up to the middletown/hartford area i would take it to avoid 95. I don't understand how metro north does not run up to our state capital area? Expand metro north service throughout the state.....to the casinos, uconn, the shoreline, up to Springfield, etc.

2.0 COMMERCIAL VEHICLE SURVEY COMMENTS

Before clicking the "End Survey" button on the last page of the survey, respondents had the opportunity to leave open-ended comments. These comments have been grouped into the following categories and presented below, edited only for extremely profane remarks:

1. Positive or neutral comments about the project or congestion pricing
2. Negative comments about the project or congestion pricing
3. Miscellaneous comments

2.1 | POSITIVE OR NEUTRAL COMMENTS ABOUT THE PROJECT OR CONGESTION PRICING

- Any amount of time costing me more than the legal driving time is unacceptable.....no matter what the cost. If cost is not deferred to customer I would no longer contract that lane. High tolls are unacceptable.
- bring the pricing down for the GW then it will help the traffic in CT. Willing to pay a toll in CT if the NY prices were lower
- I drive product for a drywall company - they pay the toll cost. Kentucky did well - when the roads were paid off they lifted the tolls.
- I think automatic tolls are better than having to pay cash.
- I think they charge enough taxes, they just need to allocate them better. If they can do this without making traffic worse, then I understand.
- I would love not to have Tolls on I-95, but to clean up I-84 of all the debris and especially during the Winter Snow. It causes worth traffic congestion, because the snow reaches 4 feet deep!
- I'd be willing to pay if the road guaranteed a reliable travel time, but you can't do that.
- if the money from the tolls goes to back into the highway itself then it will be worth it
- if the money is use for the Highway then i would be for it.
- If they are going to add more money on taxes, put it back on the road and make the road smooth.
- If they put tolls up in would be A nice thing if they used all that money to repair all the roads in Connecticut
- iI think it a great idea to get in extra revenue
- I'm hoping the tolls would be more cheaper.

- simply make toll roads rather reasonable, as well as reliable, and time saving.
- They need to come up so that everybody pays -- break it down like a dollar or whatever. Not just truck drivers and not just the people who take this road.
- Tolls on borders!
- We support it. The citizens of the area should be asked. The revenues have to come from somewhere.
- wouldn't mind paying tolls if they were the same for trucks and cars
- I understand the use of tolls. I support tolls. However they should add more lanes to make things safer.
- I would strongly be in favor of and wouldn't mind paying a reasonable toll for is if they came up with a truck only lane. That is something that I would highly consider. I wouldn't come up here anymore if the toll cost got too high.

2.2 | NEGATIVE COMMENTS ABOUT THE PROJECT OR CONGESTION PRICING

- DON'T PUT NO TOLLS!
- I don't believe in tolls.
- I don't run miles I don't get paid for -- so I'm not detouring around I-95. They say they'll use the revenue for I-95, but we know how it is -- I don't trust that will happen. I think they should use the revenue for the road it was intended.
- i oppose tolls due to the fact of cost, for what i pay i can hire another person part time to work.
- If they going to insist on adding more tolls, they going to have to drop the rate down on the Tapanzee bridge. Since they don't have no control over that, I would suggest they don't do that. It's taking money from the truckers like myself. You're messing up business for the people in CT/MA/ME. If they think owner-operators are going to continue operating on these routes into Connecticut with a toll, then they have another think coming. I'm not going to come here no more. There is going to be a shortage of drivers and the freight won't move.
- no tolls because it would hurt! trucker would find different route to avoid the tolls.
- no tolls to much money
- No tolls!
- No tolls! Tolls are expensive and you don't make more on tolls when you have them. If the tolls were more reasonable (like New York last year went up on the tolls, everybody had already been complaining about them) . . . I just feel like that is taking advantages of the arteries that people have to travel. I don't think truckers should have to pay more. Use should be use.

- please don't start tolling I-95 in connecticut
- Please no tolls. Thank you
- Prefer that you don't put up these tolls.
- Tolls are too high.
- Tolls will not eliviate traffic on the 95 corridor in this region.
- We pay too much already in taxes. We're not opposed to tolls, but the amount is too high. When a car pays $20 and we pay $85, that's unfair.
- trucks should be restricted to the 2 left lanes instead of right lanes due to trucks are going thru and not jumping from exit to exit, personal vehicles jumping on from a ramp and flying to left lane then back to right lane to exit is very dangourous, tolls for a cmv should be more reasonable than what is charged we are bringing products to your area or shipping products from your area with out us your economy doesnt work, charging us tolls of 30 to 100.00 sometimes at a booth only hurts us.
- The question asks if I would use a toll road if the tolls are reasonable . . . But I ain't never seen a toll road yet that has tolls that are reasonable. I take I-84 if I don't have a heavy load, but I won't run it if I have a heavy load because it has a lot of hills and it uses more fuel. We pay enough in road tax already. They should be using the fuel taxes we already pay for this work. I-95 is NEVER faster than an alternate route. I put down that I would never take I-95 because there ain't nothing you can do to make it a faster route. It wouldn't be; the survey lies. If there are tolls, I will go around it. You guys are trying to make it so we [truckers] don't come up here no more. We just won't come if there are tolls. Truckers that serve the northeast, even local shipments like mine today, are from other parts of the country. We'll just avoid the northeast if there are more tolls. You won't have any truckers any more and the economy is going to collapse.
- Delivery time is flexible about half the time, half the time it is fixed. Our company makes the product and I deliver it. Tolling the interstates to maintain interstates or improve it -- in a way all it does is hurt the local businesses greatly because it increases the cost of the carrier that comes up here. A lot of other companies shy away from freight that has to do with ct/ny/nj. That hurts your business, because of the tolling. The round trip I took from Buffalo to parts of New Jersey and Philly, is going to be over $300 in tolls. When I add more to that for coming to the northeast, that's a big expense.
- i pay a hwu tax 550.oo i pay road tax i pay 1735.oo for liecen 4 truck y should i pay tolls
- I have paper logs, so going through tolls reduces my flexibility. DOT needs to step up their enforcement (there was a wreck on I-95 last night and a trooper was in front of me in traffic and lots of people flew by us on the shoulder paying no attention to the trooper). The I-95 road needs to be fixed.

- I oppose the implementation of Tolls on the i-95 corridor. try expanding the lanes or build alternative highways to ease congestion. Tolls will not Help. Thanks
- Instead of paying tolls, tax the rich their FAIR SHARE!
- Please do not insert tolls. If you are gong place tolls, make sure you use the money on traffic improvement. Make sure smarter cars are on the road (self driving cars) because of the lack intelligent drivers.
- politcos will not use tolls for road improvement in connecticut. don't believe what they say. there is just to much traffic o this road.
- Tolls suck They want too much for the toll even though that's our livelinhood and they wouldn't have it if we didn't bring it to them. They need to lower the price on them. I still have paper logs. When they have electronic logs we are going to have to save time more. So truckers will use toll roads more (they are counting on that).

2.3 | MISCELLANEOUS COMMENTS

- 95 when rest areas come it that makes it better to eat, rest and make plans. I like the rest areas that are in the middle of the highway. There need to be truck stops going to FL. Love's is the best. They have a showers and they are good truck stops.
- add two lanes both directions, let the commercial vehicles have seperate lanes on left so that it doesn't interefere keeps traffic flowing
- another way that we can improve the congestion is by preventing people from texting and driving
- ct. highways is worst then new york city traffic in the morning and at diner hour i perferred not to drive in this state but i have to
- george washington bridge toll cause the alt. route besides I-95
- good luck ,and thank you
- good luck.
- i-95 roads has been in repair for too long and its not satisfactory.
- if they add tolls, they need to rethink the on-ramps and off-ramps. the ramps are a main reason of the congestion
- less traffic congestion is always the best.
- Ohio's Tollway system is a very nice system: 1. VERY large truck parking at the service plaza's spaced out every 35-40 miles 2. Free showers at the service plazas 3. Relatively cheap toll ($40 for the entire state for 5 axles) 4. Very well maintained, 6 lanes wide.
- open left line to trucks

- some customers pay tolls as a line items (and require permission for us to take a toll road), some don't.
- Thank you for considering this issue and for anything you can to help better the situation.
- There should be something done on I-95 to shorten trips. CT-15 should be advertised as an alternate route, the road should be widened/use alternating peak lanes or something to help the flow of traffic move along smoothly.
- Tolls are charged to the customer only for certain customers . . . they get charged a toll surcharge.
- trucks should be aloud in the left lane, speed limit should be raised to 65 because everyone is doing it anyway. More inforcement!!
- use the money to really fix the roads and the pot wholes and stop fixing the roads during rush hour an holidays
- when bridges are under construction the lanes are too narrow (Stratford- New Haven). Night construction the lighting is pointing in the wrong the direction. It is shining in my face. Aim it better for the drivers. I have worked for the equipment rental lighting company and I know the equipment and they can be aimed better. For safety sake for all drivers.

Connecticut I-95 Corridor Congestion Relief Study

Appendix C

Connecticut I-95 Corridor Congestion Relief Study

Base Year Simulation Calibration Report

final

report

prepared for

Connecticut Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

CDM Smith

June 2016

www.camsys.com

final report

Connecticut I-95 Corridor Congestion Relief Study

Base Year Simulation Calibration Report

prepared for

Connecticut Department of Transportation

prepared by

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New York, NY 10016

date

June 2016

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1.0 Introduction

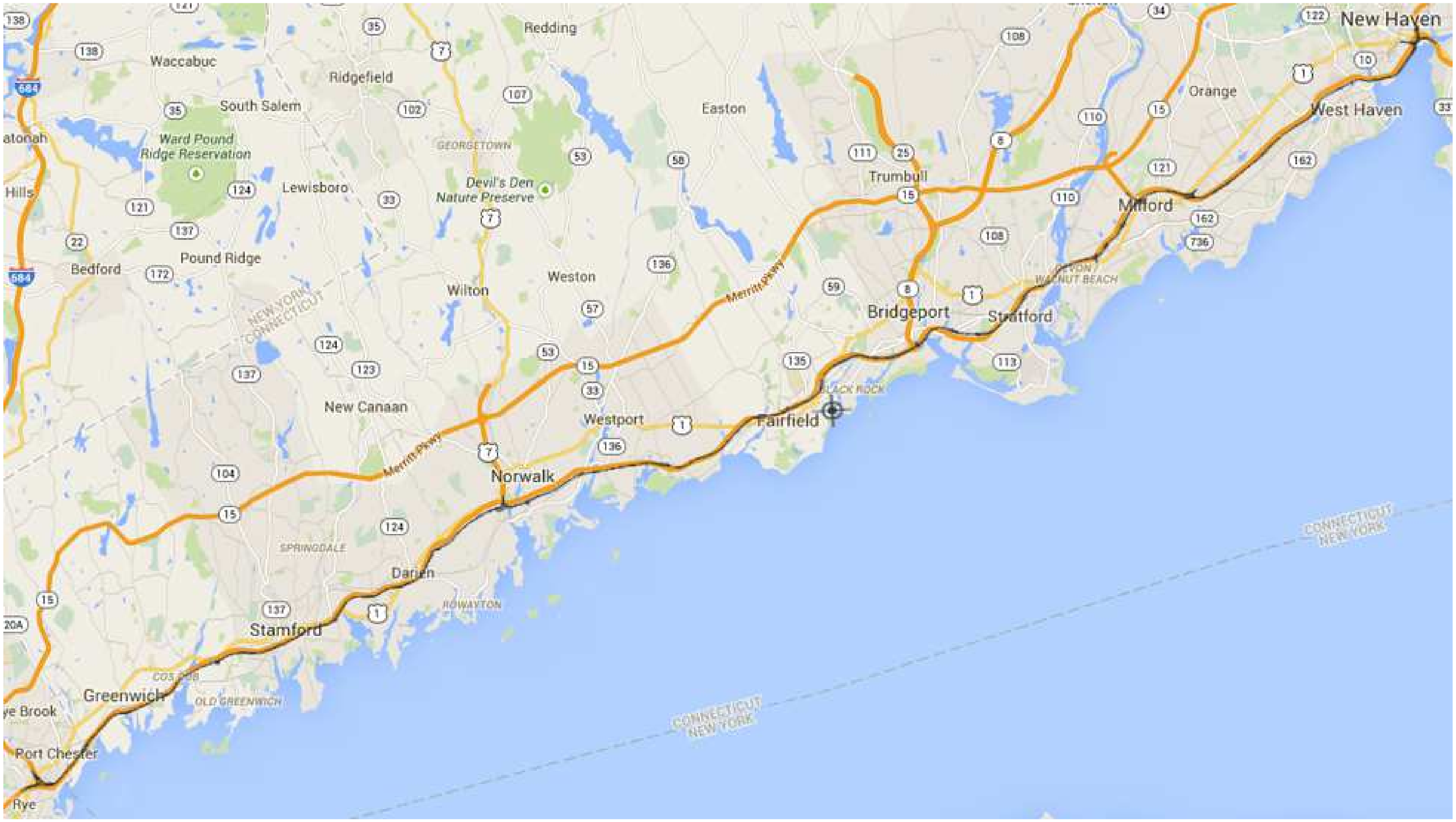
As part of the I-95 Corridor Congestion Relief study for the Connecticut Department of Transportation, Cambridge Systematics developed a microsimulation model to assess impacts of various potential geometric improvements and tolling strategies to relieve traffic congestion. The microscopic simulation model was developed using the Quadstone Paramics Microscopic Traffic Simulation Software (version 6.9.3).

This report documents the development and calibration of the existing conditions base year model and the validation of the base year model against the observed operational conditions. The application of the model in evaluating different future year scenarios is presented in a separate report.

1.1 Simulated Project Area

The microsimulation model covered a 49-mile section of I-95 in Connecticut, from the I-91 & I-95 interchange in New Haven, Connecticut in the north to the I-287 & I-95 interchange in Rye, New York in the south. The microsimulation model includes the mainline roadway, all interchange ramps to and from I-95, and all connecting roadways where available data permitted them to be included in the model. The graphic below illustrates the extents of the microsimulation model, with simulated roadways shown in black.

Figure 1.1 Geographic Extents of the Microsimulation Model



Background Image Source: Google Maps

2.0 Existing Year Subarea Demand Model Development

As part of the I-95 Corridor Congestion Relief Study, a travel demand forecasting model was developed and calibrated by CDM Smith by combining the existing Connecticut statewide model with relevant regions of the New York Metropolitan Transportation Council's Best Practices Model (NYBPM). The development and application of this regional demand forecasting tool is documented separately.

As an intermediate step between the regional demand model and the microsimulation model, a subarea demand model was developed. This subarea demand model was developed to refine the travel demand estimates for travel along I-95 corridor as forecasted by the regional demand model to better align with the traffic counts and enhance those demands as needed for the microsimulation model analyses. This subarea model was developed in TransCAD version 6.0.

2.1 Subarea Model Network Development

To create a linkage between the subarea demand model and the regional demand model, a subarea extraction of the study area roadways within the microsimulation study corridor (Figure 1.1) was completed.

After the subarea network and zone structure was extracted from the regional model, the subarea model network was reviewed to ensure that the roadway connectivity was properly represented. Where differences existed, the subarea network geometry was adjusted to match the field observed roadway connectivity. Through this process, corrections were incorporated back into the regional model as needed to ensure consistency between the two models.

As needed, zones in the extracted subarea model were split to allow better distribution of traffic loading onto ramps in the vicinity of count locations. Disaggregation factors were developed based on either available traffic counts or a visual approximation of the degree of development within each of the subarea zones.

Link Parameter Adjustments

The initial estimates of link parameters for free flow link speeds and capacity were taken from the regional travel demand model. However, as needed throughout the subarea model to better match the inferred and logical route choice patterns, the observed count data, and the observed congestion levels in existing conditions, the free flow speeds and link capacities were adjusted for the individual peak periods. This allows the resulting highway assignment and congested speeds to better match the peak period conditions as seen in the field.

Turn Penalties and Turn Bans

As needed in the study area, existing turn prohibitions at study area intersections were added to the subarea model though the creation of a turn penalty file. For the remainder of the turns, global turn penalties were added within the assignment methodology to better approximate addition delays for completing a turn at an intersection. All left turns receive a 0.2 minute time penalty while all right turns receive a 0.1 minute time penalty. Through movements were not penalized, and all U-turns in the subarea were prohibited. These values were developed at as part of the calibration of the existing year subarea demand model.

2.2 Subarea Demand Development

Following the completion of the subarea demand model network, the base year travel demands for each origin-destination (OD) pair to be used in the microsimulation model were developed. The key inputs to the development of these demands include the observed traffic count data and the overall travel patterns of traffic using the I-95 corridor.

Observed and Balanced Traffic Counts

All available data sources were collected to create a master inventory of traffic counts in the microsimulation study area. This included historical traffic counts that were collected in recent years, along with traffic counts conducted specifically for this study. Counts were generally either manually collected automated traffic recorder (ATRs) or turning movement counts (TMCs) on ramps and ramp termini intersections, but data for some permanent mainline CTDOT counts stations on I-95 were also available. Given the varied age and seasonality of the observed traffic counts, a flow balancing process of the I-95 ramp and mainline section counts was completed by CDM Smith to develop hourly balanced traffic demands for the I-95 corridor.

Since no vehicle classification counts were available during the demand calibration phase of the study, truck and auto counts were synthesized by splitting the total count volume using an assumed 5.0% truck percentage share during the peak hours.

All flow balanced traffic counts were finally geocoded and attached to the subarea demand network roadways. A review of the flow balance of the counts on the network was also completed and ensured that major imbalances between neighboring count locations did not exist.

Corridor Travel Patterns

As no field measured travel patterns were available for the I-95 corridor, estimates of the ramp to ramp OD demand patterns along I-95 were extracted from the calibrated regional travel demand model for the AM Peak Period (6:00 AM to 10:00 AM) and the PM Peak Period (3:00 PM to 7:00 PM). Separate demand tables were produced for autos and trucks. These peak period OD demand tables were then used as the input or 'seed' trip tables to the subarea demand calibration process to ensure that the subarea travel demand patterns match those as forecasted by the regional travel demand model.

2.3 Subarea Demand Calibration

Using the observed count data and the regional forecasted OD demands for the I-95 corridor, an iterative multi-class (autos & trucks) Origin-Destination Matrix Estimation (ODME) procedure was undertaken to refine the existing year AM and PM Peak Period demands to better match the observed traffic counts. The ODME process was implemented using the built-in procedures within TransCAD.

The ODME process is an iterative error reduction process where in each iteration slight adjustments to the OD tables are made to attempt to better match counts, a highway assignment is conducted, and the resulting flows are compared to observed traffic counts. Passing into the next iteration, those differences between the network flows and counts are then examined to determine the next round of OD adjustments that should be made to better match counts. The process continues until the errors between the assigned flows and the traffic counts are minimized to acceptable thresholds. The end result is a trip table that matches the overall travel patterns from the regional demand model and better matches the observed traffic counts which is needed for a microscopic simulation model calibration.

While hourly balanced flows were estimated from the observed counts, the length and degree of congestion within the I-95 corridor means that a single trip could easily take more than one hour to complete within the simulation model. In contrast, the demand model process and the ODME process does not consider this travel time in its calculation and see all trips as starting and completing within the time period being modeled. As such, instead of performing separate ODME processes for each hour of the peak period using the hourly balanced counts, the ODME process was conducted once for each four hour peak period, where the differences in when trips start and stop are minimized, and the vast majority of trips are both started and finished within the analysis period.

During the subarea demand calibration process, selected cells in the seed trip tables were sometimes adjusted to better represent demands and observed counts when errors could not be reasonably reduced. This is often caused when the seed trip table has zero trips for particular OD cells in the demand matrix. These zero cell issues are usually due to the inability of the regional demand model to accurately model local route choices through complex interchanges or for short local trips.

2.4 Subarea Demand Validation

To ensure that the final ODME produced demands are both suitable for microsimulation and keeping with the overall travel patterns predicted by the regional demand model, validation tests are conducted for the final four hour peak period demand tables.

Link Volumes

To ensure that the ODME produced demands that represent the observed balanced flow traffic counts, the final ODME highway assignment link volumes were validated against the total peak period volume balanced flow counts. The established criteria was to have a GEH value of 5.0 or less for at least 85% of the count links used in the ODME process. The GEH statistic, named such after the creator Geoffrey E. Havers, is a volume scaled error estimation statistic commonly used in traffic simulation and is calculated using the following formulation:

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

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 were met for both peak periods. The overall validation of the demand flows versus the observed counts is very good, with 95% of counts having a GEH error of 1.0 or less.

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
279	GEH <= 1	265	95.0%	N/A
279	GEH <= 3	276	98.9%	N/A
279	GEH <= 5	279	100.0%	> 85% (met)
279	GEH <= 7	279	100.0%	N/A

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
279	GEH <= 1	265	95.0%	N/A
279	GEH <= 3	275	98.6%	N/A
279	GEH <= 5	279	100.0%	> 85% (met)
279	GEH <= 7	279	100.0%	N/A

Trip Length Distribution Coincidence Ratios

To validate that the adjustments in the ODME process do not significantly change the travel patterns contained in the regional demand model produced seed trip tables, the trip length distribution patterns for the seed and the ODME adjusted trip tables are compared and a coincidence ratio between them is computed. These trip lengths represent only the travel distance on I-95 for a given trip.

The coincidence ratio 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 present the trip length distributions (in miles) for the seed and ODME adjusted trip tables for auto and truck trips respectively for the AM and PM Peak Periods. On each figure, the coincidence ratios between the two distributions are also presented.

Although there are no established standards for this measure, the coincidence ratios in all cases are near 85 percent or above, indicating a high level of coincidence and a limited change in the overall trip making and travel patterns from the ODME process.

Figure 2.1 AM Auto Trip Length Distribution

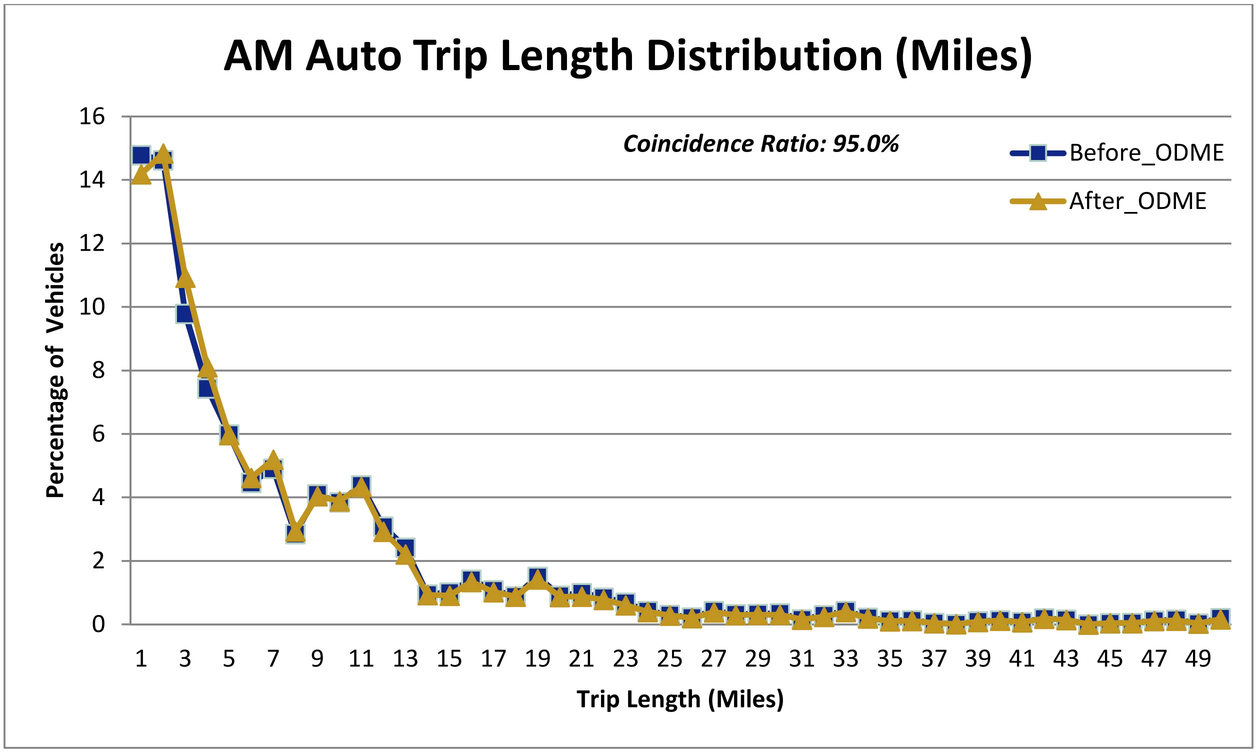


Figure 2.2 AM Truck Trip Length Distribution

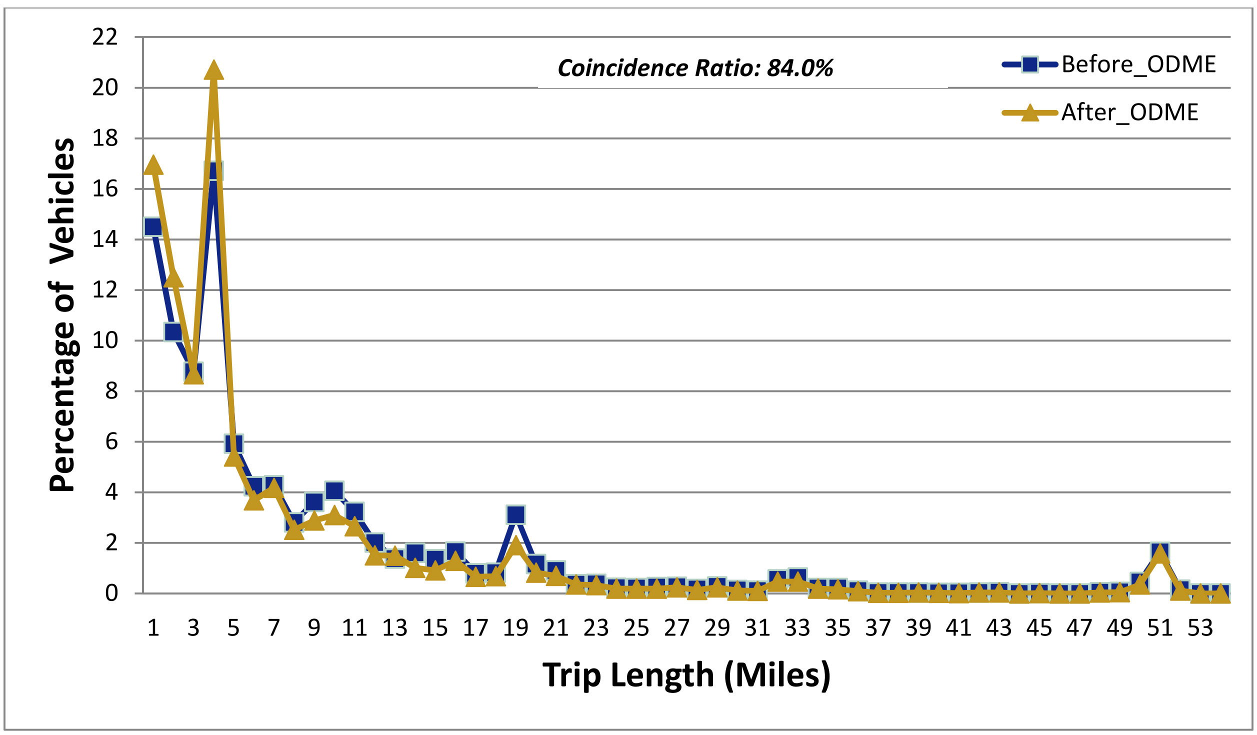


Figure 2.3 PM Auto Trip Length Distribution

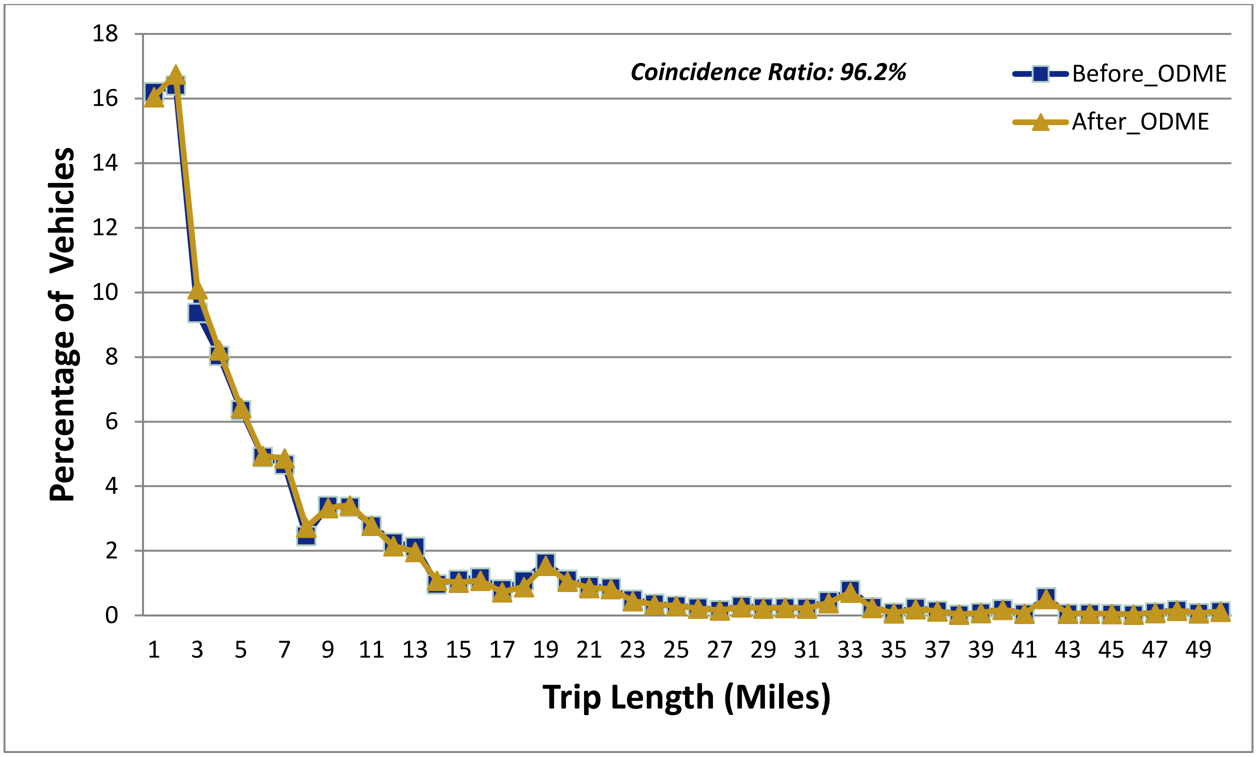
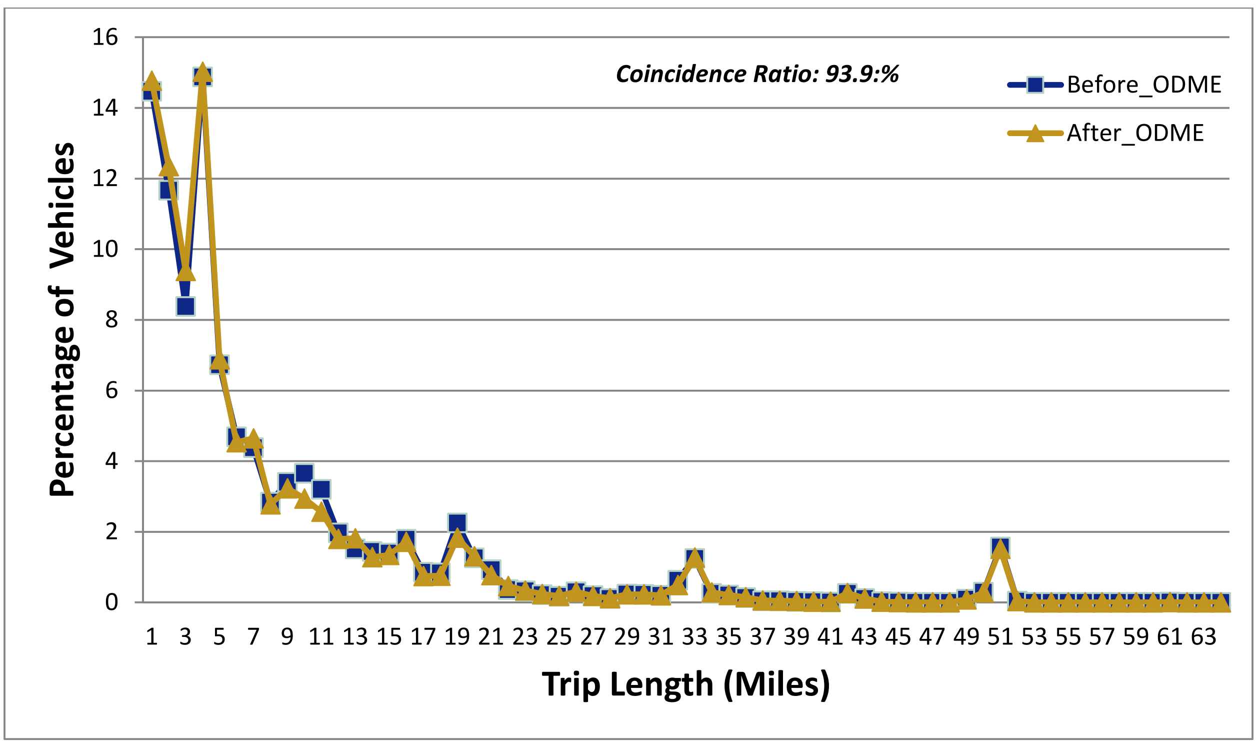


Figure 2.4 PM Truck Trip Length Distribution



2.5 Further Refinement of Demands for Microsimulation Purposes

Following the ODME procedure and validation of the peak period demands, the ODs were further adjusted and refined to better match observed counts and congestion patterns within the simulation model validation efforts.

Temporal Distribution within Peak Periods

The final adjusted AM and PM peak period demand trip tables were split into fifteen (15) minute intervals for assignment in the simulation model. The temporal distribution of demand across the peak period is necessary to ensure that the peaking nature of demand and congestion as seen in the corridor is created in the simulation model. Since in the simulation model the time interval defines when demand enters into the simulation network, the temporal distributions were applied on the origin side of the trip tables.

To accommodate various temporal volume and congestion patterns observed over the 49 mile long I-95 corridor, the zones were divided into various groups which exhibited analogous demand patterns of ramp volumes throughout the peak period.

While the temporal distributions were originally developed using the available traffic counts, the final distributions were manually manipulated to better match congestion and queuing seen within the peak periods in the microsimulation model.

3.0 Base Year Microsimulation Model Development

While the network is generally represented in the regional and subarea demand models, a much more detailed roadway network is needed for a microscopic traffic simulation tool. As such, instead of converting the demand model network into a Paramics format, the simulation model network was coded from scratch.

Roadway Details and Characteristics

The simulation network was developed to match existing conditions (2012) in terms of the number of lanes and geometric details, signal infrastructure, stop and yield control signage. The Paramics microsimulation network was coded based on 2012 orthoimages originating from the United State Geological Survey (USGS) and published online[1] by Connecticut Environmental Conditions Online (UConn and CT DEEP). The one-foot resolution orthoimagery was used as a scaled JPEG overlay in Paramics, on which the Paramics network geometry was coded. This ensured that Paramics network would be coded to accurately represent not only the number of lanes but the lengths of acceleration/ deceleration lanes at ramps and curvature of the roadways. At signalized intersections, traffic control plans were coded to match the timing and phasing control plans for AM and PM peak period conditions as such data was able to be obtained. For signalized intersections where control plans were not able to be collected from the operating agency, appropriate traffic control plans were synthesized using online ground-level imagery of the intersection controls, the simulated traffic demands, and professional judgement.

Vehicle Characteristics

The regional and subarea demand model classified vehicles into just two categories; autos and trucks. To better represent the vehicle population mix and their typical performance characteristics (e.g. size, top speed, weight, acceleration rate, deceleration rates, etc.), autos and trucks were further disaggregated into multiple vehicle classes. Autos were split into passenger cars, SUVs, pickup trucks, and buses. Trucks were further split into single unit trucks, single-trailer trucks, and multi-trailer trucks.

While the performance differences between different types of autos are not significantly different, the mix of truck sub-classes can have a performance impact on freeway operations. The truck percentages on the I-95 corridor for different truck classes were calculated from classification counts provided by CTDOT for

[1] http://cteco.uconn.edu/download/Map.htm

the permanent count station in located in Greenwich (between Exit 4 and Exit 5). The values presented in Table 3.1 were used to split the truck demand into different sub-classes of truck types.

Table 3.1 Observed Truck Shares by Truck Class

Truck Type	AM Peak Period	PM Peak Period
Single Unit Truck (FHWA Classes 5-7)	43.3%	38.1%
Single-Trailer Truck (FHWA Classes 8-10)	54.4%	58.1%
Multi-Trailer Truck (FHWA Classes 11-13)	2.3%	3.8%

Source: Summary of CTDOT provided classification counts from the Greenwich permanent count station

As total truck percentages vary greatly on I-95 throughout the day, the total truck percentages for the peak periods were from the core peak hours of each peak period, namely 7:00 AM to 9:00 AM for the AM Peak Period and 3:00 PM to 6:00 PM for the PM Peak Period by travel direction. These were used to fine tune the truck percentages used in the microsimulation model over those assumed in the demand model. From the Greenwich station classification count data for the core AM Peak Period hours (7 AM to 9 AM), the observed southbound and northbound truck percentages were 6.4% and 7.2%, respectively. During the core PM Peak Period hours (3 PM to 6 PM), the observed northbound and southbound truck percentage were 7.2% and 7.9%, respectively. For lack of any other classification data in the corridor or on ramps, these total truck percentages were applied globally to the microsimulation model. During the calibration stage of the model development, the truck trip tables were refined beyond the assumptions made in the demand models in order to have the simulated truck percentage match the observed percentage at the Greenwich permanent count station location.

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 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 coefficients of embedded relationships regarding driver behavior (calibration) in order to replicate a certain set of observed conditions (validation).

The calibration and validation 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.

After this stage of calibration, the 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.

The calibration and validation process was an iterative cycle of running the models, testing simulated results for reasonableness and against validation criteria, revising the above mentioned network, 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 calibration 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.

Calibration Parameters

The simulation model was calibrated to match observed network performance measures. Various different factors were calibrated to better match the real world connections. The parameters adjusted and refined as part of the model calibration process predominately included the average driver headway and reaction times and the signposting distances (the range in look-ahead distances where drivers make lane changes to get in the an appropriate lane to complete a turn at an intersection or move to an exit ramp from the freeway).

Validation Targets

Model validation was done for three performance measures: volumes, average congested speeds, and queues. Each of these measures was calibrated against to various degrees in the microsimulation model.

Simulated volumes were validated against observed counts to ensure the model adequately matched both the demand for travel in the corridor and the throughput from bottleneck locations. As with the demand calibration, the GEH statistic is used to measure the differences between simulated flows and observed counts and is calculated for every individual link count in the study area. The percentage of links meeting the criteria is then calculated and used as a measure of the overall "fitness" of the model. The established validation target was to have eighty-five percent (85%) or more of links with a GEH value of 5.0 or less for each hour of the simulated peak period.

Simulated congested speeds were validated against available INRIX traffic data from 2012 for the I-95 mainline roadway segments. The INRIX speed data was provided by CDM Smith and represented the average recurring congested speeds for each TMC segment for an average work weekday. Observed and simulated congested speeds for the I-95 mainline were compiled into a time-space plot using colors to indicate the different speed ranges. In these 'congestion heat maps', green indicates free flow speeds, yellows indicate moderate speeds, and red indicates slow speeds or stop and go conditions. There were no statistically tests established to measure the differences between the observed and simulated speeds. Instead, a qualitative comparison or assessment of the similarities in the bottleneck locations, duration in time, and severity were made for the validation test of speeds.

As simulation queues were similarly not measured in the field, no statistical test can be conducted. However, queues were qualitatively assessed to if the simulated and observed slow speeds and queuing in the congested locations in the congestion heat maps validated well against each other. Observations of queuing was also made through a visual comparison of the simulated conditions versus the aerial surveillance competed by Skycomp of the corridor for this study.

3.3 Validation Results

The following sections present the validation statistics for the final calibrated AM and PM Peak Period simulation models of the I-95 study area.

Volume Validation

The GEH statistics for average hourly flow rates were calculated to compare the modeled hourly flows to the observed count data. A summary is presented in Tables 3.2 and 3.3 for the AM and PM Peak Periods, respectively.

Table 3.2 AM Peak Period Volume Validation Results

	6-7 AM		7-8 AM		8-9 AM		9-10 AM		6-10 AM	
Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria
GEH <= 5	170	85%	175	87%	163	81%	175	87%	189	94%
GEH <= 6	178	89%	181	90%	174	87%	187	93%	191	95%
GEH <=7	189	94%	188	94%	189	94%	190	95%	195	97%
GEH <=8	191	95%	191	95%	192	96%	194	97%	195	97%
GEH <=10	193	96%	197	98%	196	98%	197	98%	197	98%

Note: Total of 201 Balanced Flow Ramp Counts and Mainline Observed Count Locations

Table 3.3 PM Peak Period Volume Validation Results

	3-4 PM		4-5 PM		5-6 PM		6-7 PM		3-7 PM	
Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria	Number of Locations Satisfying Criteria	Percentage of Locations Satisfying Criteria
GEH <= 5	179	89%	188	94%	183	91%	152	76%	193	96%
GEH <= 6	185	92%	191	95%	189	94%	172	86%	195	97%
GEH <=7	189	94%	197	98%	193	96%	181	90%	195	97%
GEH <=8	193	96%	198	99%	194	97%	189	94%	195	97%
GEH <=10	199	99%	199	99%	199	99%	194	97%	197	98%

Note: Total of 201 Balanced Flow Ramp Counts and Mainline Observed Count Locations

The validation target of at least 85% of links having a GEH value lesser than or equal to five is met for the all but two hours (8-9 AM and 6 -7 PM). The calibration of the microscopic model is not only a volume based validation, but speed and queue validation comparisons must also be met. In order to properly calibrate the 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. Even for these two hours where the criteria was not met, the eighty-five percent criteria is met for a GEH value or six or less, indicating that the simulated volumes still validate well against the observed volumes.

Truck Percentage

While the truck percentages were not established as a validation measure, given the high volumes of heavy trucks it the I-95 corridor, even in the peak periods, the final simulated and observed truck percentages for the core peak hours of the AM and PM Peak Periods were compared. Table 3.4 presents the well matched observed and simulated truck percentages for each direction of flow at the Greenwich permanent count location (between Exit 4 and Exit 5).

Table 3.4 I-95 Truck Percentages between Exit 4 and Exit 5

	AM Peak Hours (7-9AM)		PM Peak Hours (3-6PM)	
Direction	**Observed**	**Modeled**	**Observed**	**Modeled**
Northbound	7.2%	7.5%	7.2%	7.1%
Southbound	6.4%	6.4%	7.9%	7.7%

Source: Observed data from CTDOT classification count from the Greenwich permanent count station

Congested Speeds

Speeds from the microsimulation model were qualitatively validated against the INRIX Speed data by the comparison of time-space congested speed heat maps. Each of the following figures present two congested speed heat maps; the top heat map presents the observed INRIX congested speeds, while the bottom presents the heat map for the simulated conditions. The simulated speeds shown in the modeled speed contours are average of five independent random seeds simulations.

In the AM Peak Period, the southbound direction of I-95 (Figure 3.1) is the peak direction of traffic demand, with many bottlenecks existing along the corridor. Slow speeds are observed in the INRIX speed contours on I-95 Southbound near downtown Stamford from Exit 6 to Exit 9. The delays occur due to closely spaced ramps and high volume on and off ramp activities. A major bottleneck is seen in Norwalk due to the weaving of a high volume of traffic entering I-95 from CT Route 7 (Exit 15) and the nearby Exit 14 off ramp. A third bottleneck with reduced speeds is also observed in Fairfield and Bridgeport due to closely spaced interchanges in Fairfield and heavy traffic volumes entering I-95 from CT 25 (Exit 27). The final area of congestion in New Haven is due to construction activity that was ongoing at the I-91 & I-95 interchange.

The microsimulation model generally replicates the southbound bottlenecks observed on I-95 in terms of location, duration and severity. In the modeled speed contours for AM southbound direction (bottom of Figure 3.1) it can be seen that the model does a decent job of replicating the observed bottlenecks and related reduction in speeds. The Fairfield bottleneck was replicated, but the model slightly underestimates the temporal duration of the bottleneck. The simulation model does slightly overestimate the reduction in speed due to backup caused at the I-287 off ramp in New York to the east of Greenwich. The model also sees a minor bottleneck forming in Milford from the Exit 39 clover leaf interchange as compared to observed INRIX speed data. No attempt was made to replicate the construction related congestion in New Haven since the construction is expected to be completed within a few years and will not be present during future analysis year (2040).

During the AM Peak Period, the northbound direction of I-95 (Figure 3.2) is the off-peak direction of traffic demand. The observed INRIX speed data shows that the corridor generally operates at free flow conditions, with minor areas of slower speeds seen in Greenwich and in New Haven. The simulation model replicates these minor reductions in speed, although the speeds in New Haven were slower in the observed data due to the ongoing construction activities. As with the southbound direction, there was no attempt to mimic these additional construction influenced slower speeds.

During the PM Peak Period, the southbound direction of I-95 is the off-peak direction of travel. Despite being the off-peak direction, the observed INRIX speed data (Figure 3.3) shows congestion and reductions in speed in Greenwich (due to back-up from the I-287 off-ramp in New York), in Stamford (due to traffic volumes entering I-95 at Exit 7 and Exit 8, and in New Haven (due to entering traffic volumes compounded by construction activity). The simulation model accurately replicates the bottleneck in Greenwich, although the severity may be slightly higher than observed data indicates. The simulated Stamford bottleneck is slightly lower in severity than in the observed data, but the bottleneck is still replicated. A localized slowdown in speeds is simulated in the New Haven area, but a queue is not formed and this remains a minor bottleneck. As in the AM peak, the observed overall reduction in speed in New Haven due to construction activity is not replicated in the simulation model so as to not influence future conditions once construction has completed.

During the PM Peak Period, the northbound direction is the peak direction of demand and sees extensive congestion and numerous bottlenecks (Figure 3.4). In some locations, the congestion starts before the beginning of the defined PM Peak Period at 3:00 PM. The congestion is produced by many bottlenecks which can overlap to create miles of severe congestion with bumper to bumper traffic for long stretches of I-95, particularly from Stamford to Bridgeport. Much of this congestion is caused by high on and off ramp activities at the interchanges.

In Norwalk, severe congestion is observed due to lane changing related to traffic using Exits 14 and 15. Combined with high ramp volumes from other interchanges in the Stamford area, the congestion can be seen to extended back from Norwalk into Stamford and produced slow speeds throughout the PM Peak Period. A significant bottleneck is also observed in Bridgeport, and is created as friction from the weaving of traffic changing lanes while approaching Exit 27A to access CT Route 25. The congestion is also contributed to the closely spaced interchange ramps in Fairfield. In New Haven, slow speeds area observed as vehicles weave to access local New Haven interchanges as well as the left-hand exit ramp to I-91. The observed speed data is also worsened by additional friction from the construction activities. Overall, the simulation model replicates the location, severity and duration of the congestion at the observed bottleneck locations in Figure 3.4.

Figure 3.1 Congested Speed Heat Maps: I-95 Southbound, AM Peak Period

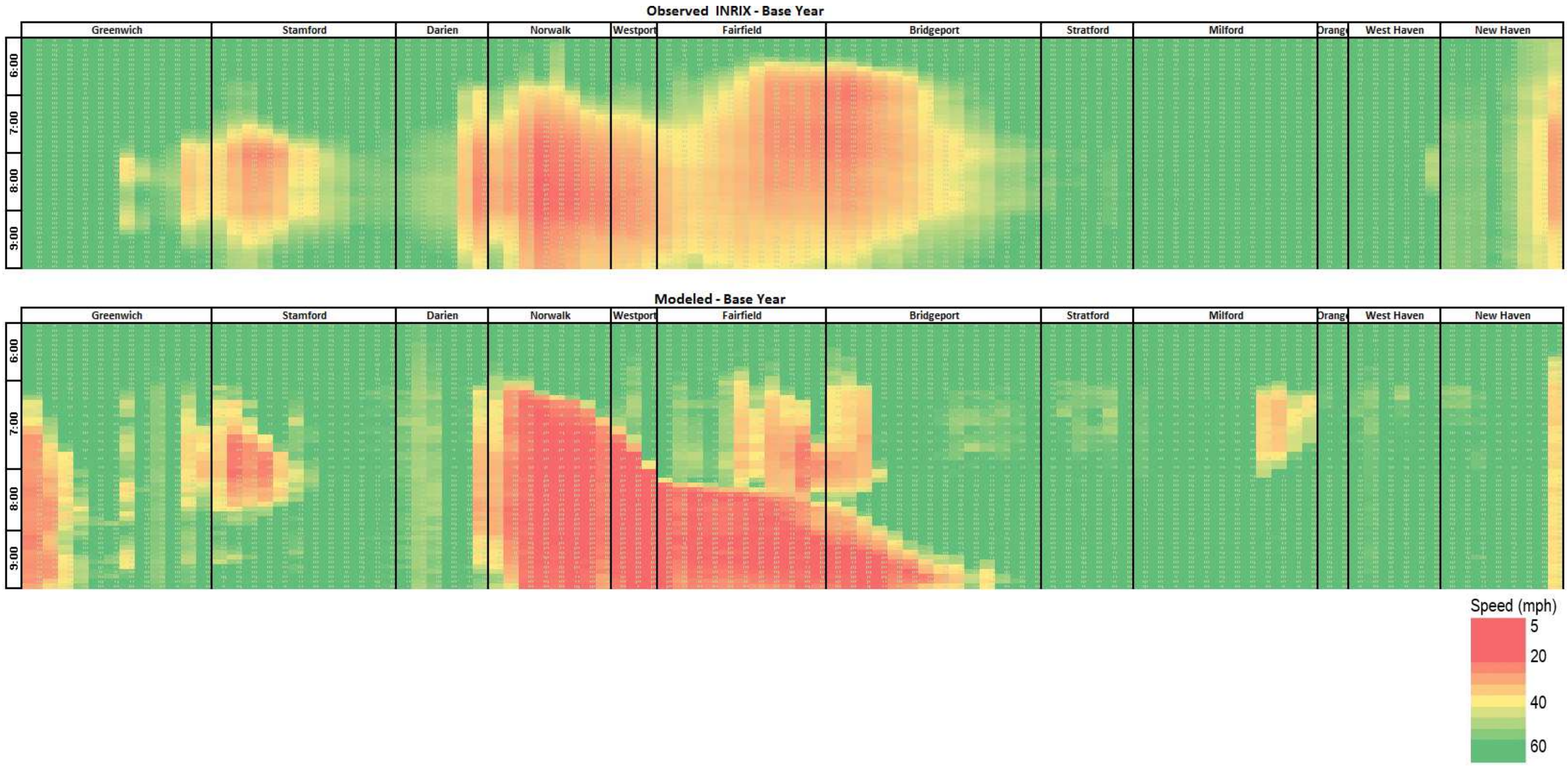


Figure 3.2 Congested Speed Heat Maps: I-95 Northbound, AM Peak Period

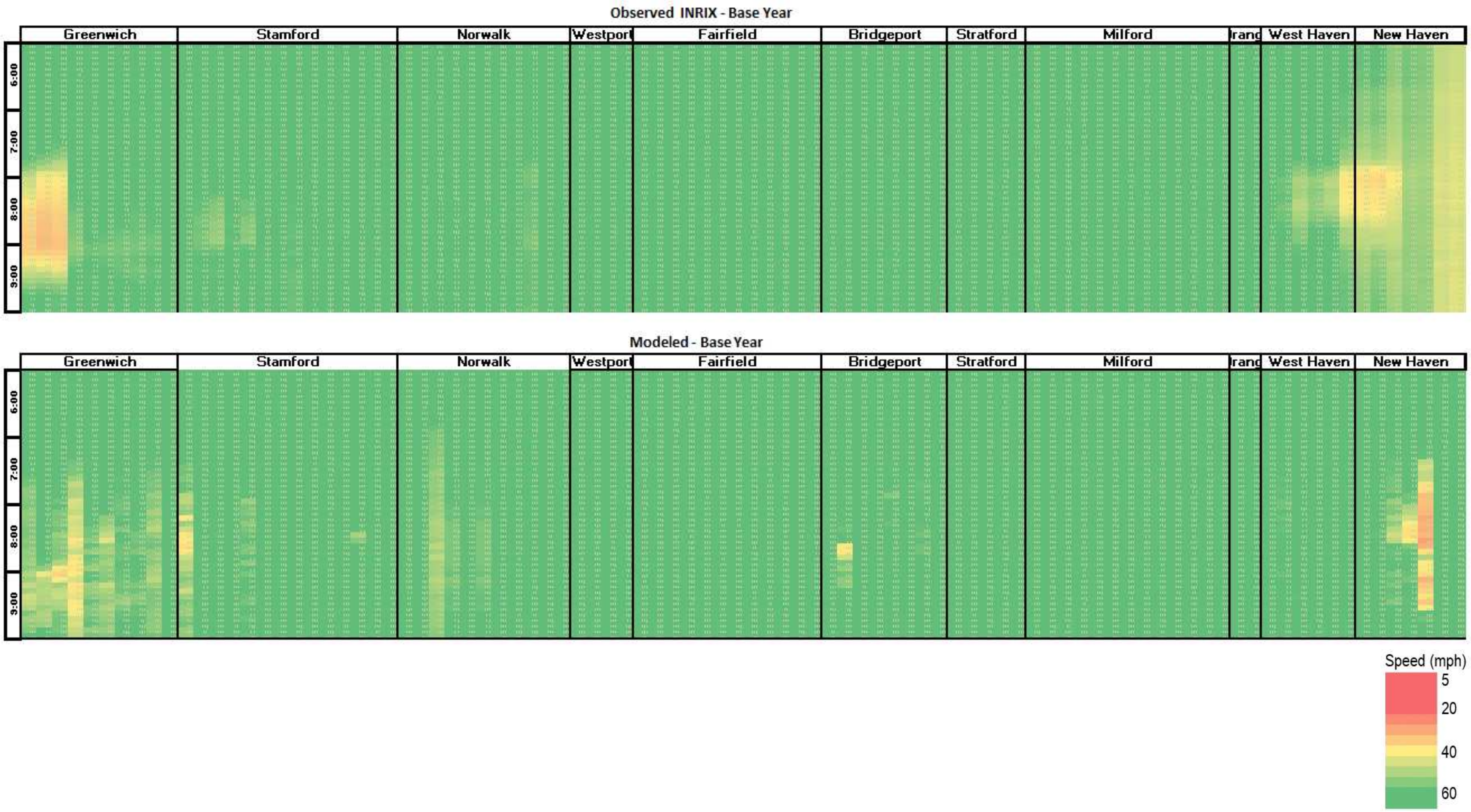


Figure 3.3 Congested Speed Heat Maps: I-95 Southbound, PM Peak Period

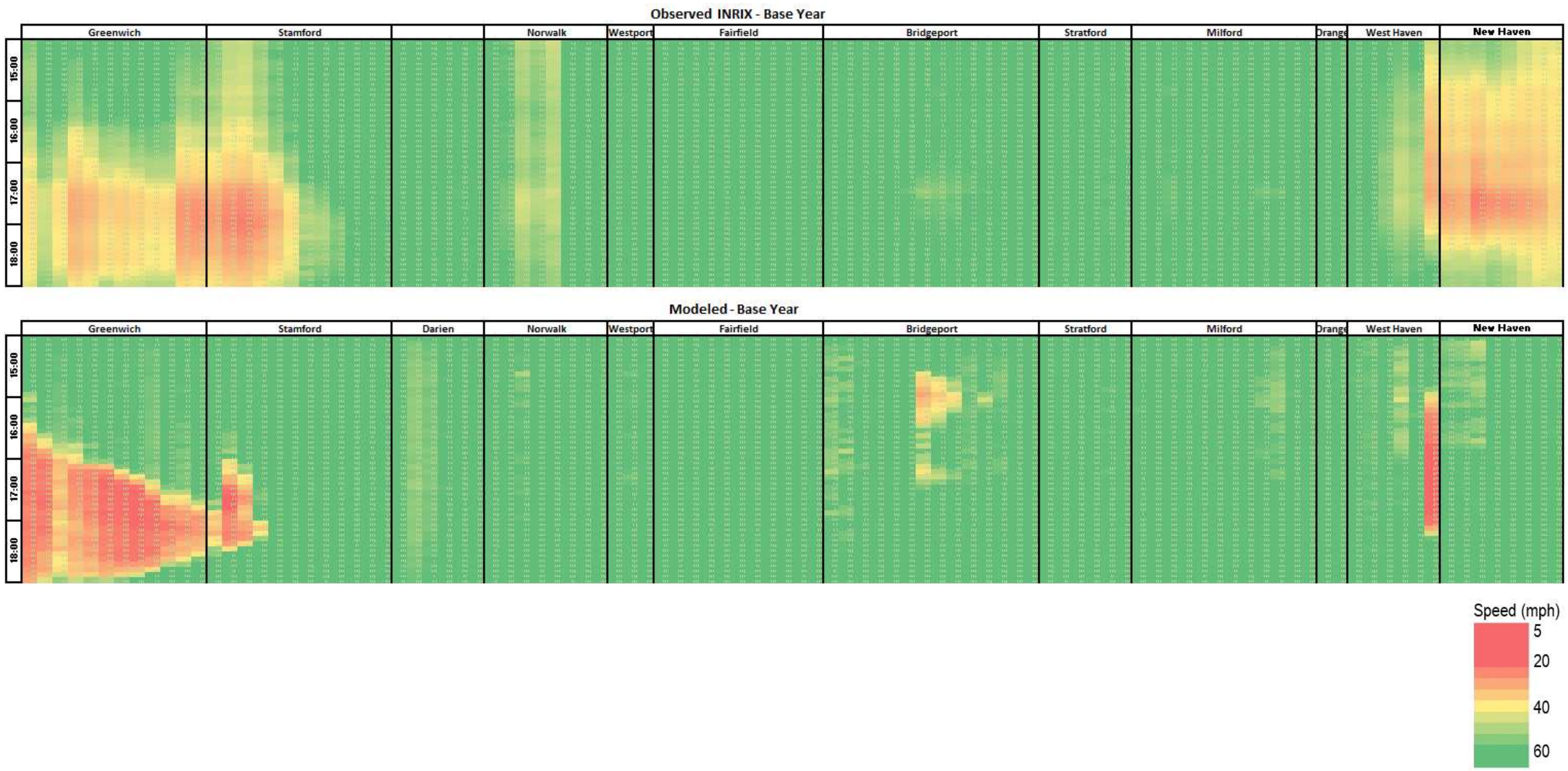
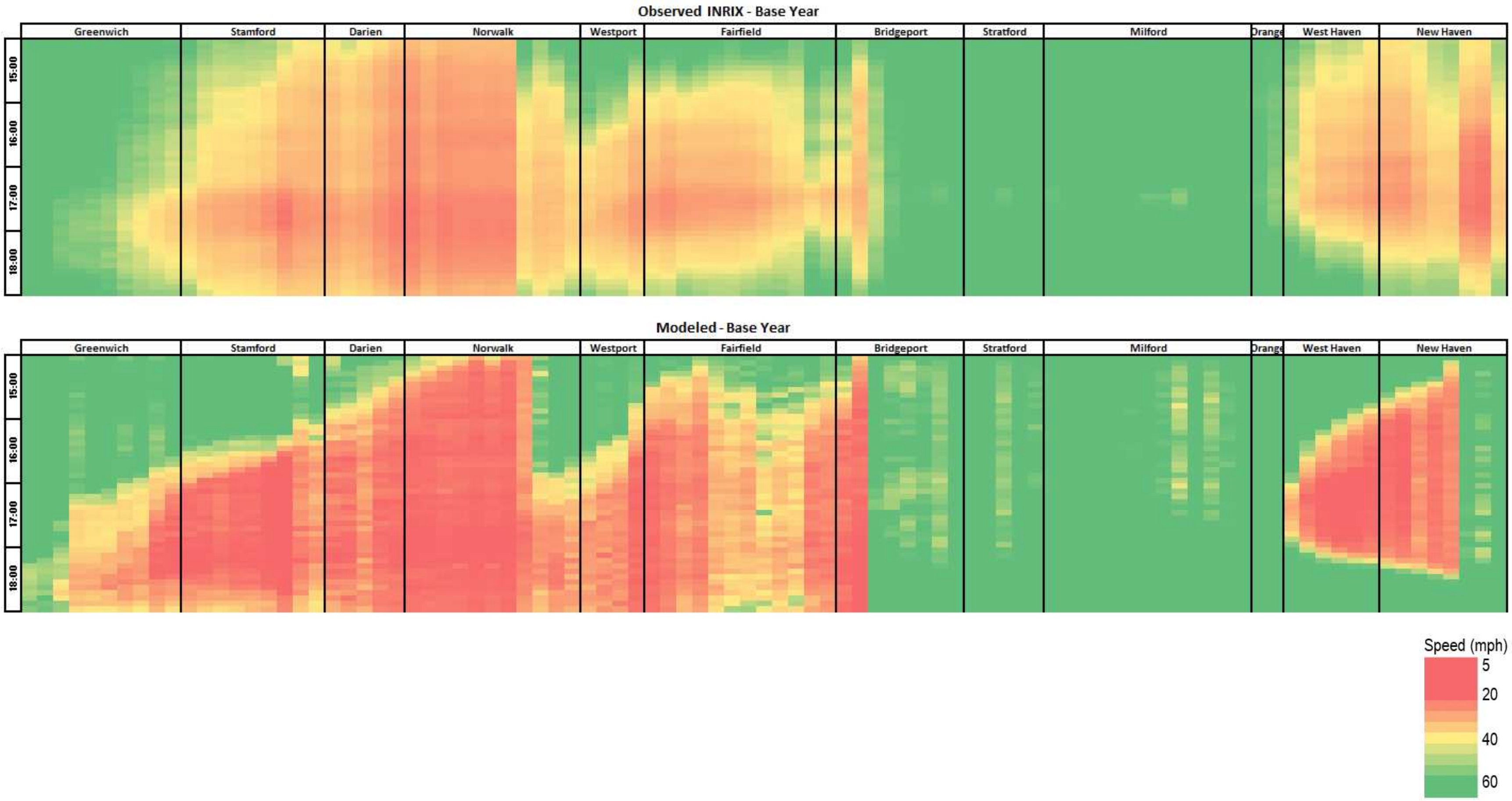


Figure 3.4 Congested Speed Heat Maps: I-95 Northbound, PM Peak Period



Queues

The simulated results were checked to ensure that areas of queues and high vehicle densities as simulated in the model well match the observed conditions. While not quantifiably compared, the length of the queued conditions in the congestion heat maps generally match between the observed INRIX and simulated speed data.

These queued areas were further qualitatively reviewed and validated against local knowledge of where the congestion hotspots exist during typical weekday conditions. The results of these modeler's audits found that simulated results accurately represent the congested locations known to exist in typical weekday conditions.

4.0 Calibration Conclusions

As part of the I-95 Corridor Congestion Relief Study, the purpose of the development of the traffic microsimulation model was to allow for the forecasting of impacts of various potential future year geometric improvements and tolling strategies to relieve traffic congestion on I-95 in Connecticut. However, in order to allow for the simulation of different future year scenarios, the model must first be built and calibrated to represent the existing conditions and modeled results need to be validated against observed results.

The calibrated microsimulation model of existing (2012) base year conditions accurately replicates the major bottlenecks on I-95 both in terms of severity and duration during both the AM and PM peak periods. The model also replicates the observed counts in terms of modeled volumes on mainlines and ramps. Given the high degree of validation against observed conditions, the simulation model was found fit to assess the peak period operational performance of I-95 under various possible future year conditions.

Connecticut I-95 Corridor Congestion Relief Study

Future Year Simulation Scenarios

final

report

prepared for

Connecticut Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

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June 2016

www.camsys.com

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date

June 2016

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1.0 Introduction

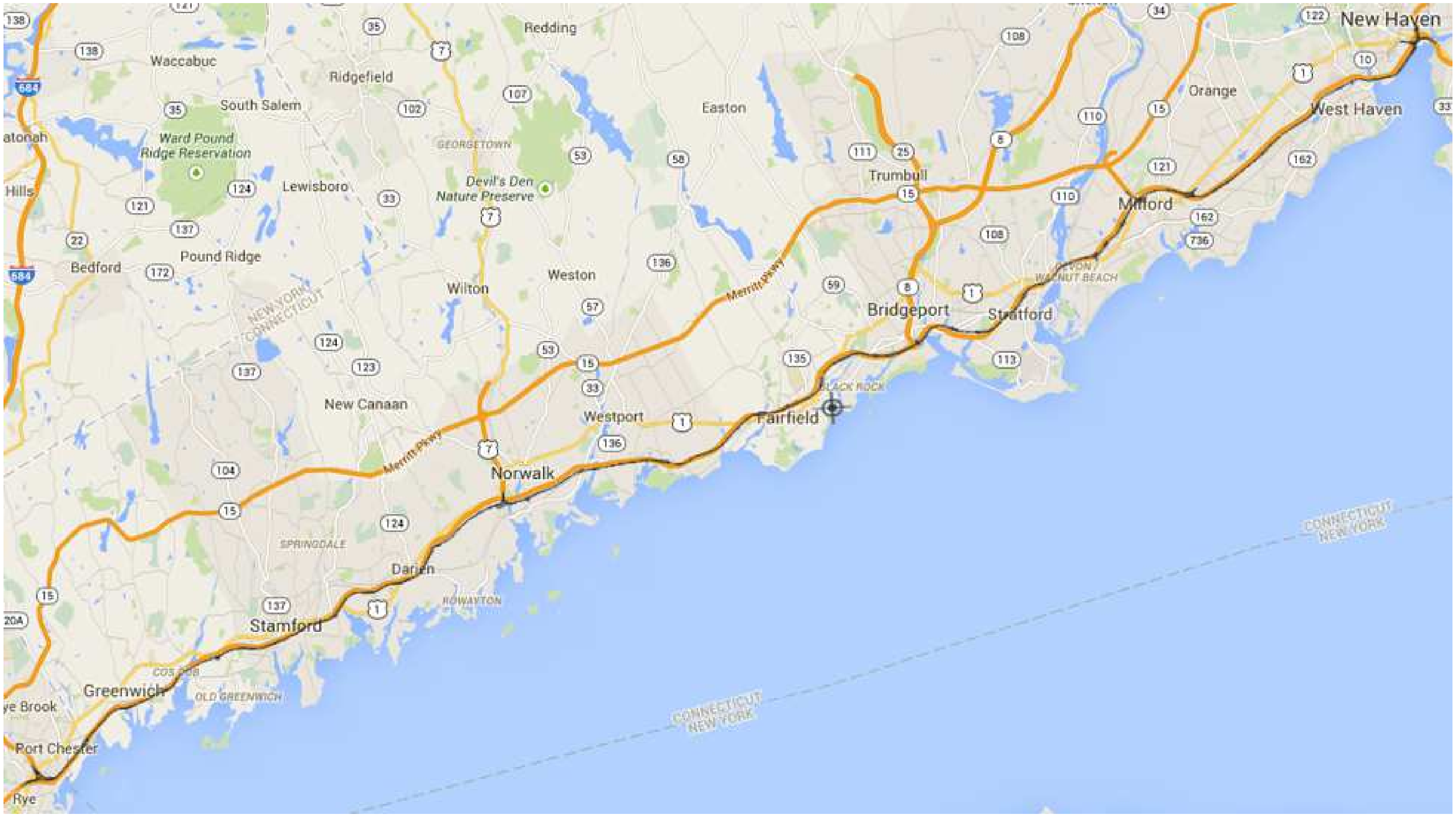
As part of the I-95 Corridor Congestion Relief study for the Connecticut Department of Transportation, Cambridge Systematics developed a microsimulation model to assess impacts of various potential geometric improvements and tolling strategies to relieve traffic congestion. The microscopic simulation model was developed using the Quadstone Paramics Microscopic Traffic Simulation Software (version 6.9.3).

This report documents the simulation of future year scenarios for the I-95 corridor under various physical improvements and/or tolling scenarios. The development and calibration of the existing conditions Base Year simulation model are presented in a separate report.

1.1 Simulated Project Area

The microsimulation model covered a 49-mile section of I-95 in Connecticut, from the I-91 & I-95 interchange in New Haven, Connecticut in the north to the I-287 & I-95 interchange in Rye, New York in the south. The microsimulation model includes the mainline roadway, all interchange ramps to and from I-95, and all connecting roadways where available data permitted them to be included in the model. The graphic below illustrates the extents of the microsimulation model, with simulated roadways shown in black.

Figure 1.1 Geographic Extents of the Microsimulation Model



Background Image Source: Google Maps

1.2 Future Year Scenarios Analyzed

After the development of 2012 base year calibrated microsimulation model for I-95, several 2040 future year scenario models were created and simulated to analyze the operational impacts of the different combinations of conceptual design improvements for I-95 and for different tolling scenarios.

The various physical improvements that were considered include addition of auxiliary lanes in key locations and/or the addition of full travel lanes throughout all or parts of the I-95 corridor. Tolling scenarios considered remaining toll free, the introduction of tolls on I-95 alone, and the introduction of tolls on both I-95 and the Merritt Parkway (CT-15). The following scenarios were analyzed in microsimulation model for this study, and are reported on in this report.

Table 1.1 Analyzed Future Year Scenarios

Number	Scenario Name	Physical Improvements	Tolling Strategy
1	2040 No Build	Existing committed improvements only	No Tolling
2	2040 Widened New York to New Haven – Toll Free	Add one travel lane per direction throughout corridor, additional hotspot improvements	No Tolling
3	2040 No Build with I-95 Toll	Existing committed improvements only	Toll I-95 only
4	2040 Widened Bridgeport to Stamford without Tolls	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	No Tolling
5	2040 Widened Bridgeport to Stamford with I-95 Toll	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	Toll I-95 only
6	2040 Widened Bridgeport to Stamford with I-95 & CT-15 Tolls	Add one travel lane per direction between Bridgeport and Stamford, additional hotspot improvements	Toll I-95 & CT-15

1.3 Scenario Travel Demand Modeling

As a key input to all simulated future year scenarios, a travel demand forecast analysis was completed by CDM Smith to assess cumulative impacts of the growth in traffic to 2040 conditions, the capacity increases of physical improvements made, the driver decisions regarding the time of travel and in route choices in response to the scenario tolling strategies, and resulting revenue estimates.

This demand model served as the key input in the changes in the traffic demands for the I-95 corridor, including where traffic enters and exits the corridor. These travel demand model analyses and the resulting forecasts for both time and route diversions for all scenarios are documented in a separate report produced by CDM Smith.

1.4 Operational Performance Reporting

For each of the analyzed scenarios included in this report, several performance metrics are presented which capture the simulated operational conditions of the I-95 corridor. These metrics presented both the details of the corridor (speed contour diagrams) and aggregate measures of operational performance of the I-95 corridor.

Speed Contours

When analyzing the operations of a freeway corridor like I-95, locating the congestion and bottleneck points helps to identify and understand the root causes of congestion in the corridor. A useful tool for qualitative analysis of this type is to use speed contours or congestion heat maps. Speed contours are time-space diagrams which indicate the speed throughout the corridor and throughout the peak period, where the green colors indicate free-flow or near free-flow speed, and the red colors indicate significantly reduced speed. In this report speed contour diagrams are utilized to visualize the location, magnitude, and duration of the congestion on I-95 for all the scenarios. The speed contours provide a concise picture of the operations of the corridor to help compare the operations across all of the I-95 alternatives. Throughout this report, the speed contours for each scenario are presented along with another scenario to make evident the differences between the analyzed scenario and an appropriate reference scenario. Also provided in these figures for added context, are the locations of the improvements assumed in the presented scenarios, to allow the reader to better correlate the impacts of those improvements on the simulated operational conditions along the I-95 corridor.

Aggregate Performance Metrics

To allow for a more quantified assessment of the operational performance of the I-95 corridor in each of the simulated future year scenarios, aggregate performance metrics are presented. These metrics include the total vehicle miles travel, total vehicle hours traveled, and average speed for each hour by travel direction of I-95 for all reported scenarios. In addition, average simulated travel times between two different points along I-95 are also reported for each direction by each hour. The travel times are presented for two different trips on I-95; between New Haven and the New York Stateline, and between Bridgeport and Stamford.

2.0 2040 No Build Scenario

The 2040 No Build model was built to serve two roles; first to assess the impacts of growth in traffic demand over 28 years (from 2012 to 2040), and second to serve as a basis of comparison between the future year build alternatives. The No Build scenario model network was built by including all the future committed highway physical improvement projects in the calibrated base year model network. For the No Build scenario, no tolling was considered to be in place on either I-95 or the Merritt Parkway (CT-15). The vehicular demands for the I-95 corridor were also developed for the 2040 No Build model taking into consideration the growth in demand and change in travel patterns over the 28 years period in the project area predicted by the macroscopic travel demand model developed by CDM Smith.

2.1 Roadway Improvements

Through a review of the state Transportation Improvement Plans and consultation with Connecticut Department of Transportation officials, the following committed projects were identified and included in the 2040 No Build simulation network:

- Addition of an auxiliary lane northbound between Exit 8 and Exit 10
- Addition of an auxiliary lane northbound between Exit 14 and Exit 15
- Addition of an auxiliary lane southbound between Exit 15 and Exit 14
- Redesigned I-91 and I-95 interchange in New Haven (currently under construction)

2.2 Demand Development

The 2040 future year no-build demands were developed by superimposing the difference (growth) in modeled demands between the 2012 Base Year and 2040 No Build travel demand modeled demands for the I-95 corridor onto the calibrated base year micro simulation demand trip tables. This growth was applied to each origin-destination (OD) pair in the I-95 corridor to incorporate all growth and changes in the travel patterns in the I-95 corridor. As with the 2012 Base Year models, the demand trip tables were developed for the AM peak period (6 to 10 AM) and PM peak period (3 to 7 PM).

The growth in overall demand in the microsimulation subarea from the 2012 Base Year to 2040 No Build scenario is summarized in the following table for autos, trucks, and the total for vehicle classes for each of the peak periods.

Table 2.1 Growth in Demand for 2040 No Build Scenario

Time Period	Vehicle Type	2012 Base Year Simulation Demand	2040 No Build Simulation Demand	2012 to 2040 Percent Growth in Demand
AM	Autos	212,080	229,829	8.4%
	Trucks	21,538	24,562	14.0%
	Total	233,618	254,391	8.9%
PM	Autos	249,053	278,737	11.9%
	Trucks	21,198	23,008	8.5%
	Total	270,251	301,745	11.7%

As part of the Base Year model development, temporal demand profiles were developed that split the total four hour peak period demand into 15 minute intervals. Sixteen different temporal demand profiles were developed for each peak period for similar groups of OD pairs in the corridor based on location and direction of travel. Initially based on the available hourly count data on the I-95 ramps, the profiles were further refined and split into 15 minute intervals during the Base Year calibration process to better match the simulated congestion patterns to the observed speed data. As the amount of growth in the corridor is limited on a per annum basis, and combined with the already significant degree of peak spreading of demand throughout the peak periods, the same profiles that were developed for the Base Year were used for the 2040 No Build scenario.

Similar to the 2012 Base Year scenario, the auto and truck demands in the 2040 No Build microsimulation model were further disaggregated into various vehicle types to accurately simulate the operational performance characteristics of different categories of vehicles observed on I-95. Without additional information regarding the future year vehicle mix, the same vehicle classification disaggregation was used for the 2040 No Build as for the Base Year scenario. Autos were classified into passenger cars, sport utility vehicles, pickup trucks, and buses, while trucks were classified into single unit trucks (FHWA truck classes 5 to 7), single-trailer combination trucks (FHWA truck classes 8 to 10), and multiple-trailer combination trucks (FHWA truck classes 11 to 13).

2.3 Operational Analysis

Following the development of the 2040 roadway network and the 2040 No Build demands, the No Build scenario was simulated for five different random seeds. The results of those simulations were averaged to produce the operations results of the 2040 No Build scenario.

Though the growth forecasted for the 2040 No Build scenario during the 28 years (2012 to 2040) is minimal on a per annum basis, the compounded growth in demand over the 28 years period is enough to deteriorate the operations and cause significant delays on I-95. This is not surprising considering the severe congestion that is seen in the corridor under existing conditions, combined with the limited nature of the committed improvements added to the network under the No Build scenario conditions.

Speed contours for the AM Peak Period are shown in Figures 2.1 and 2.2 for the southbound and northbound direction, respectively. In the AM Peak Period the southbound direction is the peak direction of travel. Due to the increased demand in the 2040 No Build and limited committed highway improvement projects to alleviate the current bottlenecks, it is shown in the figures that the congestion severity at the existing bottlenecks generally increases, causing higher delays in the 2040 No Build than in the Base Year scenario.

In 2040 No Build model, higher southbound delays are seen on southbound I-95 at the off ramp to I-287 and into Greenwich, near downtown Stamford, at the closely spaced interchanges in Fairfield, and at the Exit 39 clover leaf interchange connecting with Route 1 in Milford. Contrary to this trend of increase delays, the bottleneck seen in Norwalk remains, but the extent of the congestion and length of the queue from the bottleneck reduce significantly. This improvement in the operational conditions can be attributed to the committed No Build improvement project to add an auxiliary lane between Exit 15 and 14.

In the AM Peak Period in the off-peak northbound direction, in the 2040 No Build scenario, higher delays are observed south of I-95 interchange with I-91 in New Haven due to increase in demand. This bottleneck, while very minor in the base year models, becomes more severe in the 2040 No Build conditions from weaving friction caused as vehicles make lane changes to get into correct lane to continue along either I-95 or exit to I-91. While the improvements to the I-95 and I-91 interchange have been completed in the 2040 No Build scenario, the increased number of lanes and higher demands cause increased congestion approaching the interchange.

Figure 2.1 2040 No Build: AM Peak Southbound Speed Contour

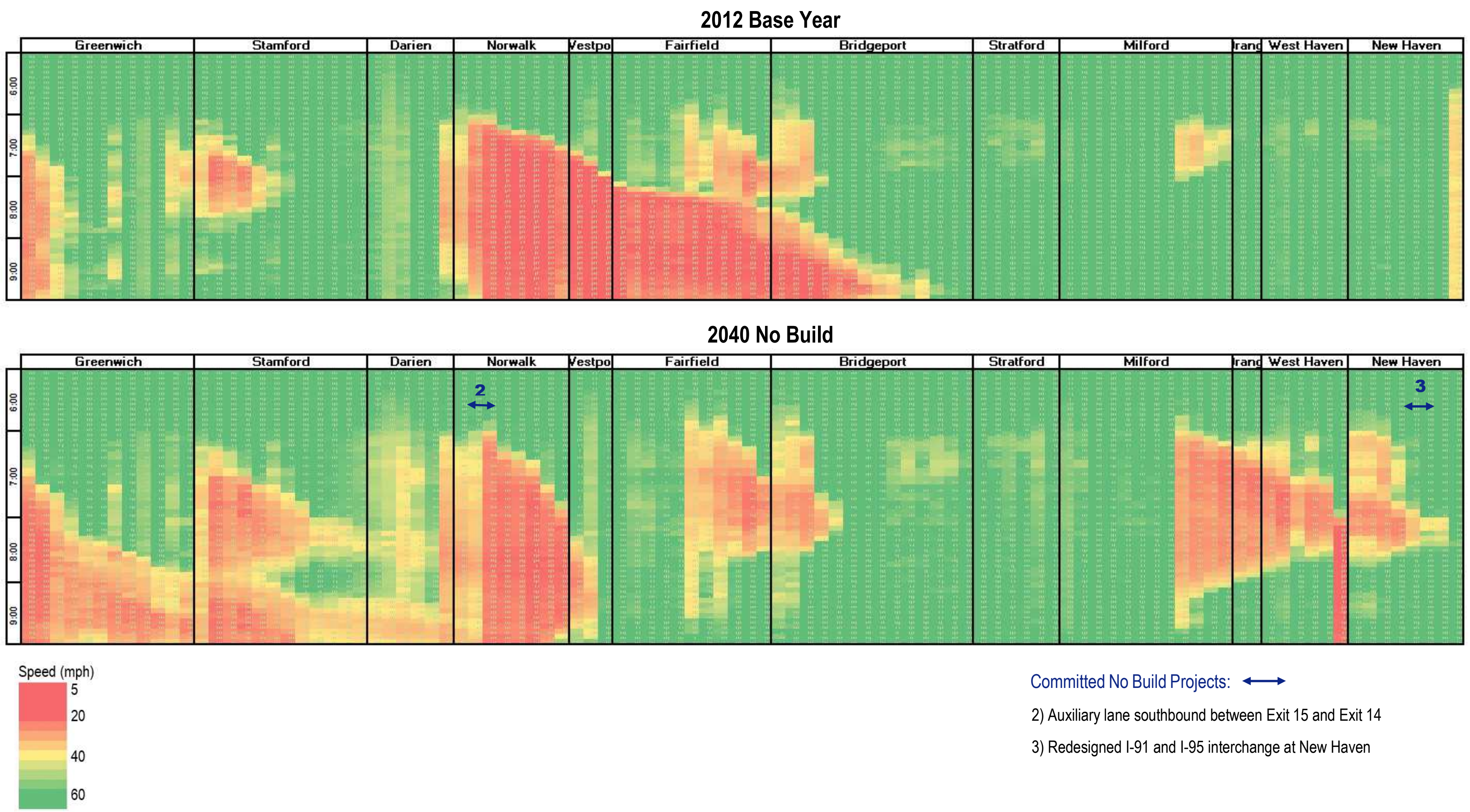
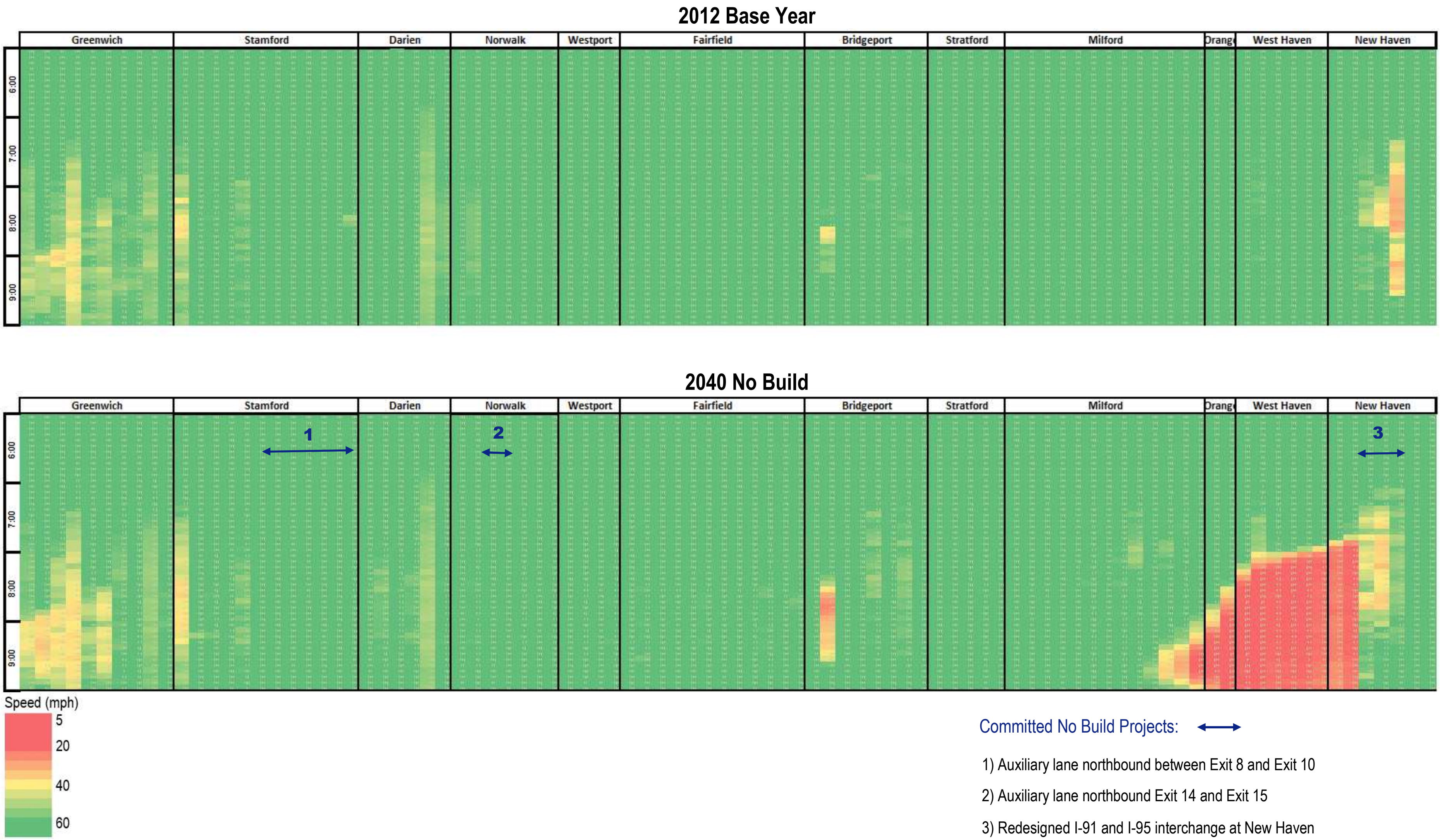


Figure 2.2 2040 No Build: AM Peak Northbound Speed Contour



Speed contours for the PM Peak Period are presented in Figures 2.3 and 2.4 for the northbound and southbound directions of travel, respectively. In the PM Peak Period, the northbound direction of travel is the peak direction of traffic demand.

The congestion patterns in AM and PM Peak Periods are very different due to the difference in the way the demand peaks in these peak periods. The AM Peak Period has a more pronounced demand peak during the heart of the period (peak hours between 7 a.m. and 9 a.m.) with less congestions seen in the shoulder hours of the peak period. The PM Peak Period demand pattern is more evenly spread across the entire four hour peak period, with a higher degree of peak spreading which creates almost constant and steady demand throughout the entire period. At some locations in the corridor, a standing queue is observed even before 3 p.m. when the defined PM peak starts.

In the 2040 No Build scenario in the northbound direction (Figure 2.3), the addition of northbound auxiliary lanes between Exit 8 and Exit 10 (Stamford and Darien) and between Exit 14 and Exit 15 (Norwalk) shows some benefits in terms of reduction in severity of congestion in Norwalk and Stamford. Due to this slight reduction in congestion, especially in the early part of the PM Peak Period, the metering effects of traffic in the Base Year conditions are somewhat improved, and additional traffic can now past Norwalk. This effect, combined with added traffic growth, shifts the bottleneck downstream to Exits 16 and 17 in Norwalk, and the resulting extent of congestion remain significant.

The bottleneck in Fairfield observed in the 2012 Base Year model, which was caused by high demand and closely spaced interchanges, worsens in magnitude in the 2040 No Build from additional traffic demands. This worsened bottleneck acts as a metering effect on I-95 that causes the existing bottleneck in Bridgeport to appear to lessen in severity. Finally, due to increases in demand, the congestion in New Haven from I-91 and I-95 diverge worsens in the 2040 No Build scenario despite the completion of the improvements to the I-95 and I-91 interchange.

During the PM Peak Period, the southbound direction (Figure 3-4) is the off-peak direction of travel and generally operates as or near free flow conditions with the congestion observed in the 2040 No Build scenario similar to the base year conditions. However, with increased demands from growth, minor bottlenecks are now seen in Milford and New Haven in the 2040 No Build Scenario.

Figure 2.3 2040 No Build: PM Peak Northbound Speed Contour

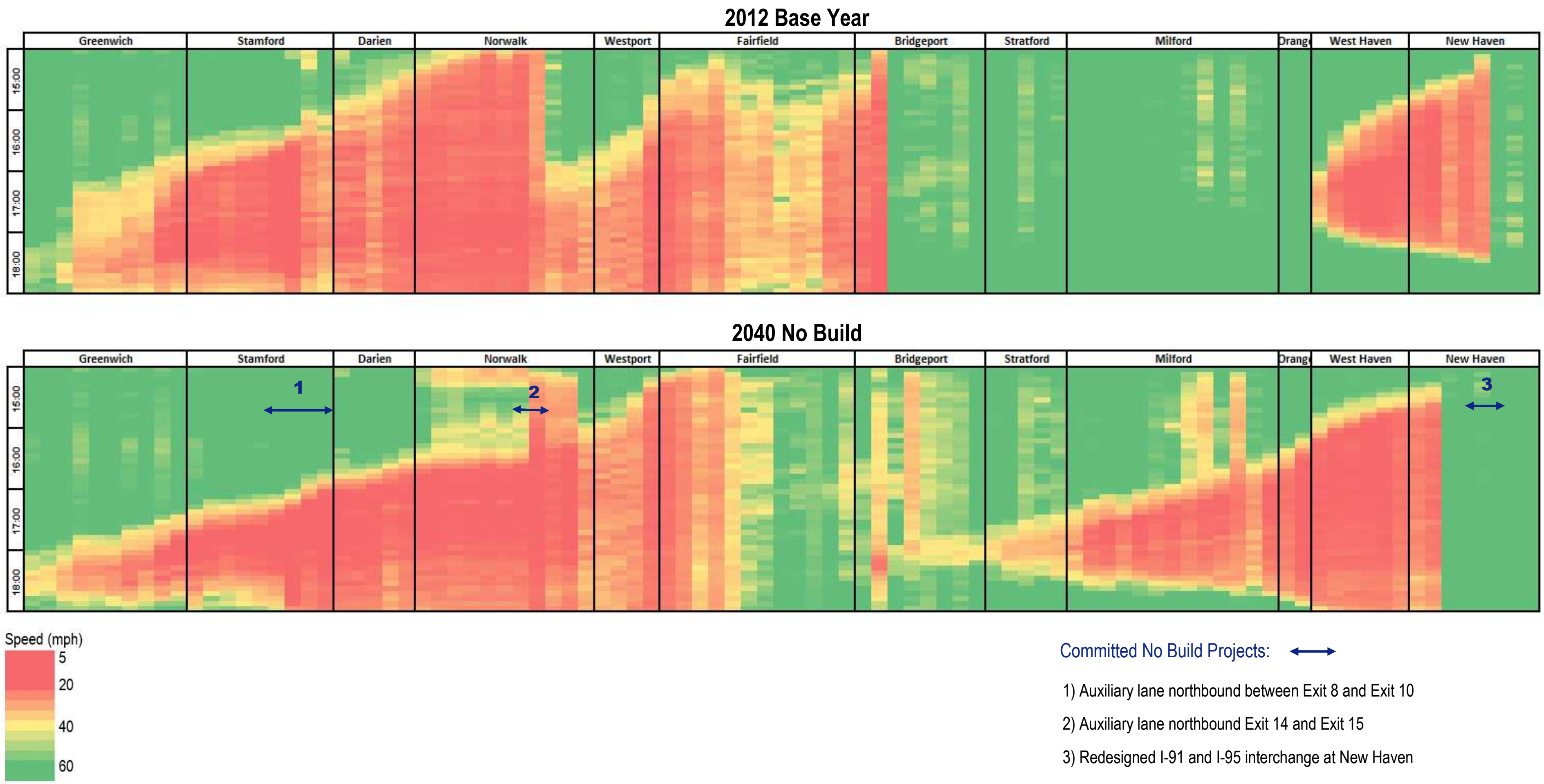
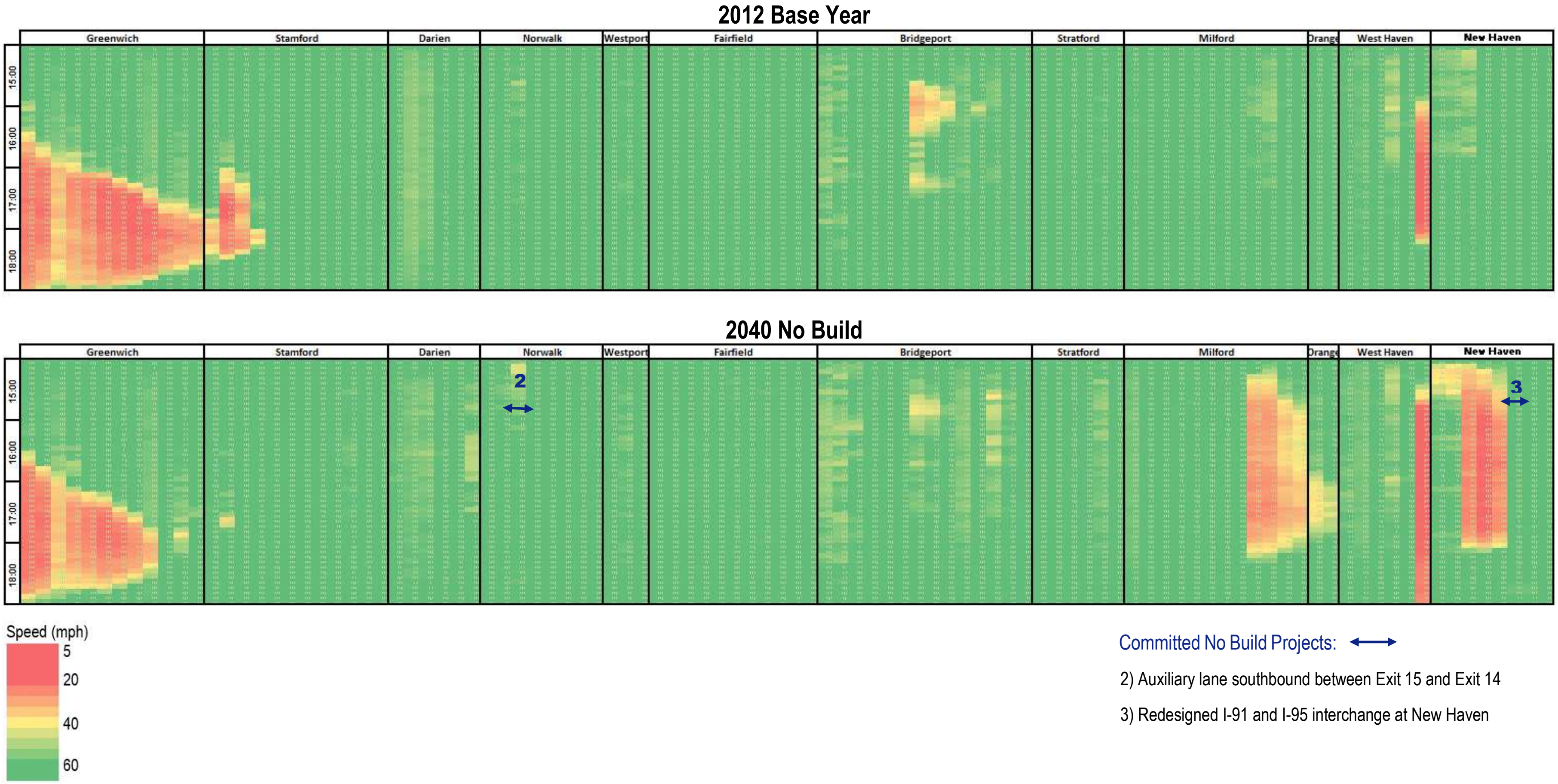


Figure 2.4 2040 No Build PM Peak: Southbound Speed Contour



3.0 2040 Widened New York to New Haven - Toll Free

For the congestion relief project, one of the future scenarios analyzed was addition of one continuous travel lane on I-95 covering the entire study area from New York to New Haven in both the northbound and southbound directions without the introduction of any tolls.

3.1 Roadway Improvements

The additional lane was considered to be added between the I-287 and I-91 interchanges. The additional lane was also considered to be added in lieu of the committed No Build improvement projects, and the interchange improvement project included in the scenario is the I-95 and I-91 interchange improvement which was already under construction under the base year conditions. No tolling was included in this scenario. The additional travel lane was added to I-95 on the 2012 base year roadway configuration without introduction of tolling on I-95. Under this defined scenario, the additional lane was added on the left side of the I-95 mainline, as opposed to being added as auxiliary lanes. This resulted in the existing configuration of the interchanges along I-95 being unchanged, including the addition of any committed auxiliary lanes.

After initial simulation analysis of the Widened New York to New Haven scenario, it was observed that with the additional induced demand and without improving the interchange designs, there was limited improvement in congestion on I-95. In fact in many instances the simulated congestion became far worse in terms of both magnitude and duration.

As imputed from the ramp and mainline count data available and resulting balanced flows, the average distance traveled on the I-95 mainline facility in the study area is less than 10 miles. Further this finding, a review of AirSage OD data by CDM Smith showed that a small minority of trips traverse long distances in the I-95 corridor. With the increased off and on ramp volumes attracted to the corridor to use the widened I-95 roadway, the existing interchange designs and configurations are further stressed as additional vehicles attempt to use the added capacity to I-95. While the addition of through capacity would help lower the density of the through traffic, it does not help address any existing bottlenecks that exist as a result of ramp merging, diverging, and weaving traffic during the peak periods.

Building upon these preliminary observations of the poor operational conditions for this scenario, additional congestion mitigation strategies were devised and applied in the simulation model at a handful of locations to ease worsened congestion on I-95 under the widened scenario as compared to the No Build scenario. The mitigation strategies were limited to addition of auxiliary lanes and increasing the off ramp capacity, or related to a realistic termination of the added through lane (at the I-287 or I-91 interchanges). The locations of the mitigations focused on where on or off ramps which had demand exceeding ramp and interchange capacity and where bottleneck queues were cascading upstream from the interchange to severely limit the mainline operations of all through lanes.

Adding these mitigation strategies improved the operational performance of I-95 for the Widened New York to New Haven scenario. The additional mitigations also gave a more realistic assessment of how the corridor would be built out under such a scenario; not only through capacity would be added throughout the corridor, but also at key interchange bottleneck locations as well.

Under the final Widened New York to New Haven scenario, the following projects were added to the scenario to help mitigate the key bottlenecks:

Table 3.1 2040 Widen New York to New Haven without Toll Additional Interchange Mitigations Included

ID	Mitigation Description
1)	Two lane exit ramp and deceleration lane for the off ramp to I-287 from I-95 Southbound.
2)	Auxiliary lane southbound between Exits 7 and 6.
3)	Auxiliary lane southbound between Exits 15 and 14.
4)	Two lane off ramp from I-95 Northbound at Exit 27A and auxiliary lane between Exits 26 and 27A.
5)	Additional fifth lane southbound between Exits 48 and 47.
6)	Lane configuration improvements to northbound I-95 approaching the I-91 Interchange.

3.2 Demand Development

The demand for this scenario was developed by superimposing the difference in demand from the demand trip tables in the travel demand models for 2040 No Build and 2040 Widened New York to New Haven without Toll scenario on top of the 2040 No Build microsimulation scenario demand. As expected, the increase in roadway capacity on I-95 from the additional travel lane attracted more trips to I-95, particularly in the peak travel directions. The same temporal distributions and vehicle type distributions used in 2040 No Build scenario were used in the 2040 Widened New York to New Haven without Toll scenario.

3.3 OPERATIONS ANALYSIS

Speed contour diagrams are presented for the Widened New York to New Haven without Toll scenario in Figures 3.1 through 3.4 for both directions of I-95 for the AM and PM Peak Periods.

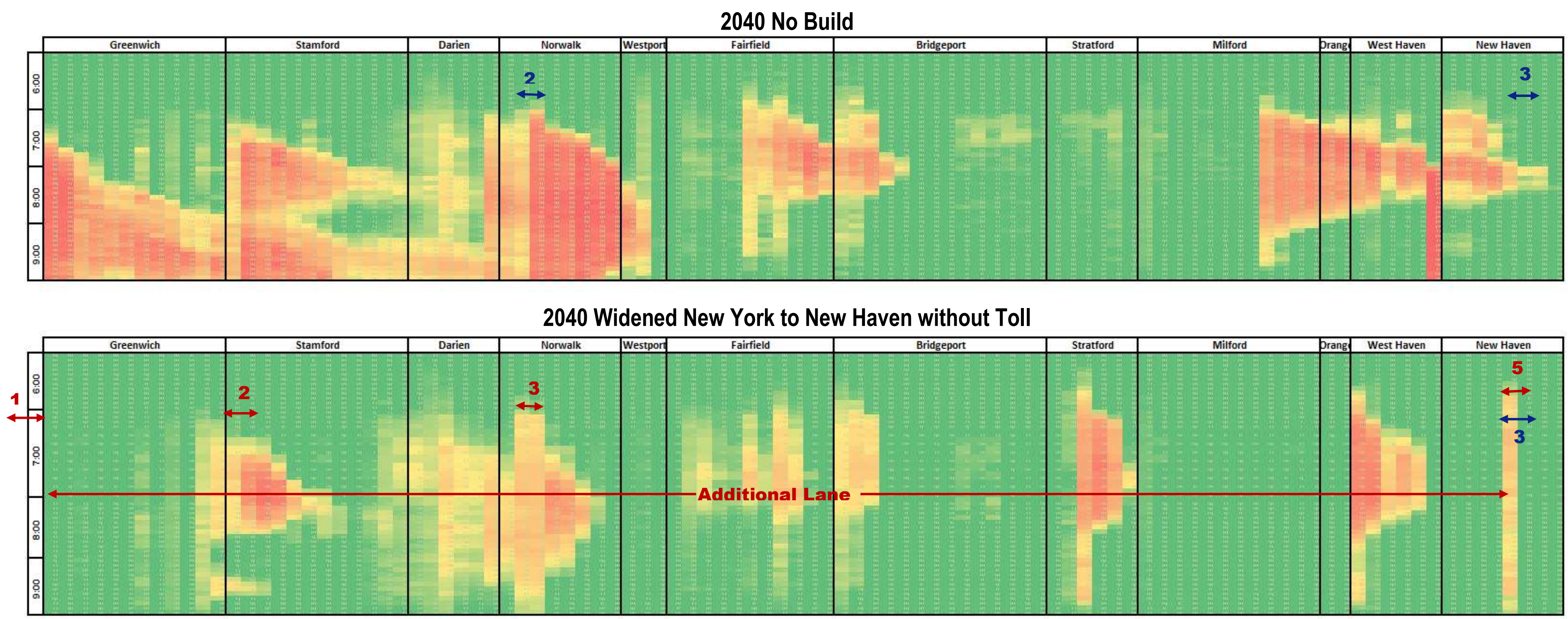
In the AM Peak Period, the additional through lane combined with the additional mitigation strategies at some of the key bottleneck locations reduce the severity of the No Build scenario bottlenecks in the peak southbound direction of travel, but many less severe bottlenecks are still seen. The off-peak direction in the AM Peak Period (northbound) operates at or very near to free-flow conditions.

In the PM Peak Period, the widening and additional mitigation strategies do not alleviate congestion and delays in the same way as in the AM Peak Period. The mitigation strategies do help in shifting the bottleneck locations temporally (congestion starts later) and/or spatially (congestion moves downstream to new bottleneck locations). However, despite higher throughput on I-95, the northbound peak direction of travel in the PM Peak Period still sees severe congestion throughout much of the corridor.

To see improvements in conditions in the PM Peak Period in the northbound direction, capacity improvement projects would need to be devised along all the corridor in a holistic manner, and would better benefit from devising and deploying demand management strategies in tandem with the capacity increases that could help to reduce the intensity of the demand volumes entering and exiting I-95 which ultimately create congestion from the associated weaving, merging, and diverging traffic at bottleneck interchanges along the I-95 corridor.

This finding, combined with the estimated costs of adding a full travel lane between New York and New Haven, led the project team to exclude the Widened New York to New Haven without Toll scenario from further consideration or analysis.

Figure 3.1 2040 Widened New York to New Haven without Toll: AM Peak Southbound Speed Contour



Speed (mph)
5
20
40
60

Committed No Build Projects:

2) Auxiliary lane southbound between Exit 15 and Exit 14

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

Mitigation Projects:

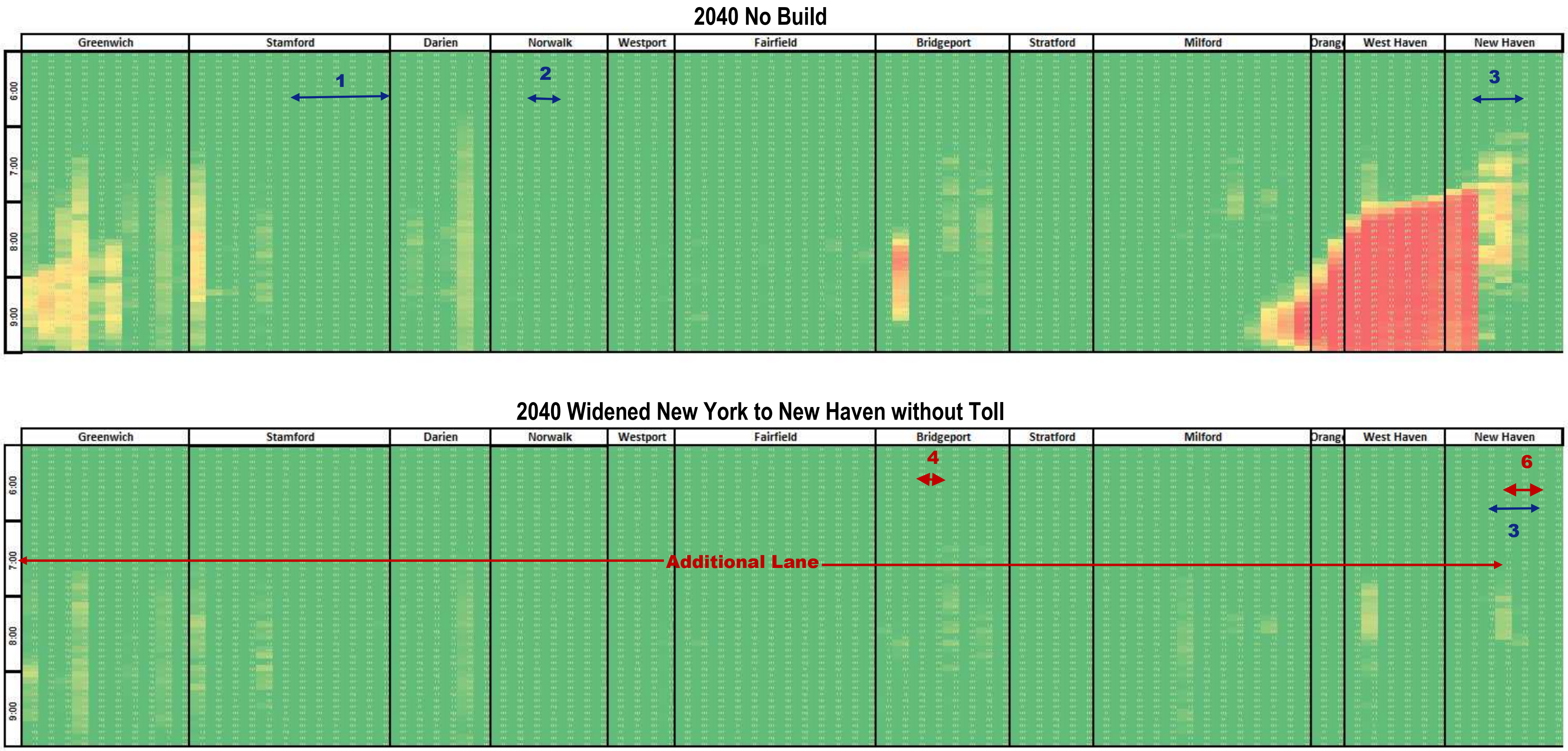
1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound

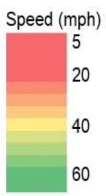
2) Auxiliary lane southbound between Exits 7 and 6

3) Auxiliary lane southbound between Exits 15 and 14

5) Additional 5th lane southbound between Exits 48 and 47

Figure 3.2 2040 Widened New York to New Haven without Toll: AM Peak Northbound Speed Contour





Committed No Build Projects:

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

Mitigation Projects:

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

Figure 3.3 2040 Widened New York to New Haven without Toll: PM Peak Northbound Speed Contour

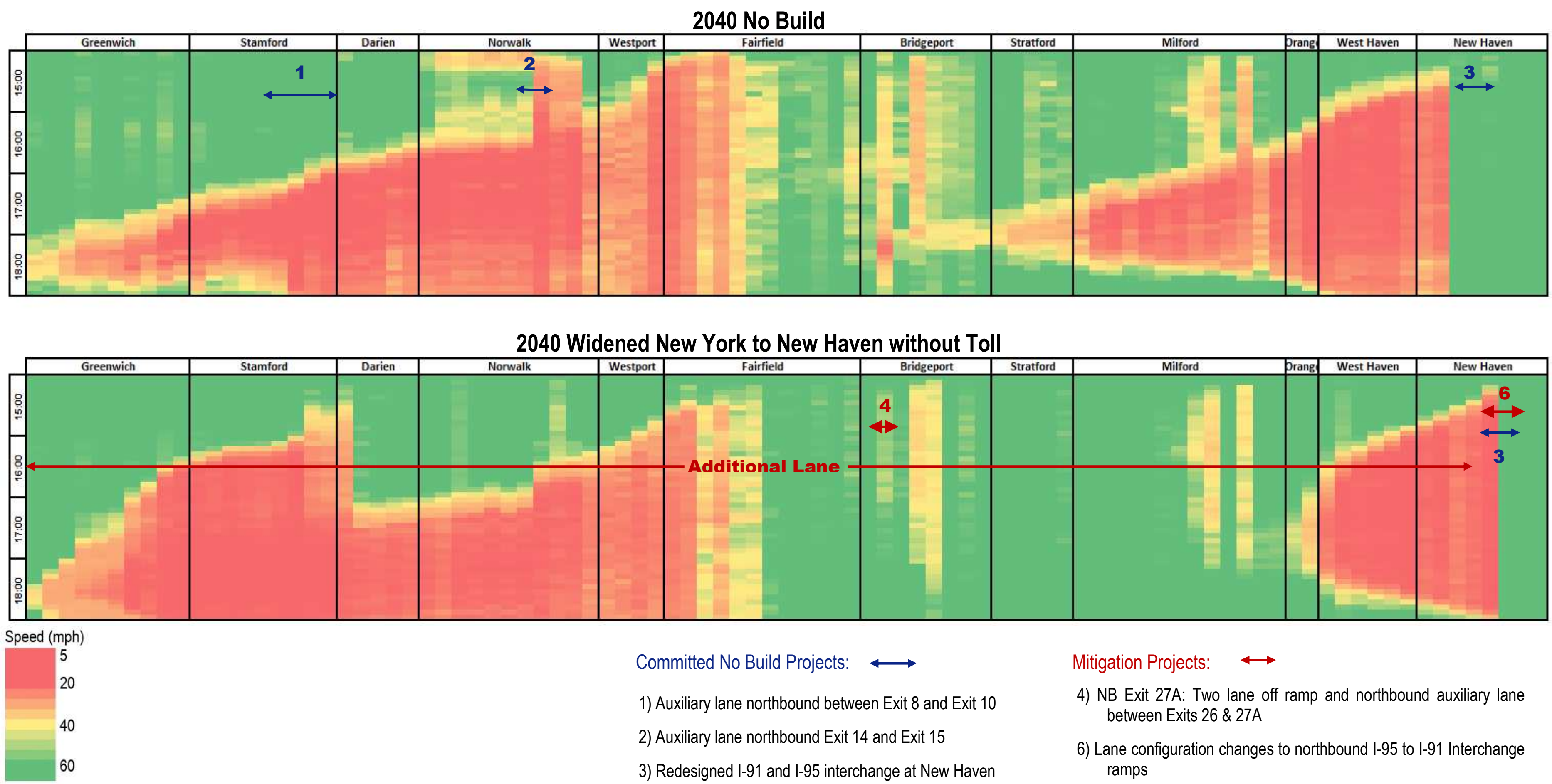


Figure 3.4 2040 Widened New York to New Haven without Toll: PM Peak Southbound Speed Contour

Committed No Build Projects

2) Auxiliary lane southbound between Exit 15 and Exit 14

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

Mitigation Projects

1) Two lane exit and deceleration lane for off ramp to I-287 from I-95 Southbound

2) Auxiliary lane southbound between Exits 7 and 6

3) Auxiliary lane southbound between Exits 15 and 14

5) Additional 5th lane southbound between Exits 48 and 47

4.0 2040 No Build with I-95 Tolls

The 2040 No Build with I-95 Tolls scenario considered the exact same roadway conditions as the 2040 No Build (without tolling) scenario, but added the demand management strategy of adding tolls along I-95. No other physical improvements over the committed improvements projects were included in this scenario.

Essentially this scenario was devised to assess the impacts on operational performance of I-95 between New York and New Haven with the simple addition of a toll for I-95 users. The envisioned toll would be collected through purely electronic toll collection systems, where overhead gantries placed at several strategic locations along the I-95 between interchanges would collect tolls from either wireless transponders or through license plate recognition and mailed statements. Regardless of collection method, the tolls would be collected at highway speeds without any need for any traffic to slow down and would not contribute to any interruption in the operations of I-95.

For the purpose of this study, a peak period toll of 50 cents would be collected from autos at each of twelve gantry locations along the I-95 corridor. A reduced toll rate of 35 cents per gantry would be paid outside of the AM and PM Peak Periods. Trucks would pay a proportionally higher toll rate. The locations of the toll gantries were roughly spaced every four miles through the corridor, taking into consideration the location of the major interchanges, and connections to the parallel route options of U.S. Route 1 and the Merritt Parkway.

4.1 Demand Development

It was expected that addition of tolls on I-95 would result in a reduction in the peak period demand for travel on I-95 due to trip suppression (reduced trips), mode shift to the metro north railroad, diversion of traffic to non-tolled parallel roadways including the Merritt Parkway (CT-15) and U.S. Route 1, and a time shift to the reduced toll rate off-peak periods. Additionally, some long distance truck trips would be expected to divert regionally to the non-tolled I-84 while the local truck traffic would use Route 1.

In order to estimate the level of toll diversion, the methodology adopted for all tolling scenarios was that the toll decisions of drivers would be modeled and estimated in the regional travel demand model developed by CDM Smith. This demand model would be able to estimate the diversion of trips to roadways other than I-95 which are not included in the simulation model. In addition to route diversions to avoid tolls, the time shift to off-peak periods (also not included in the simulation model) could be modeled in the regional demand model. The simulation model would then be used to estimate the operational performance of the tolling scenarios that would be seen under the toll diversion responses as estimated by the demand model.

The ramp to ramp vehicle demands for the 2040 No Build with Toll scenario were created by overlaying the difference in I-95 corridor demand as modeled in the regional demand model from the 2040 No Build with I-95 Toll and 2040 No Build scenario onto the simulation demands used in the 2040 No Build scenario. This process was completed twice; once for autos and again for trucks.

In a tolling scenario, the regional travel demand trip tables distinguish between those vehicles that are willing to and have chosen to pay a toll versus those vehicles that have not paid a toll. This proportion of paying and non-paying vehicles for every origin and destination (OD) pair for each vehicle class (Autos and Trucks) in the 2040 No Build with I-95 Toll demand model scenario was calculated and carried forward into the simulation model as well to be able to track paying and not paying vehicles. The same vehicle disaggregation to different subclasses of autos and trucks used in the 2040 No Build model was used in the 2040 No Build with I-95 Toll scenario.

As the regional model does estimate a driver's willingness to shift the start time of a trip either forward or backward in time to avoid paying the peak period toll rate and instead travel just outside the peak period and pay a reduced toll rate, the temporal profiles of demand within the peak periods needed to be adjusted. Since it is more likely that a driver will be able and willing to shift a trip a short time period of fifteen or thirty minutes than two hours, more traffic shifts from the shoulders of the peak period than from the core of the peak period. The end result is a slightly more peaked nature of demand for I-95 in the No Build with I-95 Toll scenario as compared to the No Build scenario.

4.2 OPERATIONAL ANALYSIS

As expected, the 2040 No Build with I-95 Toll scenario does see a reduction in demand on I-95 due to trip reduction, mode shift to rail, diversion of traffic to alternative routes, and in time shifts outside of the peak period. The results of this reduced demand are evident in the speed contour diagrams (Figures 4.1 through 4.4) which compare the operations on I-95 in this scenario to those under the 2040 No Build scenario.

In the AM Peak Period in the southbound direction (Figure 4.1), significant reduction in congestion and improved speeds can be seen. In the 2040 No Build with I-95 Toll scenario, the bottlenecks located at the I-287 interchange, Stamford, Milford and New Haven all see significant reductions in severity, with some bottleneck locations operating under near free flow conditions as compared to the No Build scenario. As the roadways are identical in both scenarios, the improvements can be purely attributed to a reduction in demand. The bottleneck located in Norwalk (between Exits 15 and 14) sees only a marginal improvement. While the presence of a toll gantry between Exit 14 and Exit 13 reduces peak period demands by approximately 11 percent on I-95 between those interchanges, there is an increase of approximately 23 percent in demand for southbound Exit 14. The additional friction cause by the heavy off ramp offsets gains from reduced through demands and the bottleneck remains similar in severity and duration as in the 2040 No Build scenario.

During the AM Peak Period in the northbound off-peak direction (Figure 4.2), there is improvement in operation of I-95 approaching the I-91 interchange due to reduction in demand between Exits 46 and 47 of approximately 17 percent versus the No Build scenario. The reduction in demand for the off-peak direction of travel is higher than in the peak, as both directions pay peak toll rates and other parallel routes are less congested and provide a toll-free option.

During the PM Peak Period in the 2040 No Build with I-95 Toll scenario, there is a significant improvement in northbound operations approaching New Haven (Figure 4.3). The section of I-95 Exits 46 and 47 sees approximately an eight percent reduction in demand over the peak period, and with changes in travel demands and patterns created by the tolling, significant improvements in the operations of the I-95 interchange with I-91 are seen. Those improved operations have a significant impact on the simulated speeds on I-95 northbound between Milford and New Haven. Additionally, a reduction in demand for northbound I-95 between Norwalk and Fairfield helps improve the operations of the No Build bottlenecks. While there is still heavy congestion from the Fairfield bottleneck, the length and duration of the queues have reduced significantly under the No Build with I-95 Toll scenario.

As seen for the southbound direction of I-95 in the PM Peak Period (Figure 4.4), the No Build bottleneck conditions which slowed I-95 speeds in Greenwich is no longer present and I-95 operates at or near free flow speed conditions. This improvement in operations is created by the approximately 18 percent reduction in demand for the off-peak direction of travel on I-95 approaching the I-287 interchange. Under the tolled scenario, a new bottleneck forms at Exit 5. Exit 5 serves as an important and easy connection between I-95 and Rt. 1. Due the placement of a toll gantry between Interchange 4 and 5, additional traffic gets off at exit 5 to avoid paying toll at the toll gantry location in Greenwich. Due to the additional demand at exit 5 (nearly doubled), the operations at the off ramp worsens and a minor bottleneck is created as queues spill back and slow down the mainline speeds. Finally, due to the improved operations of the I-95 and I-91 interchange in the tolled scenario, queues on connecting roadways are reduced and in turn created small benefits on southbound I-95 in the New Haven area as slow moving queued off-ramp traffic no longer impact the mainline operations.

Figure 4.1 2040 No Build with I-95 Toll: AM Peak Southbound Speed Contour

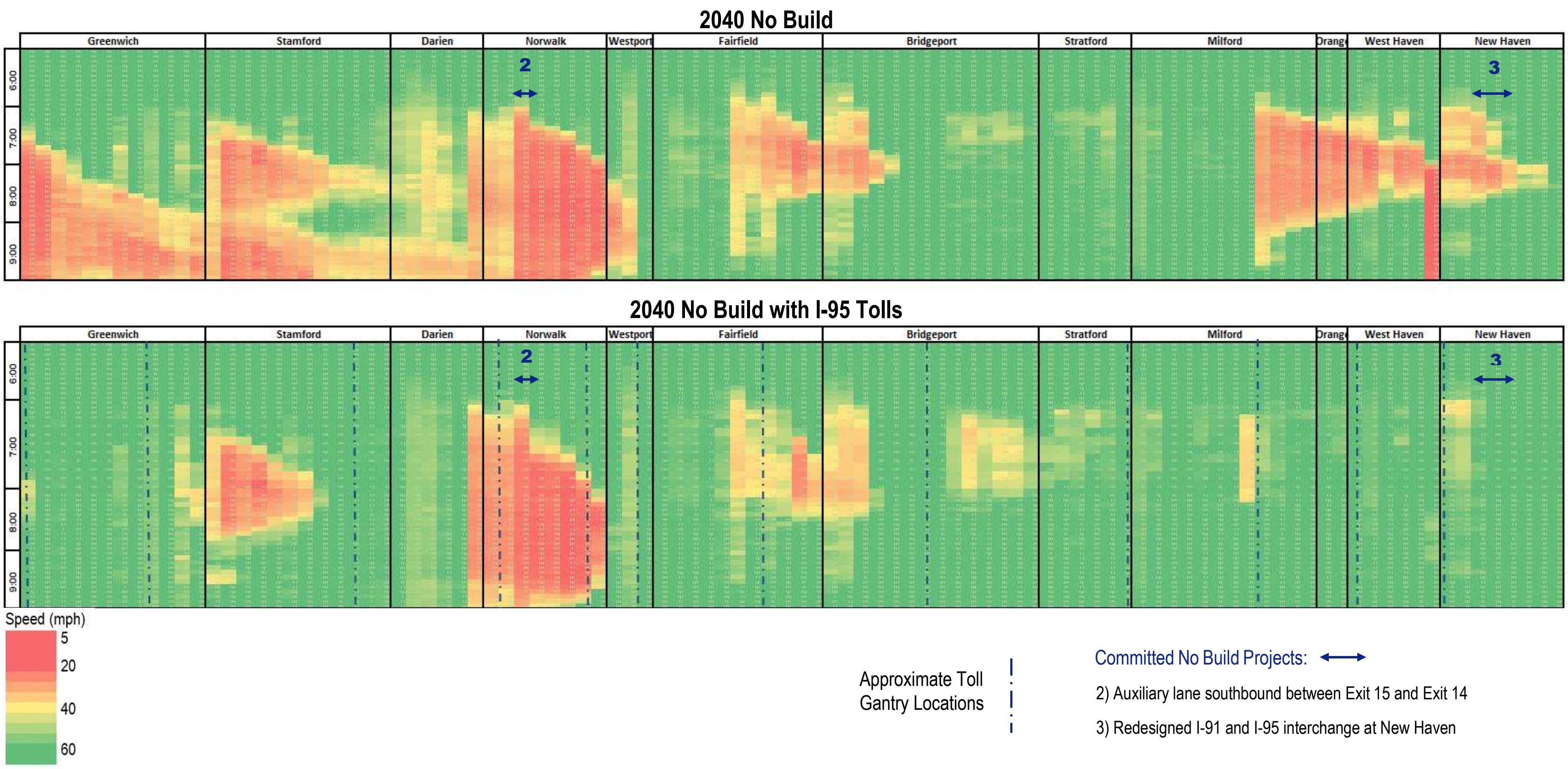


Figure 4.2 2040 No Build with I-95 Toll: AM Peak Northbound Speed Contour

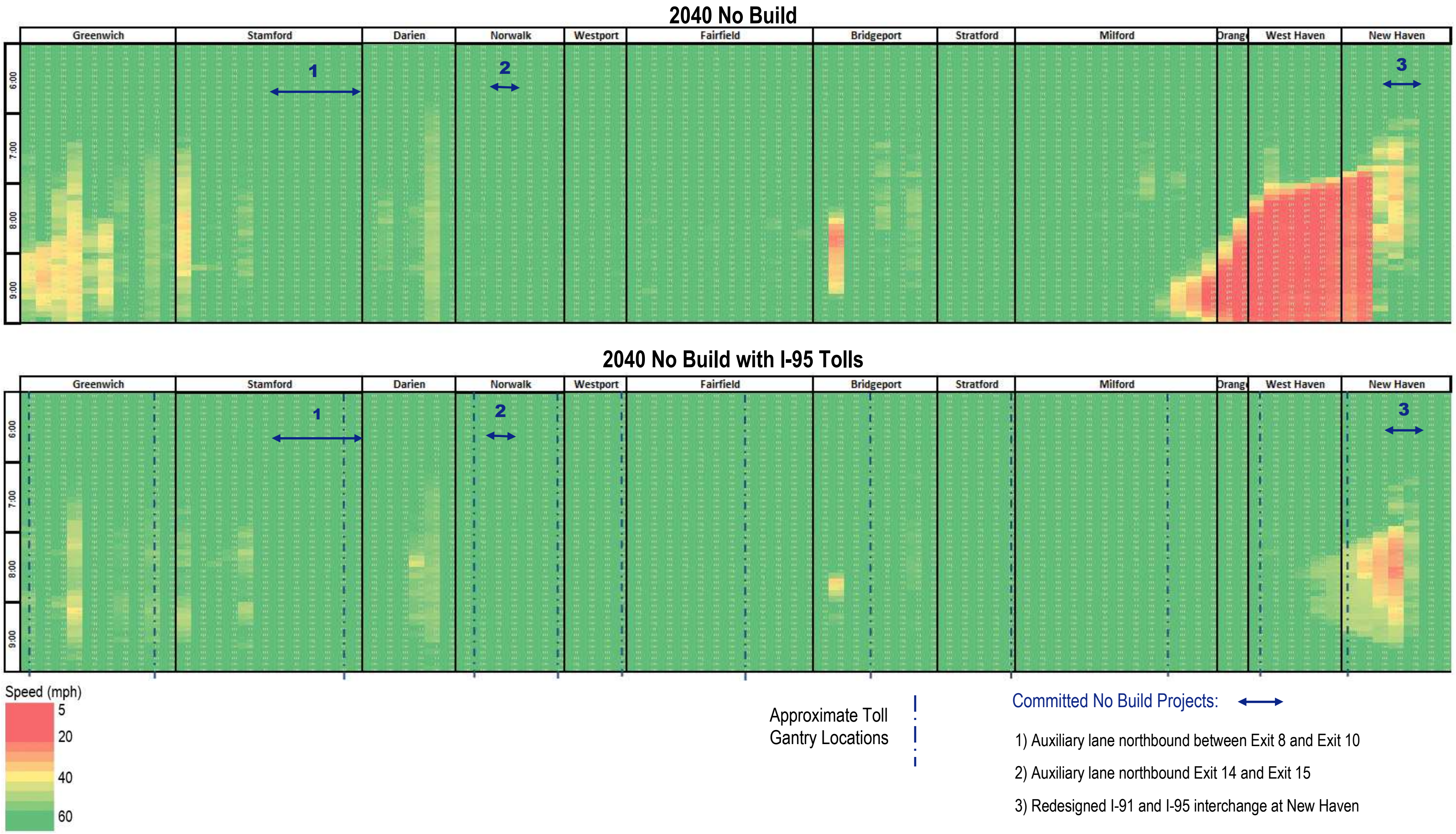


Figure 4.3 2040 No Build with I-95 Toll: PM Peak Northbound Speed Contour

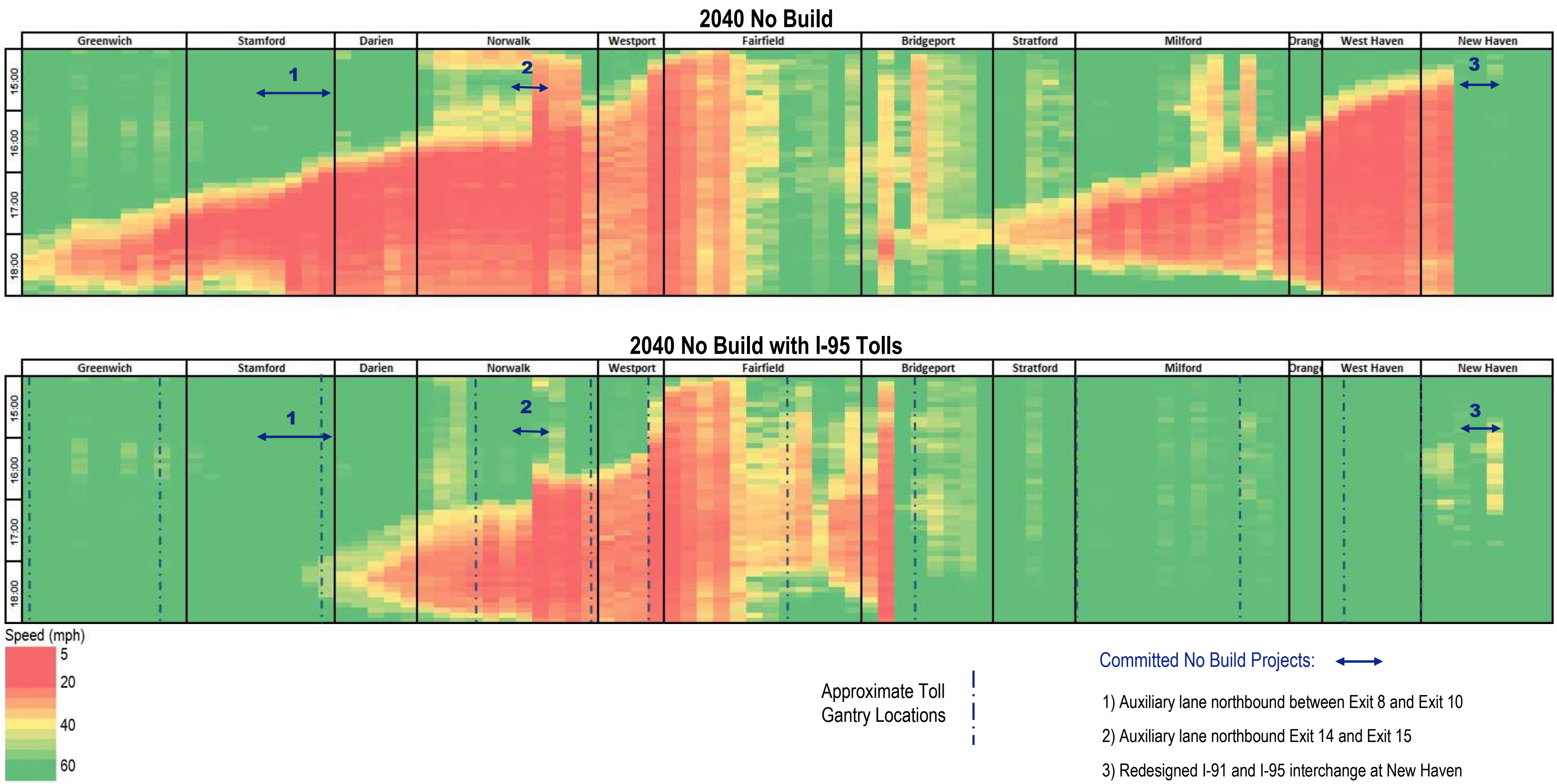
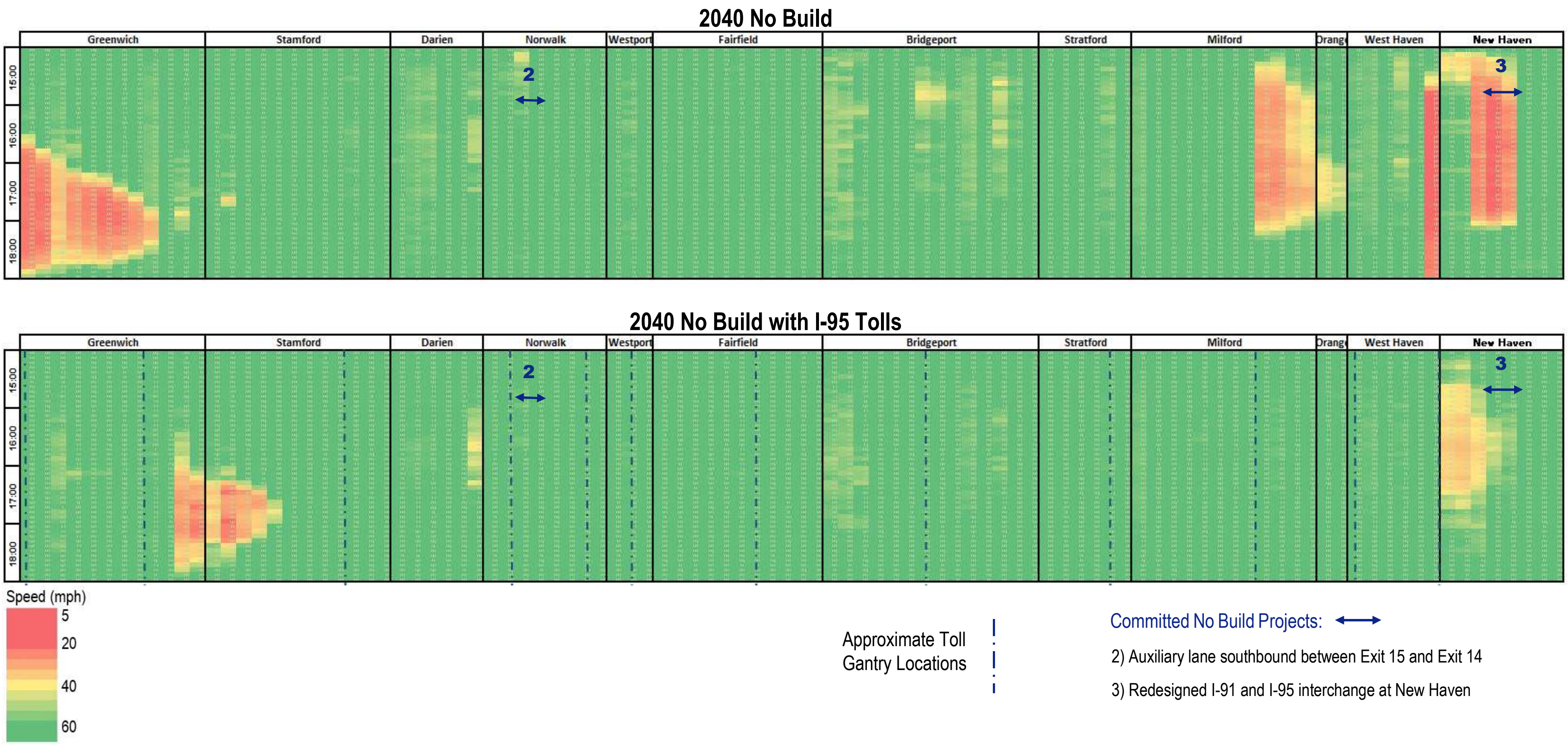


Figure 4.4 2040 No Build with I-95 Toll: PM Peak Southbound Speed Contour



5.0 2040 Widened Stamford to Bridgeport without Tolls

Stamford and Bridgeport are two major employment centers along I-95. Under existing AM and PM Peak Period conditions, I-95 between Stamford and Bridgeport is the most congested section in the study corridor. To build on the finding of the Widened New York to New Haven scenario, a scenario was conceived where an addition through travel lane would be added between Stamford and Bridgeport in both directions on I-95.

5.1 Roadway Improvements

For the purposes of the simulation analysis, the additional lane was added between Exit 6 in Stamford to Exit 27A in Bridgeport. It was also assumed that the additional lane would be added on the left side of the carriageway without changing the geometric configuration of the ramps and interchanges between Stamford and Bridgeport, and only the committed improvement of the I-95 and I-91 interchange would be included in the scenario.

The increased capacity on I-95 from the addition of a lane between Stamford and Bridgeport attracts additional traffic from parallel routes to I-95. Similar to the Widened New York to New Haven without Toll scenario, initial simulations of the scenario without any roadway improvements other than the additional through lane showed worsened bottlenecks with higher delays and lower speeds on I-95 due to the increased demand. These conditions were caused by worsened interchange merging, diverging, and weaving operations which more than offset the benefits from the additional through travel lane on I-95.

As a result, additional improvement projects were added to the scenario in order to better represent how I-95 the corridor would be built out under such a major investment scenario as an additional travel lane between Stamford and Bridgeport represents. The mitigation strategies for these hotspot congestion locations were limited to addition of auxiliary lanes and increasing the off ramp capacity, or related to a realistic termination of the added through lane. The locations of the mitigations focused on where on or off ramps which had demand exceeding ramp and interchange capacity and where bottleneck queues were cascading upstream from the interchange to severely limit the mainline operations of all through lanes. However, these hotpots were targeted throughout the corridor, and were not limited to the sections of I-95 between Stamford and Bridgeport. Under the final Widened Stamford to Bridgeport scenario, the following projects to mitigate the key bottlenecks congestion were added to the analyzed scenario in addition to the additional travel lane and the improved I-95 and I-91 interchange.

Table 5.1 2040 Widen Stamford to Bridgeport without Tolls Additional Interchange Mitigations Included

ID	Mitigation Description
1)	Two lane exit ramp and deceleration lanes for the off ramp to I-287 from I-95 Southbound.
2)	Auxiliary lane southbound between Exits 7 and 6 with a two lane exit at Exit 6.
3)	Auxiliary lane southbound between Exits 15 and 14.
4)	Two lane off ramp from I-95 Northbound at Exit 27A and auxiliary lane between Exits 26 and 27A.
5)	Additional fifth lane southbound between Exits 48 and 47.
6)	Lane configuration improvements to northbound I-95 approaching the I-91 Interchange.

Adding these mitigation projects improved the operational performance of I-95 for the Widened Stamford to Bridgeport scenario, which is presented in Figures 5.1 through 5.4.

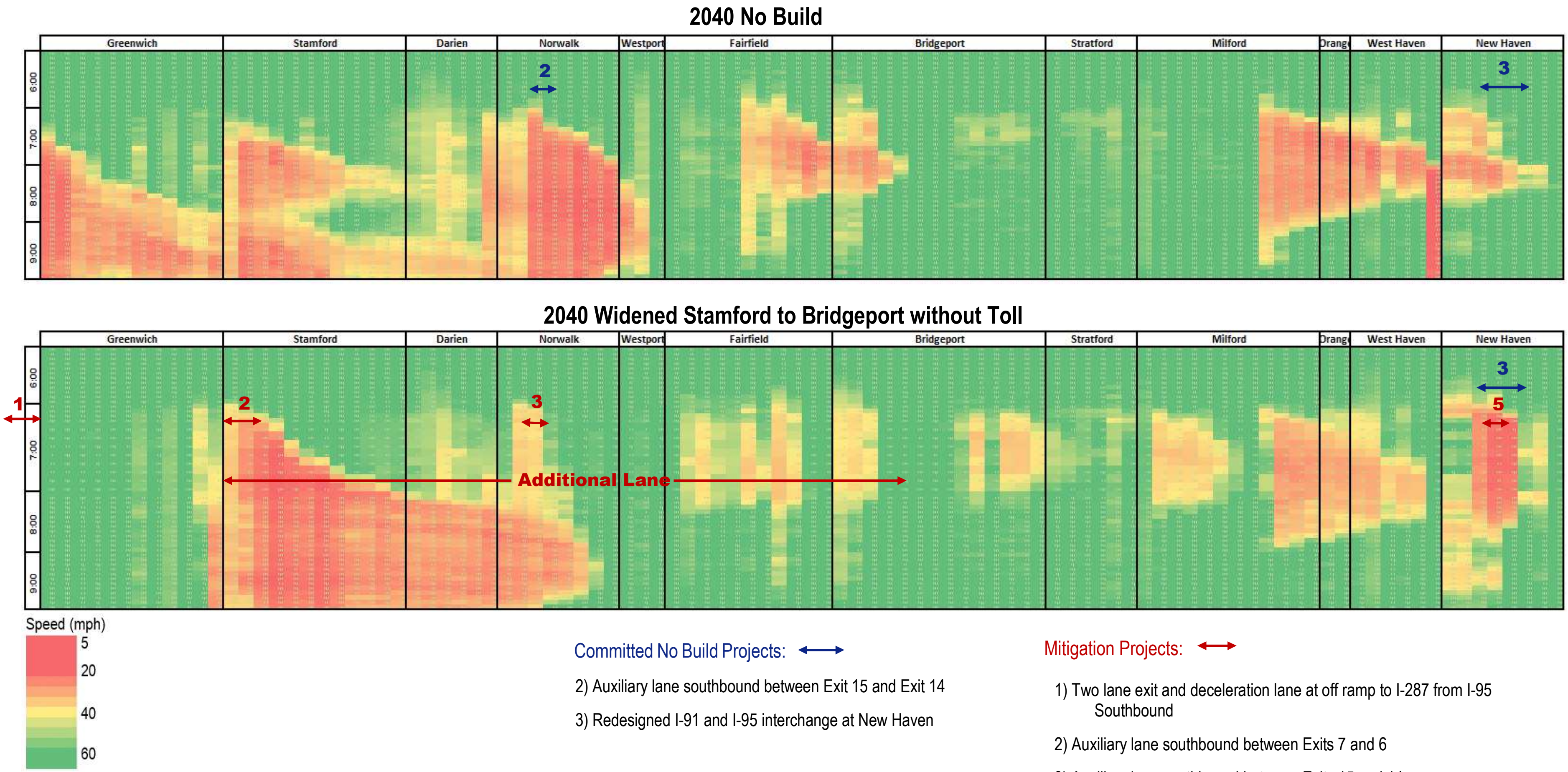
5.2 Demand Development

The demands for the microscopic simulation model were developed by calculating the difference in OD demands for the I-95 corridor as modeled in the regional demand model 2040 No Build and 2040 Widened Stamford to Bridgeport without Toll scenarios. Those differences in OD demands were then superimposed on the 2040 No Build scenario simulation demand trip tables. Similar to the Widened New York to New Haven without Toll scenario, the temporal profiles of demand within the peak periods and the disaggregation of autos and trucks into multiple subclasses of vehicle types from the No Build scenario were used unchanged in this scenario.

5.3 Operations Analysis

During the AM Peak Period in the southbound direction, the capacity increase from the added travel lane attracts more demand from alternative routes to I-95 especially south of Bridgeport. When the added travel lane ends in Stamford at Exit 6 in the southbound direction and I-95 is restricted back to the existing three lane cross-section, a significant bottleneck is created which sees queues eventually extending back to Norwalk. While not directly analyzed in this study, extending the widening south of Stamford to the I-287 interchange could provide a significant improvement in this bottleneck and further reduction in this congestion. Despite this new severe bottleneck, several of the No Build bottlenecks can be seen to improve, most notably the bottlenecks in Norwalk, Fairfield, and Bridgeport. The No Build bottlenecks north of the additional lane are generally unchanged, although some minor new bottlenecks are seen in Bridgeport and Milford due to increased demands on I-95.

Figure 5.1 2040 Widened Stamford to Bridgeport without Tolls: AM Peak Southbound Speed Contour



Committed No Build Projects:

2) Auxiliary lane southbound between Exit 15 and Exit 14

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

Mitigation Projects:

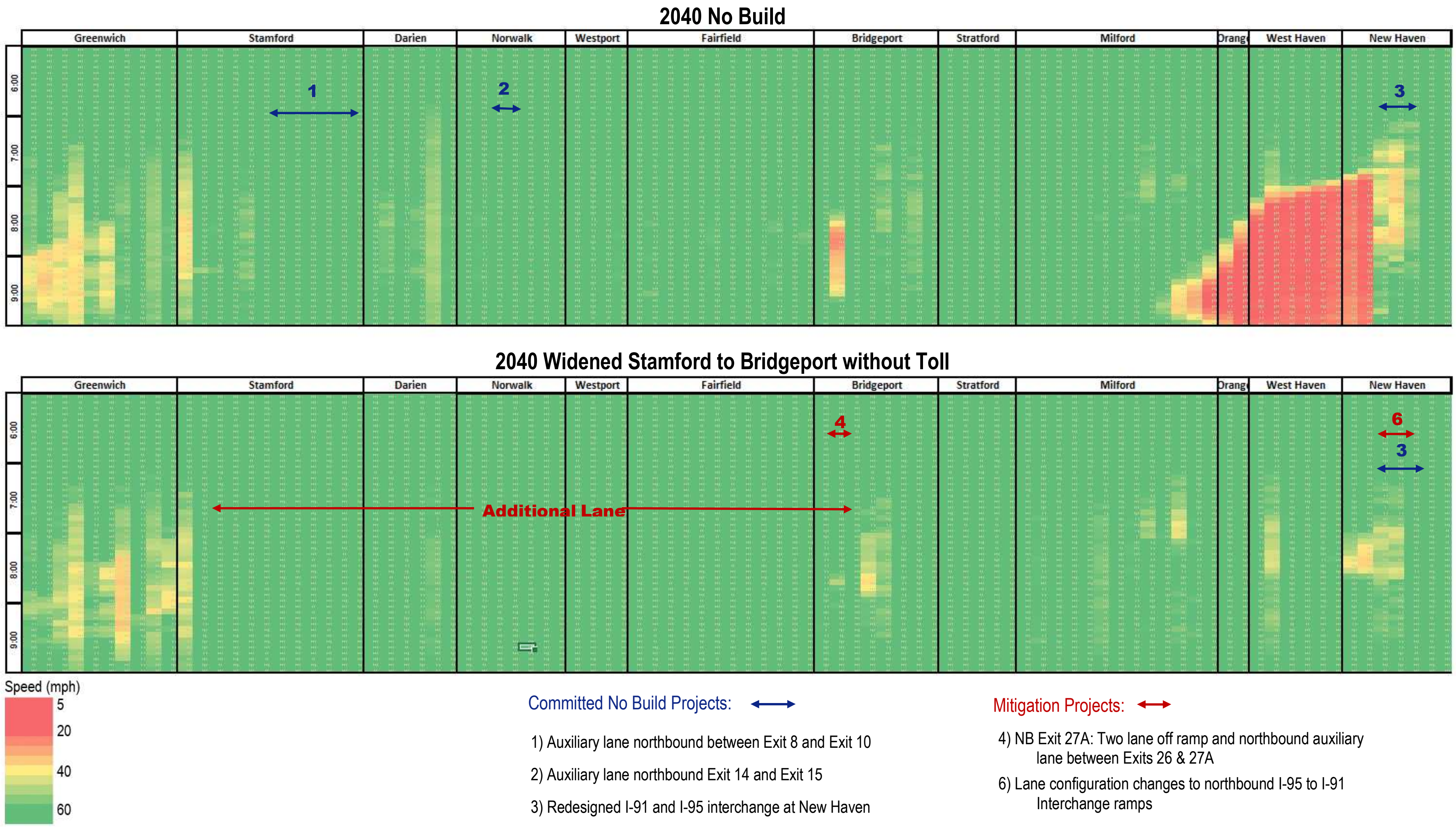
1) Two lane exit and deceleration lane at off ramp to I-287 from I-95 Southbound

2) Auxiliary lane southbound between Exits 7 and 6

3) Auxiliary lane southbound between Exits 15 and 14

5) Additional 5th lane southbound between Exits 48 and 47

Figure 5.2 2040 Widened Stamford to Bridgeport without Tolls: AM Peak Northbound Speed Contour



In the AM off-peak northbound direction, operations are at or near free flow conditions for the majority of the corridor, with only a few locations of minor congestion. The only major No Build bottleneck in New Haven is seen to improve significantly due to the added hotspot mitigation improvement projects.

During the PM Peak period in the peak northbound direction (Figure 5.3), the added travel lane between Stamford and Bridgeport can be seen to somewhat improve the travel speeds along I-95, despite I-95 see higher volumes. Congestion is still widespread through the area, but travel speeds are slightly improved and the duration is somewhat shorter. Due to added capacity, more vehicles can pass the major bottleneck in Fairfield, and additional congestion is seen in Bridgeport after the additional travel lane is removed and I-95 returns to its original cross-section. Due to this metering of traffic at Bridgeport the operations of I-91 and I-95 interchange improves.

In the southbound off-peak direction, the operations approaching the I-287 Interchange is improved with the added hotspot improvement project which added a two lane exit to I-287 and improved deceleration lanes. Similar to the bottleneck seen in the AM Peak Period, but with a reduced severity, a new bottleneck is seen in Stamford where the added travel lane is terminated. The No Build bottleneck near New Haven remains with similar congestion patterns in this scenario.

Figure 5.3 2040 Widened Stamford to Bridgeport without Tolls: PM Peak Northbound Speed Contour

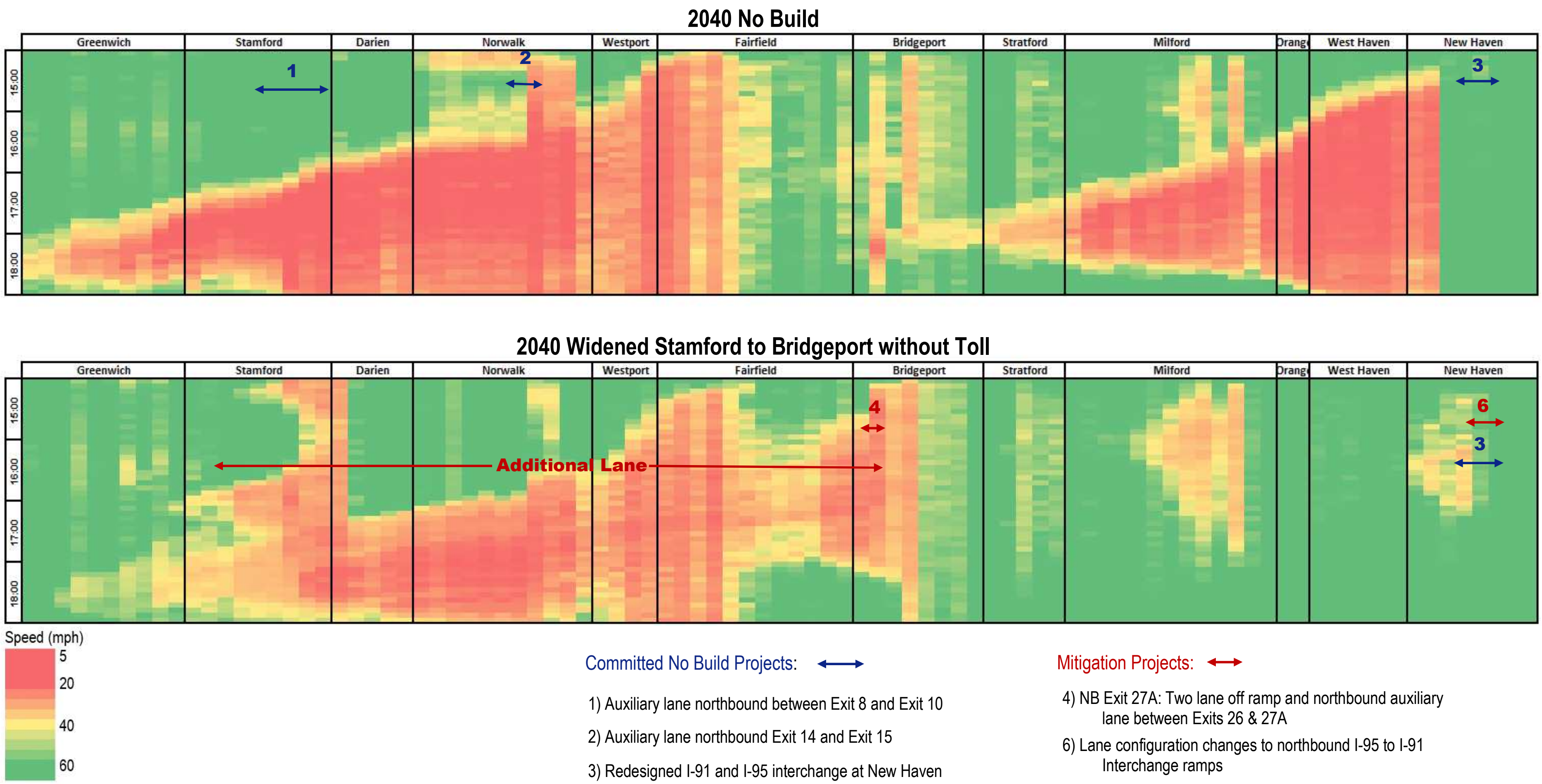
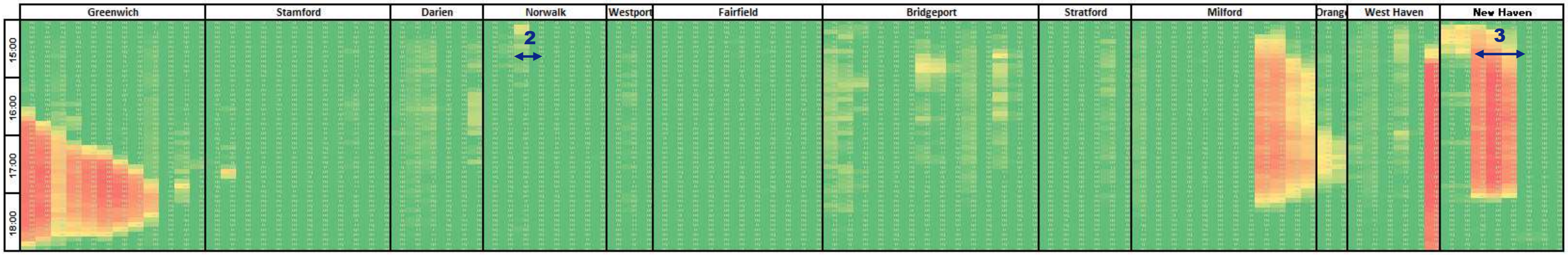
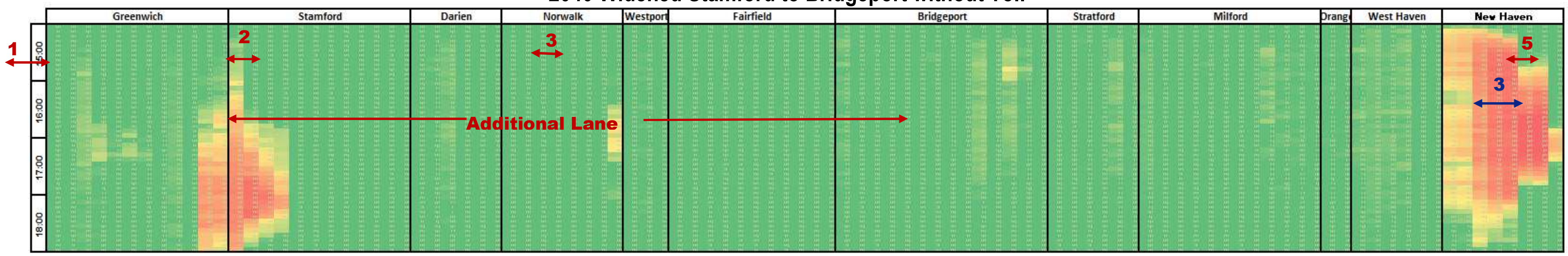


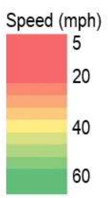
Figure 5.4 2040 Widened Stamford to Bridgeport without Tolls: PM Peak Southbound Speed Contour

2040 No Build



2040 Widened Stamford to Bridgeport without Toll





Committed No Build Projects:

2) Auxiliary lane southbound between Exit 15 and Exit 14

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

Mitigation Projects:

1) Two lane exit and deceleration lane at off ramp to I-287 from I-95 Southbound

2) Auxiliary lane southbound between Exits 7 and 6

3) Auxiliary lane southbound between Exits 15 and 14

5) Additional 5th lane southbound between Exits 48 and 47

6.0 2040 Widened Stamford to Bridgeport with I-95 Toll

Through analysis of the previous Widened Stamford to Bridgeport without Toll scenario, it was seen that congestion is likely to continue along the I-95 corridor despite the additional capacity improvements added to the corridor. Instead of purely adding capacity, an approach to manage the congestion is to also manage the corridor demand. This scenario builds upon the previous Widened Stamford to Bridgeport scenario capacity improvements, but also adds a tolling strategy to temper the demands for the corridor. No further changes to roadways were considered in this scenario, and all projects included in the Widened Stamford to Bridgeport scenario were retained for analysis of this scenario.

As in the 2040 No Build with Toll scenario, tolling in this scenario would be collected exclusively through electronic tolling via overhead gantries, and no vehicles would need to slow down from highway speeds to pay a toll thus having no interference in the operations of traffic flows on I-95. Also identical to the 2040 No Build with Toll scenario, tolls would be collected at twelve mainline locations between interchanges roughly evenly distributed every four miles along the I-95 corridor. As analyzed in this scenario, a toll of 50 cents per auto would be paid at each gantry location during the AM and PM peak periods, while an off-peak reduced toll rate of 35 cents per gantry would be collected to encourage demand to shift into off-peak periods when a viable option. Trucks would pay a proportionally higher toll rate.

6.1 Demand Development

With the addition of I-95 tolls, the demand on the I-95 corridor would be reduced as vehicles instead would reduce trip making, shift to alternative modes, and divert to non-tolled alternative roadways, especially to the Merritt Parkway or U.S. Route 1. As with all scenarios, the impacts of the added tolling strategy on the demand for the I-95 corridor were estimated through regional travel demand model analyses completed by CDM Smith. The demand for the microsimulation model was developed by calculating the difference in demand model forecasts of I-95 volumes between the 2040 No Build and the 2040 Widened Stamford to Bridgeport with Toll scenarios. This difference in demand was then superimposed onto the simulation model 2040 No Build scenario demand to arrive at the demand for this scenario.

The temporal profiles used to define when trips start within the peak period were adjusted from those used in the No Build scenario to account for the time shift from the shoulder of the peak periods into the off-peak to benefit from the reduced off-peak toll rates. The cumulative impacts of these time of day shifts created a slightly more peaked profile of demand as compared to the No Build scenario. As with the all previous scenarios, the disaggregation of auto and truck demands into more subclasses of vehicles types was unchanged and identical to the 2040 No Build scenario.

6.2 Operations Analysis

During the AM peak period in the peak southbound direction (Figure 6.1), the reduction in demands for the I-95 corridor improve the operational conditions along I-95. Congestion is reduced at the bottleneck locations which were observed in the Widened Stamford to Bridgeport without Toll scenario, most notably at the bottleneck at Exit 6 in Stamford where the widening project terminates. There is still a bottleneck occurring in this scenario at this location, but the severity is significantly reduced and queues can be seen to remain within Stamford as opposed to extending upstream into Norwalk in the scenario without tolling. The improvement can be solely attributed to an approximately ten percent reduction in demand through the bottleneck location. While not directly analyzed in this study, extending the widening south of Stamford to the I-287 interchange could provide a significant improvement in this bottleneck and further reduction in this congestion. The less severe bottleneck in Milford is predominately eliminated as demands through that location are more significantly reduced by approximately 21 percent. Other minor bottlenecks in the corridor persist with a similar intensity.

In the northbound off-peak direction in the AM Peak Period, there is also a noted reduction in demand for vehicles using I-95. The limited number of minor bottlenecks that exist in the Widened Stamford to Bridgeport without Toll scenario are seen to improve (Figure 6.2), with the majority of northbound I-95 operating at or near free flow speeds throughout the AM Peak Period.

During the PM peak period in the peak northbound direction (Figure 6.3), the added tolling reduced demand for travel on I-95 which improves the operations and speeds on I-95. Most significant is the improvement at the Fairfield bottleneck, which in the scenario without tolling created extensive queuing to the south. Tolling on I-95 creates a reduction in demand through this bottleneck location by approximately 18 percent, reducing the severity of the bottleneck to only a minor bottleneck during the peak hours of the peak period. The bottleneck in Bridgeport at Exit 27A can also be seen to improve, although much more moderately. The approximate ten percent reduction in demand through this bottleneck location creates a bottleneck that persists through much of the peak period, but does not see significant queuing develop. Finally, the more minor bottleneck in Milford can be seen to mostly dissipate with the introduction of tolling on I-95.

In the off-peak southbound direction (Figure 6.4), though tolling creates approximately an eleven percent reduction in demand on I-95 at the bottleneck location before Exit 6 in Stamford, there is also an increased demand for the Exit 5 off ramp by approximately 70 percent as traffic diverts to nearby Route 1. When both changes in travel patterns are combined, the Stamford bottleneck persists in a similar nature with tolling as without. Similarly in New Haven, the reduced demands improve the severity of the bottleneck seen in the without tolling scenario, but a minor bottleneck remains through much of the peak period.

Figure 6.1 2040 Widened Stamford to Bridgeport with I-95 Toll: AM Peak Southbound Speed Contour

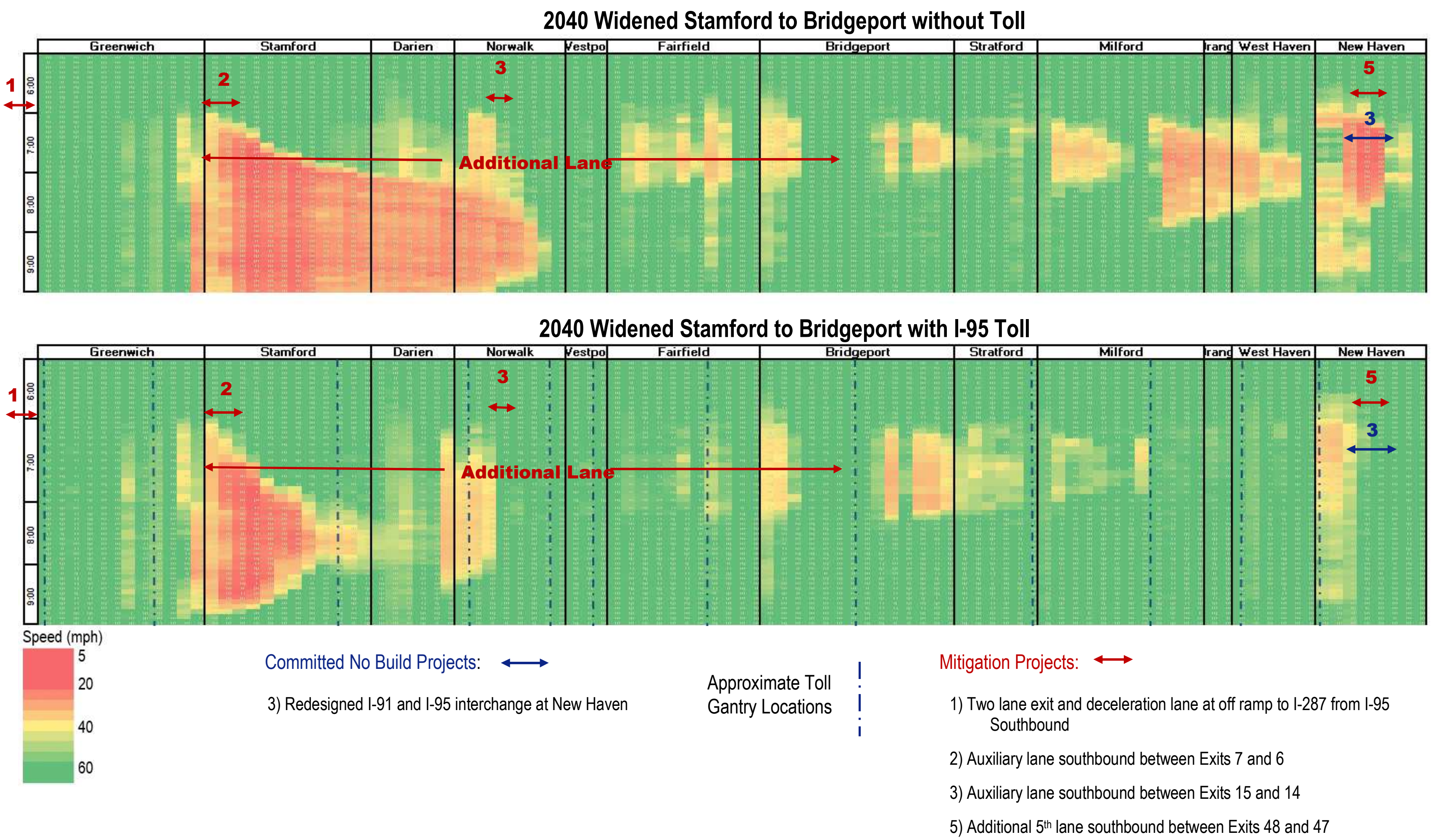


Figure 6.2 2040 Widened Stamford to Bridgeport with I-95 Toll: AM Peak Northbound Speed Contour

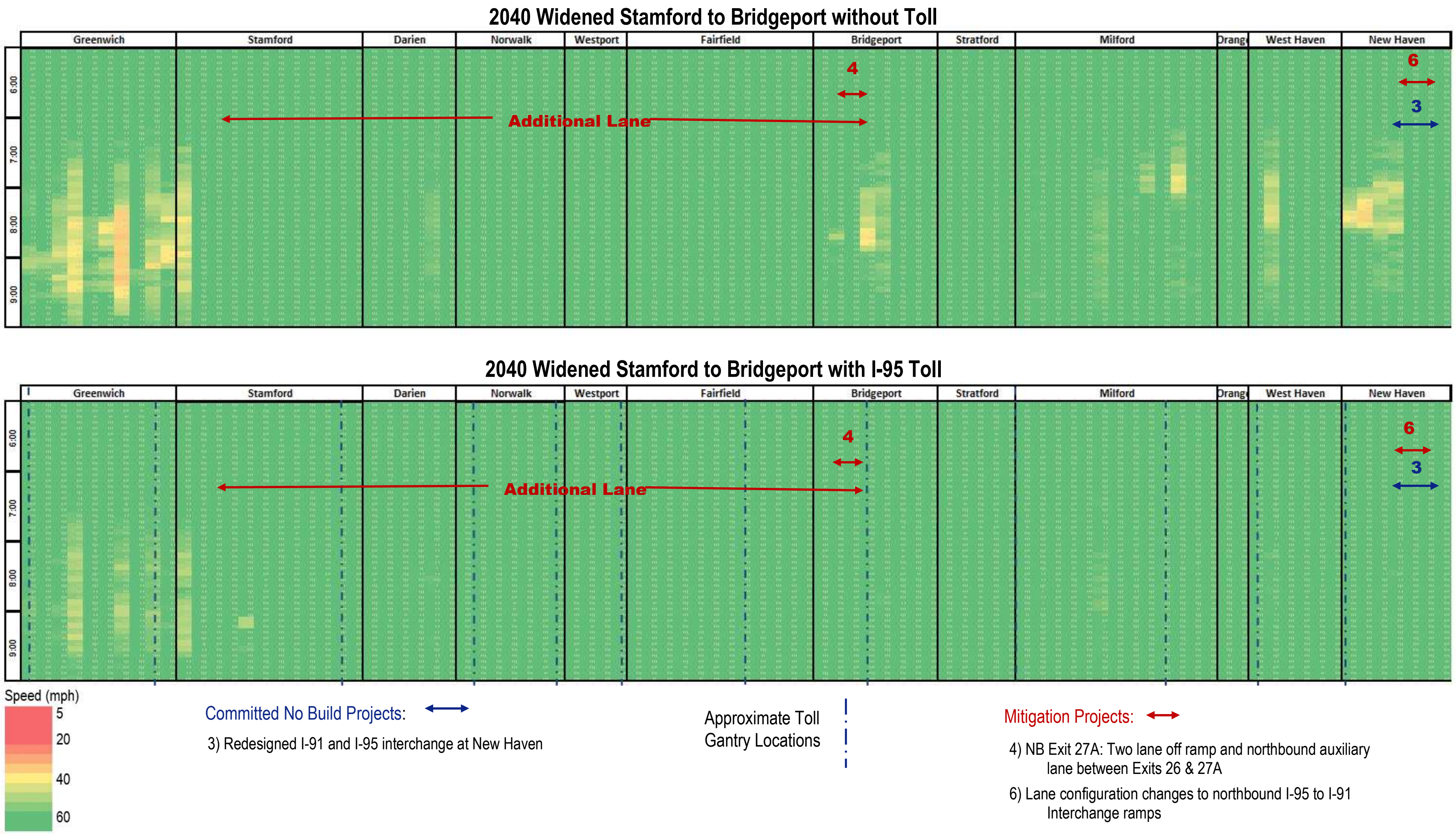


Figure 6.3 2040 Widened Stamford to Bridgeport with I-95 Toll: PM Peak Northbound Speed Contour

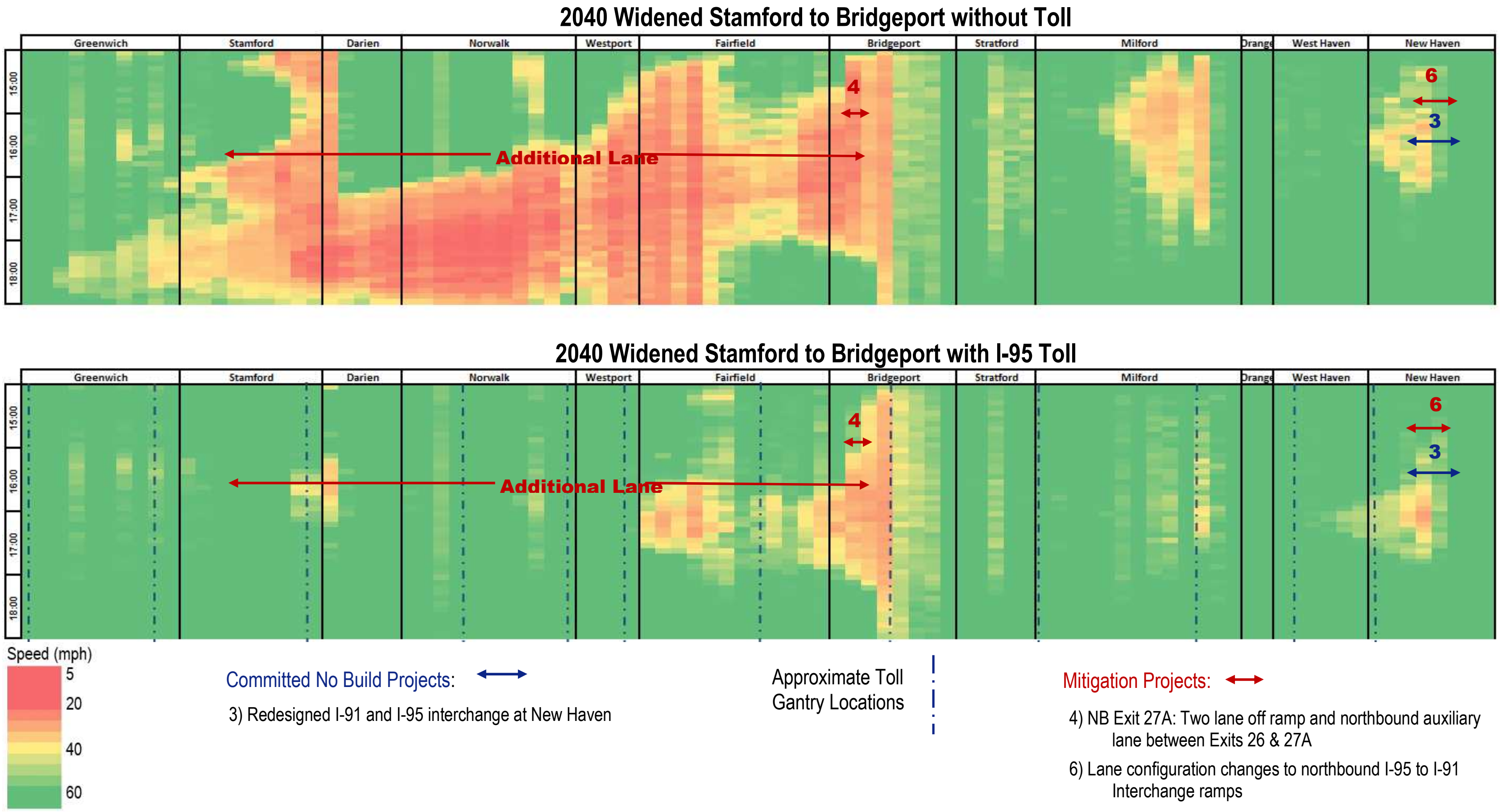
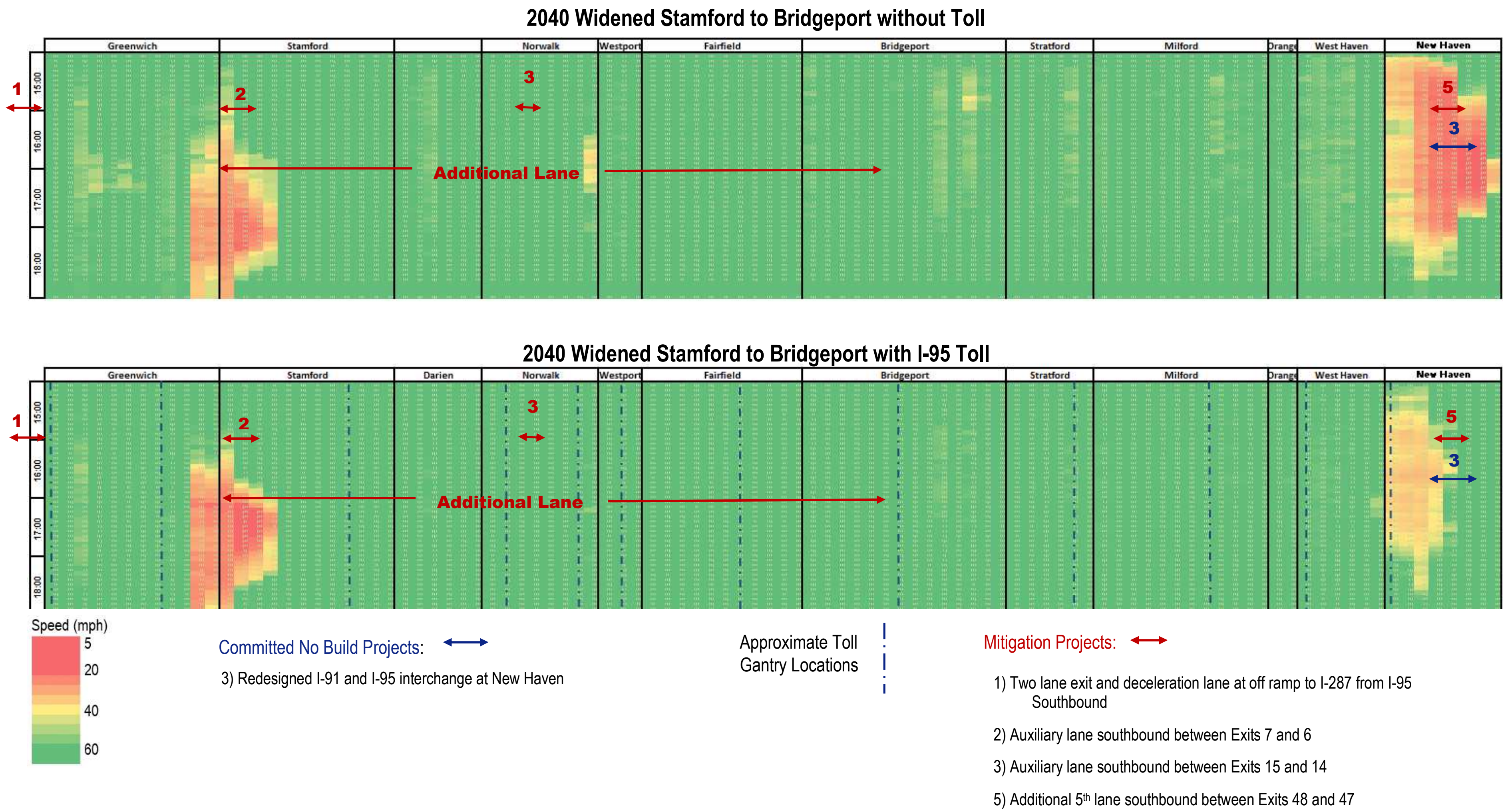


Figure 6.4 2040 Widened Stamford to Bridgeport with I-95 Toll: PM Peak Southbound Speed Contour



7.0 2040 Widened Stamford to Bridgeport with I-95 and CT-15 Tolls

The final scenario that was simulated consisted of a revised tolling strategy to the previous Widened Stamford to Bridgeport with I-95 Toll scenario. In this scenario, in addition to tolls collected on I-95, tolls would also be collected on the Merritt Parkway (CT-15). Tolls on CT-15 would be collected through identical methods (fully electronic via overhead gantries) and rates per gantry as on I-95, although only ten gantries would be placed on CT-15. While this scenario would increase the demand on I-95 over the previous scenario where CT-15 remained free to use, the overall strategy in this scenario is to manage not only the demand on the I-95 facility, but on the larger I-95 and CT-15 corridor between New Haven and New York State.

Although the Merritt Parkway is not included the simulation study area, it is fully included in the regional demand model, and an operations simulation of this scenario will still reveal the operational impacts on I-95 of the new tolling strategy for the corridor. The identical set of project improvement projects and the resulting roadway network used in Widened Stamford to Bridgeport with I-95 Toll scenario was also used for the simulation of this scenario.

7.1 Demand Development

The demand for 2040 Stamford to Bridgeport widening with I-95 and CT-15 tolls was calculated in similar fashion to the other tolled scenarios wherein the differences between the regional demand model forecasts of ramp to ramp OD trip tables of I-95 from the 2040 Widened Stamford to Bridgeport with I-95 and CT-15 tolled and 2040 No Build scenarios were calculated and then superimposed onto the 2040 No Build simulation trip tables.

The temporal profiles used to define when trips start within the peak period were adjusted from those used in the No Build scenario to account for the time shift from the shoulder of the peak periods into the off-peak to benefit from the reduced off-peak toll rates. The cumulative impacts of these time of day shifts created a slightly more peaked profile of demand as compared to the No Build scenario. As with the all previous scenarios, the disaggregation of auto and truck demands into more subclasses of vehicles types was unchanged and identical to the 2040 No Build scenario.

7.2 OPERATIONS ANALYSIS

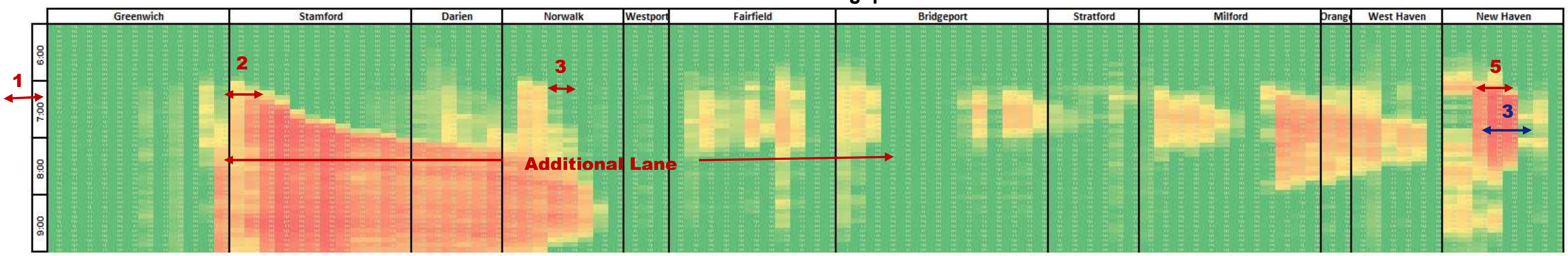
With both of the high speed facilities in the corridor tolled, traffic diversions between the two facilities were reduced and the resulting demand reductions were generally smaller than those seen in the scenario with only I-95 tolled.

Not surprisingly then, the operations of the AM Peak Period are not significantly different for this scenario as compared to the Widened Stamford to Bridgeport without Toll scenario. For the most significant bottleneck, located in Stamford at Exit 6, the tolling strategy does somewhat reduce the through volume demands but also increases the off ramp demands for Exit 6. The net result is a bottleneck that has very similar duration and severity characteristics to the non-tolled scenario. While not directly analyzed in this study, extending the widening south of Stamford to the I-287 interchange could provide a significant improvement in this bottleneck and further reduction in this congestion. The reduction in demands from tolling does eliminate the slow speeds at the Milford bottlenecks. Some slight improvements are created in the more minor bottlenecks at New Haven and Fairfield, while a slight increase in congestion is created by changing demands for ramp traffic at Bridgeport bottleneck.

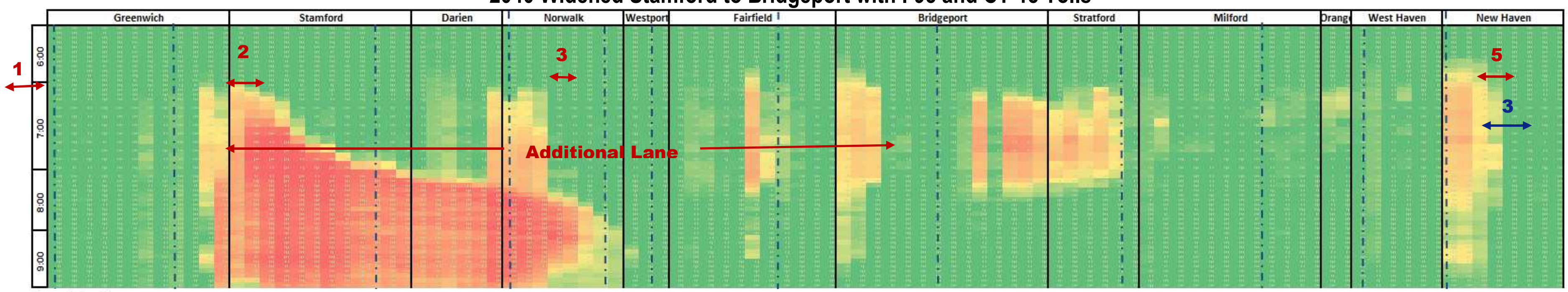
During the AM Peak Period in the northbound direction, the demand on I-95 is also close to the demand in 2040 Widened Stamford to Bridgeport without Toll scenario, although the slight reduction in demands can be seen to have some effects on reducing those minor bottlenecks that form in the scenario without tolling. Overall the facility operates at or near free flow speeds throughout the corridor.

Figure 7.1 2040 Widened Stamford to Bridgeport with I-95 and CT-15 Tolls: AM Peak Southbound Speed Contour

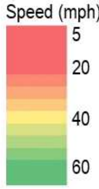
2040 Widened Stamford to Bridgeport without Toll



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



Speed (mph)



Committed No Build Projects:

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

Approximate Toll Gantry Locations

Mitigation Projects:

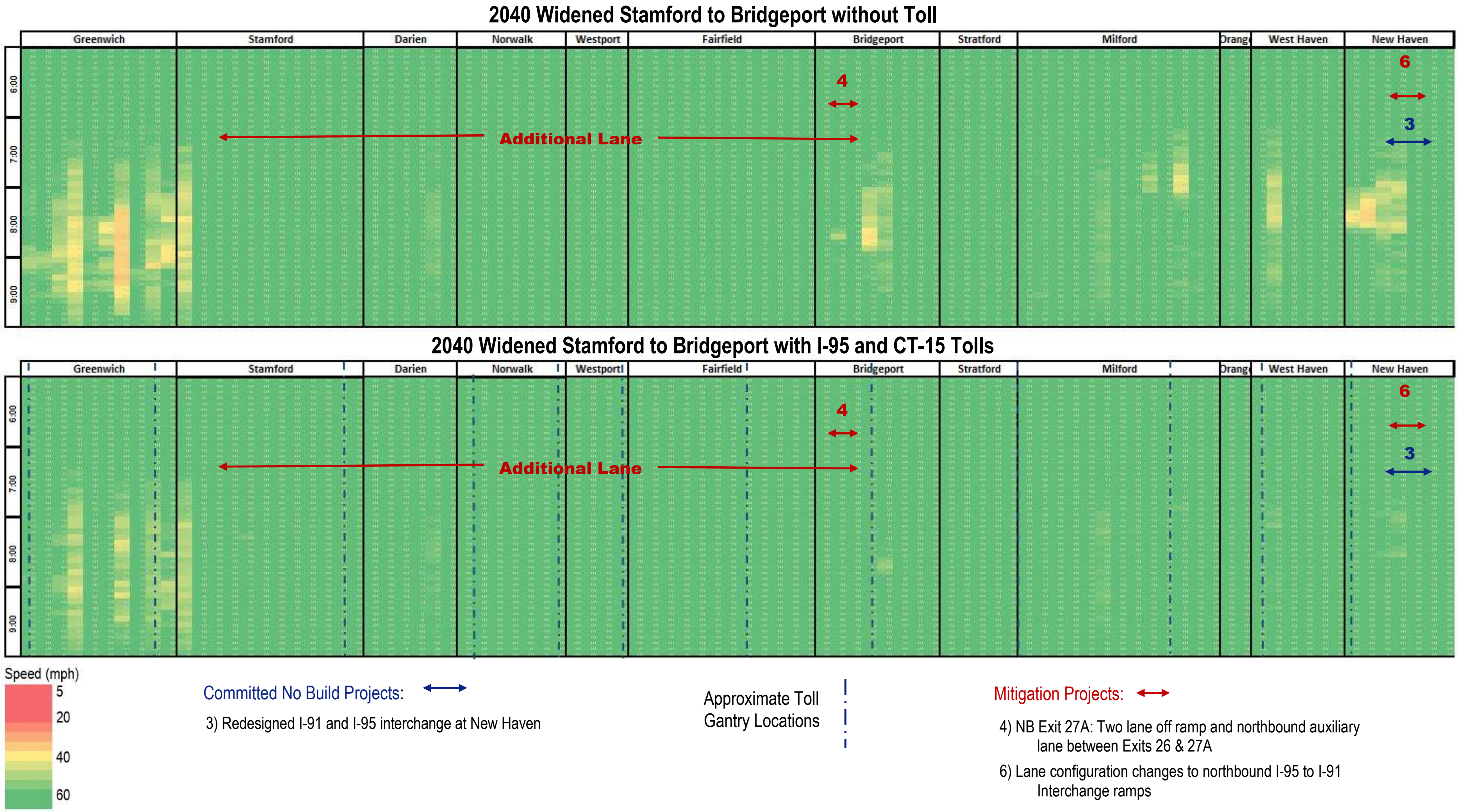
1) Two lane exit and deceleration lane at off ramp to I-287 from I-95 Southbound

2) Auxiliary lane southbound between Exits 7 and 6

3) Auxiliary lane southbound between Exits 15 and 14

5) Additional 5th lane southbound between Exits 48 and 47

Figure 7.2 2040 Widened Stamford to Bridgeport with I-95 and CT-15 Tolls: AM Peak Northbound Speed Contour



In the PM Peak Period, the changes in the I-95 operation performance resulting from the addition of tolling on I-95 and CT-15 are more significant than in the AM Peak Period. With reductions in demand for I-95 under this tolling scenario, improvements in the majority of the bottlenecks in the corridor can be seen (Figure 7.3). A major improvement in speeds along I-95 can be seen resulting from the improvement of the bottleneck locations at Fairfield. This improvement is created from a still significant reduction in demand of approximately 18 percent lower than the non-tolled scenario. A moderate bottleneck still forms at this location, but extent of the queuing is dramatically improved. The bottleneck at Bridgeport also sees some improvement in speeds and a smaller queue formation arising from an approximate eight percent reduction in demand through the bottleneck location as compared to the scenario without tolling.

In the PM Peak Period, the addition of tolling has mixed impacts on congestion on the off-peak southbound direction of travel on I-95 when compared to the non-tolled scenario (Figure 7.4). The bottleneck in Stamford can be seen to worsen under the tolling scenarios. Similar to the impacts seen it the previous scenario with tolling only on I-95, the potential for benefit from the reduction in through demands for I-95 are more than offset by an approximate 60 percent increase in demand for Exit 5 as traffic diverts to Route 1. The net result is are lower speeds and a longer queue on I-95 approaching this bottleneck. The opposite is true for the New Haven bottleneck, as the reduction in demands has a net positive benefit on I-95 speeds. Congestion still occurs, but the length of the queue is shorter and the I-95 speeds are not as low through this bottleneck as in the non-tolled scenario.

Figure 7.3 2040 Widened Stamford to Bridgeport with I-95 and CT-15 Tolls: PM Peak Northbound Speed Contour

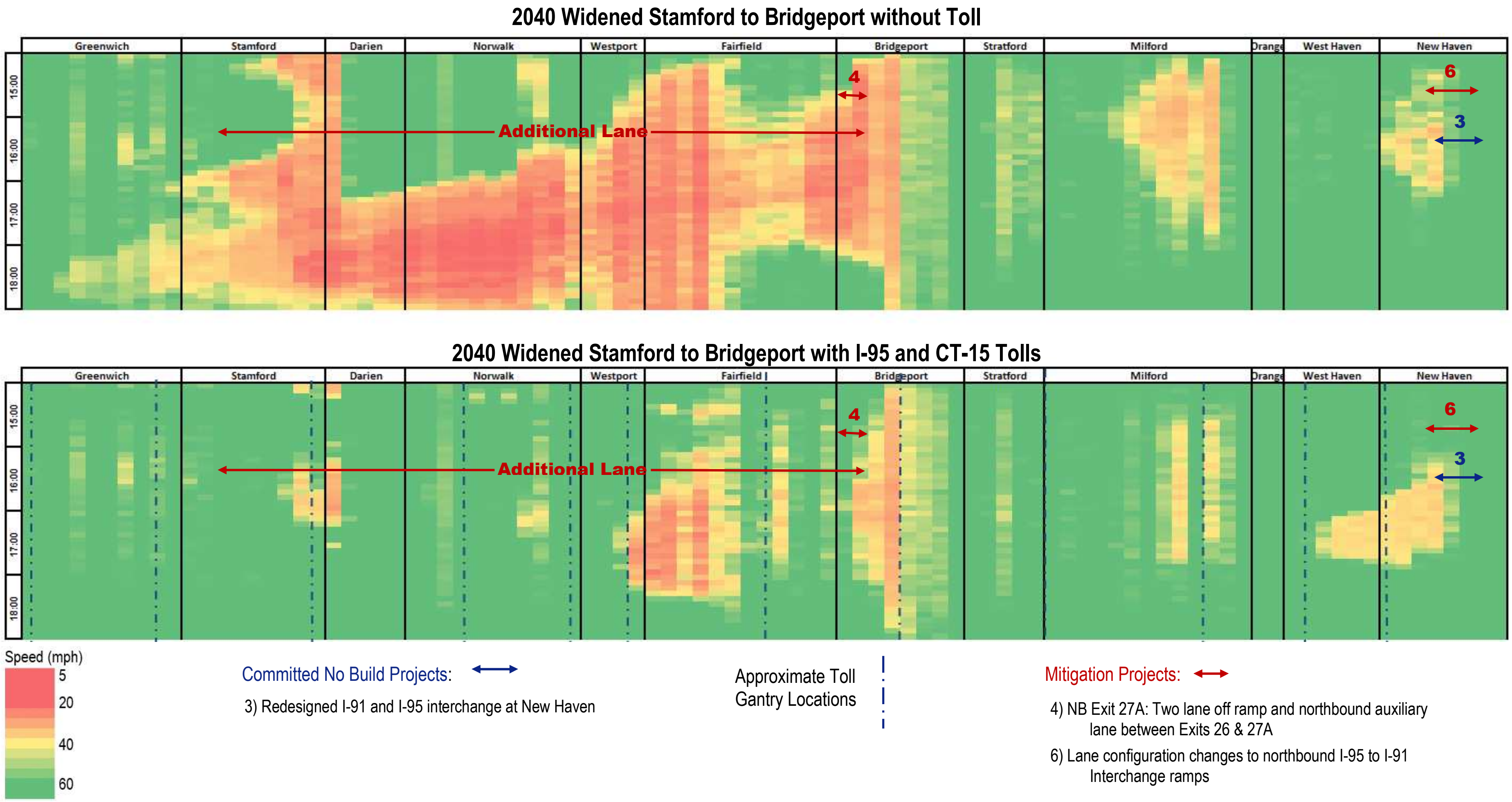
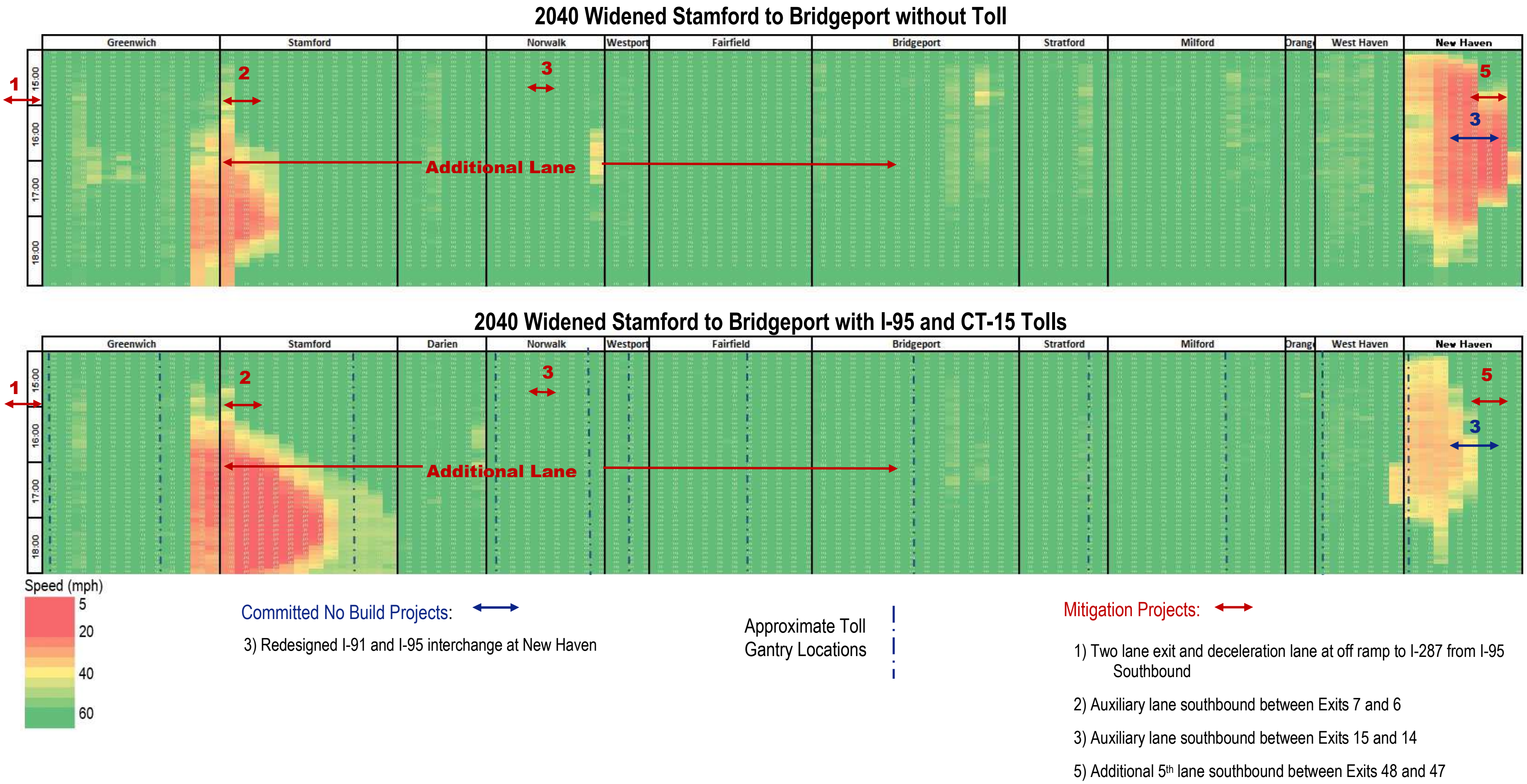


Figure 7.4 2040 Widened Stamford to Bridgeport with I-95 and CT-15 Tolls: PM Peak Southbound Speed Contour



8.0 Comparison of Scenario Performance Measures

While the presentation of the speed contours for each of the analyzed scenarios is an excellent method to present a detailed summary of the operations along the corridor, it is not a quantified approach to assessing the operational performance of each scenario.

This chapter presents two different sets of performance metrics which were computed from the simulation results of each scenario. Note that due to the high projected cost of improvement and the limited benefits associated with the 2040 Widened New York to New Haven without Toll scenario, it has been excluded from the performance measures reported in this chapter.

8.1 Aggregate Performance Metrics

The performance measures of vehicle miles traveled (VMT), vehicle hours traveled (VHT), and average speed are good measures of effectiveness to gauge the relative performance of the corridor between the simulated scenarios. VMT is an indication of both the demand and simulated throughput of the roadway. VHT is a good aggregate measure of the total simulated driver or user costs. Average speed is a good quantified measure of the operational performance of the roadway. However, none of the metrics or presented graphs should be analyzed in isolation; VMT, VHT, and average speeds for a facility should be analyzed together to get the complete picture of performance of a facility type during the analysis period.

Reported in Figures 8.1 and 8.2 are the total VMT, VHT, and average speed for the AM and PM Peak Period, respectively, for the peak direction of flow (southbound in AM, northbound in PM) along I-95. The measures are reported for each hour of the peak period for each of the future year 2040 scenarios. The total VMT and VHT metrics were calculated from the simulation outputs of every I-95 mainline section of roadway in the simulated network. Average speeds are calculated from the aggregate VMT and VHT values to derive a volume weighted mean harmonic or space mean average speed.

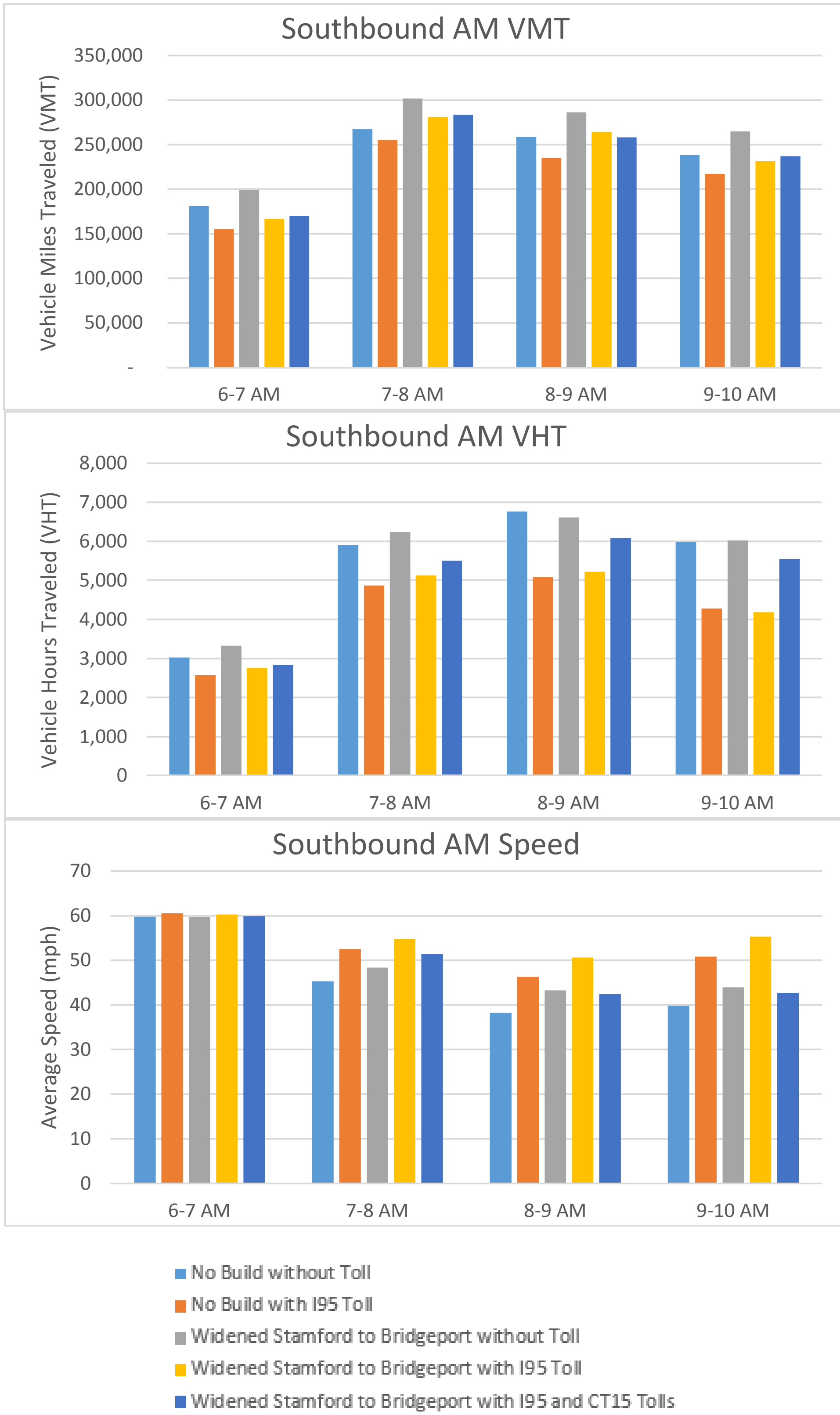
During the AM Peak Period (Figure 8.1), the 2040 No Build with Toll scenario sees a reduction in VMT in the southbound direction and corresponding reduction in VHT and increase in average speed when compared to the 2040 No Build scenario. All are indications of reduced demand and improved performance along the corridor.

In comparing the Widened Bridgeport to Stamford without Toll scenario to the No Build without Toll, the benefits of the added travel lane and mitigation projects can be seen. Large VMT increases are an indication of increased capacity and roadway throughput, more moderate VHT increases indicate both increased demand and improved performance, while the higher average speeds quantify the performance improvements on the corridor in the peak direction of travel.

When tolling is added to just I-95 in the Widened Stamford to Bridgeport with I-95 Toll scenarios, reduced VMT and VHT indicate the level of reduction in travel demand on the corridor. An increase in average speeds is also observed and a measure of the overall improvement in operations on I-95.

When both I-95 and the Merritt Parkway are tolled, lesser diversion to alternative roadways are observed in the VMT and VHT which are both between the equivalent values from the other Widened Stamford to Bridgeport scenarios with either no tolling or only tolling on I-95. Speeds indicate an approximate equal level of operations as compared to the Widened without tolling scenario and worse performance on I-95 as compared to the I-95 only tolled scenario. However, when compared to the No Build without scenario, the metrics show an approximate equal level of demand and throughput in VMT, while VHT and average speeds show marked improvements in all hours of the AM Peak Period.

Figure 8.1 Aggregate Performance Metrics: 2040 AM Peak Southbound Direction



During the PM Peak Period (Figure 8.2) in the 2040 No Build without Toll scenario the average northbound speed from New York to New Haven falls below 50 mph even during the first hour (3-4 PM) of the peak period and drops to a low of 23 mph in the core peak hour (5-6 PM).

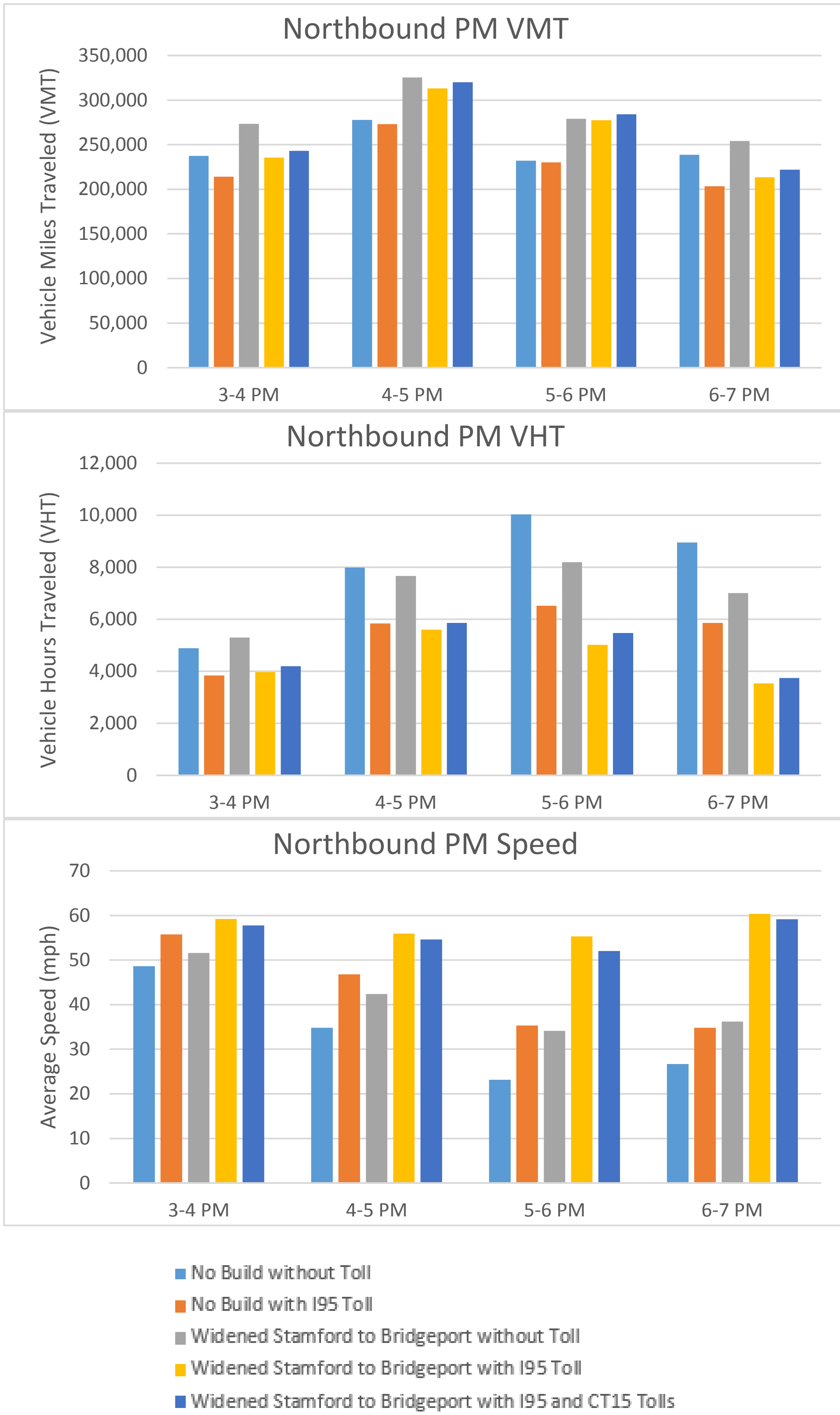
When tolls are added in the No Build with Toll scenario, the demand of vehicles using I-95 in the northbound direction is reduced as evident from the reduction in VMT in all hours of the peak period. The operations of I-95 improves over the No Build scenario as VHT and average speeds increase in all hours, but the continued slow average speeds even in the final hours (6-7 PM) of the simulation indicate severe congestion remains in the corridor at the conclusion of the simulated peak period.

As the targeted capacity improvements in the corridor are introduced in the Widened Stamford to Bridgeport without Toll scenario, the increased demand and throughput is evident in the increases in simulated VMT in each hour of the simulation. When compared to the No Build with Toll scenario, the overall higher VHT and average speeds indicate an improved performance, but the low speeds in the final two hours of the simulated peak period indicate severe congestion remains in the corridor in the PM Peak Period and the freeway does not operate significantly better than in the No Build with Toll scenario.

As demand management strategies are introduced along with the widening in the Widened Stamford to Bridgeport with I-95 Toll scenario, reduced VMT in all hours shows the effects of the toll in managing the demand for I-95. The more significantly reduced VHT and increased average speed values indicate that the corridor is operation much more efficiently, with average speeds across the entire northbound I-95 remaining above 50 mph in all hours of the peak period.

Under the final scenario where tolling is included on both I-95 and the Merritt Parkway, the lower VMT in the first and final hour when compared to the widened without toll scenario show the reduced demand for I-95. For the remaining hours, however, VMT are generally equal to the widened without toll scenario, indicating the improved throughput of vehicles in corridor as operations improve. Reduced VHT and higher average speeds in all hours confirm the improved operations of the corridor.

Figure 8.2 Aggregate Performance Metrics: 2040 PM Peak Northbound Direction



8.2 AVERAGE TRAVEL TIME

Travel times are easily comprehended by patrons using a roadway. They are intuitive to gauge the performance of a roadway by virtue of the time it takes to travel a known distance of roadway and are directly comparable to a driver's own observations and experiences under existing conditions. For this reason, average travel times for two different sections of I-95 were extracted from the simulation results and reported for each hour of the peak period for the peak directions of travel (southbound in the AM Peak Period, and northbound in the PM Peak Period). The two sections of I-95 where simulated travel times for the 2040 future year scenarios are reported are between New York State and New Haven (a 48 mile stretch of roadway between the I-287 and I-91 interchanges), and from Stamford to Bridgeport (a 22 mile stretch of I-95 between Exit 7 and Exit 27A). Tables 8.1 through 8.4 present the average simulated travel times.

In the AM Peak Period for the No Build without Toll scenario, it takes at most 37 minutes to travel from Bridgeport to Stamford and 76 minutes to travel from New Haven to New York State.

Under the No Build with Toll scenario, the reduction demand from toll diversions away from I-95 helps to reduce the travel by 16 minutes between New Haven and New York and 7 minutes between Bridgeport and Stamford.

Widening by one lane per direction between Stamford and Bridgeport without any tolls shows some but generally limited benefits in reducing travel times as more traffic is attracted to I-95 based on the added capacity.

But when widening is combined with tolls on I-95, more significant improvements in travel times are seen, with a simulated maximum travel time of 27 minutes from Bridgeport to Stamford and 55 Minutes from New Haven to New York.

Finally with the widening and tolls on both I-95 and CT-15, the diversions from I-95 to CT-15 are reduced. The resulting travel times see some improvement over the No Build without Toll scenario, but are generally equal to those under the widen without toll scenario.

Table 8.1 Bridgeport to Stamford 2040 AM Peak Average Travel Time

Scenario	No Build without Toll	No Build with I-95 Toll		Widen Stamford to Bridgeport without Tolls		Widen Stamford to Bridgeport with I-95 Toll		Widen Stamford to Bridgeport with I-95 and CT-15 Toll	
Hour	Travel Time	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build
6-7 AM	21	21	0	21	0	21	0	21	0
7-8 AM	28	26	-2	25	-3	23	-5	25	-3
8-9 AM	37	34	-3	32	-5	27	-10	37	0
9-10 AM	36	29	-7	34	-2	23	-13	28	-8

Note: Travel times reported in minutes

Table 8.2 New Haven to New York 2040 AM Peak Average Travel Times

Scenario	No Build without Toll	No Build with I-95 Toll		Widen Stamford to Bridgeport without Tolls		Widen Stamford to Bridgeport with I-95 Toll		Widen Stamford to Bridgeport with I-95 and CT-15 Toll	
Hour	Travel Time	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build
6-7 AM	48	47	-1	48	0	47	-1	48	0
7-8 AM	64	54	-10	60	-4	52	-12	55	-9
8-9 AM	76	62	-14	65	-11	55	-21	66	-15
9-10 AM	72	56	-16	62	-10	51	-21	63	-9

Note: Travel times reported in minutes

During the PM Peak Period when congestion is worse than the AM Peak Period, average simulated travel times in the No Build without Toll scenario takes a maximum of 71 minutes to travel from Stamford and Bridgeport and 135 minutes from New York State and New Haven due to the severe congestion. These values represent approximately three times longer than a travel time under uncongested free flow conditions.

In the No Build with Toll scenario, some drivers reduce trip making, change modes, or divert to avoid paying the tolls or shift to the off peak period to pay a reduced toll. This reduction in demand causes conditions to generally improve. However, significant travel times are still seen, with an average simulated travel time within the peak period of a maximum of 55 minutes from Stamford to Bridgeport and 82 minutes from New York State to New Haven. While greatly improved over the travel times in the No Build without Toll scenario, the travel times are still at least double the uncongested free flow travel times.

While widening I-95 between Stamford and Bridgeport adds through capacity to the corridor, it attracts additional demand to the corridor with further exacerbates weaving delays seen at many interchanges through the corridor. The resulting simulated travel times see some improvement over the No Build without Toll scenario, but are similar to those under the No Build with Toll scenario.

When an additional lane on I-95 between Stamford and Bridgeport is combined with tolling on I-95, significant reductions in travel times are estimated to occur in the PM Peak Period. Travel times between Stamford and Bridgeport are near uncongested travel times and drop to under an hour to travel from New York State to New Haven, an improvement of cutting the worst No Build without Toll travel times in half.

When tolling is implemented on CT- 15 in addition to those on I-95, more traffic demand is retained on I-95 and congestion worsens slightly. But travel times are still significantly improved over the No Build without Toll scenario, and are kept under a half hour to travel between Stamford to Bridgeport and under an hour to travel from New York State to New Haven.

Table 8.3 Stamford to Bridgeport 2040 PM Peak Average Travel Time

Scenario	No Build without Toll	No Build with I-95 Toll		Widen Stamford to Bridgeport without Tolls		Widen Stamford to Bridgeport with I-95 Toll		Widen Stamford to Bridgeport with I-95 and CT-15 Toll	
Hour	Travel Time	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build
3-4 PM	30	24	-6	26	-4	21	-9	22	-8
4-5 PM	46	35	-11	36	-10	23	-23	23	-23
5-6 PM	71	55	-16	53	-18	23	-48	26	-45
6-7 PM	55	53	-2	46	-11	21	-32	21	-32

Note: Travel times reported in minutes

Table 8.4 New York to New Haven 2040 PM Peak Average Travel Time

Scenario	No Build without Toll	No Build with I-95 Toll		Widen Stamford to Bridgeport without Tolls		Widen Stamford to Bridgeport with I-95 Toll		Widen Stamford to Bridgeport with I-95 and CT-15 Toll	
Hour	Travel Time	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build	Travel Time	Vs. No Build
3-4 PM	59	51	-8	55	-4	48	-11	49	-10
4-5 PM	86	61	-25	67	-19	51	-35	52	-34
5-6 PM	135	82	-53	81	-54	51	-84	55	-80
6-7 PM	111	79	-32	74	-37	47	-64	48	-63

Note: Travel times reported in minutes

9.0 Findings and Recommendations

As part of the I-95 Corridor Congestion Relief Study, various roadway improvements and pricing strategies for demand mitigation were analyzed and simulations of the peak period operational performance on I-95 between the New York Stateline and New Haven for several 2040 future year scenarios were conducted. In order to complete the analysis, several future year condition models were developed and simulated using the Quadstone Paramics microscopic traffic simulation software.

Scenarios included combinations of physical improvements that added capacity to I-95 and different tolling strategies on Connecticut roadways. Forecasts of the driver responses to the different scenario components and the resulting net changes in trip making patterns in the I-95 corridor for each scenario were completed separately using demand models developed by CDM Smith. The output from those models then served as a key inputs to the microscopic traffic simulation models developed by Cambridge Systematics to perform detailed estimates of the future year traffic operation conditions and performance in different future year conditions.

9.1 Scenario Findings

The addition of an extra travel lane in each direction between the New York Stateline and New Haven without tolling to manage demand increases the volume attracted to I-95 as vehicles divert from other parallel congested roadways to I-95. While the added lane improves the throughput capacity of the roadway, the added demands at the interchanges create localized ramp and interchange failures, which in turn can create severe mainline congestion on I-95. Considering the projected costs of building an additional lane between New York and New Haven, there will not be likely be significant improvements in the operation of I-95 to justify the costs. Without additional major investment at interchanges with high demand, this alternative will likely show modest improvements in the peak travel directions.

As a more cost effective improvement, an additional lane between the most congested portions of I-95 between Stamford and Bridgeport showed additional benefits when combined with localized selective interchange improvements. The mitigation projects included in the widening scenarios can be further studied for implementation for improved operations of I-95. Additionally, simulation results showed there may be even more substantial benefits if the selective widening was continued further south to meet the I-287 interchange near the New York Stateline.

The addition of an extra lane with tolling on I-95 showed potential for dramatic improvements in the future year operations of I-95 when compared to a No Build scenario. The actual location of the toll gantries and toll rates may be refined in future studies based on the results of the microsimulation models to help minimize congestion impacts from toll diversion traffic at key interchanges in the corridor.

While the tolling of both I-95 and the Merritt Parkway actually provides worse operations on I-95 than tolling I-95 alone, it does apply a more balanced corridor-wide approach to demand management to pair with the selective capacity improvements in the I-95 corridor. While some congestion would occur under this scenario, a 2040 future year I-95 would still operate at reasonable levels of service during the peak periods and provide significant benefits over other analyzed future year scenarios.

9.2 RECOMMENDATIONS

The completed scenario simulation analyses showed that adding an additional through lane in each direction along I-95 between New Haven and New York without additional improvements to the interchanges and ramp operations will not significantly reduce congestion and improve traffic conditions on I-95. Along I-95 in Connecticut, the interchange density is very high with approximately one interchange per mile and many closely spaced interchanges. Available data and modeling also show that most vehicles using I-95 in the peak periods travel for short distances on I-95. This high proportionality of short trips on I-95 puts additional strain on the ramps and interchanges in future year conditions where traffic growth increases the number of on and off movements at the various interchange ramps. Operational issues from weaving delays and oversaturated ramps on these interchanges can have cascading impacts on mainline I-95 operations when interchange operations fail. Should expanding the roadway be further investigated in the future, a more balanced physical improvement plan for the corridor where improvements targeted to improve operations at key interchanges are also considered in addition to adding through capacity on I-95 should be considered.

The simulation analyses also showed that the addition of tolls on I-95 proved to be an effective tool to manage demand for I-95 and would help improve the future year operational performance of the roadway in the peak periods. The use of open road tolling technologies which collects tolls completed electronically from vehicles operating at full highway speeds will not introduce any additional delays to I-95 drivers as traditions toll collection methods do.

Maximum benefits are seen when selective physical improvements are combined with demand management tolling strategies. With a combined approach to adding capacity and managing demand through tolling implemented, the 2040 operations of I-95 can function at a high level as it was intended.

Connecticut I-95 Corridor Congestion Relief Study

Appendix D

State of Readiness for Tolling

Part of the I-95 and I-84 Value Pricing Pilot Program Studies

October 2014

State of Readiness for Tolling
Connecticut DOT

Table of Contents

1.0 Introduction

1.1 Purpose

The purpose of this report is to assess the readiness of the State of Connecticut to begin a program of tolling. The evaluation involves an examination of how tolling operations and administration are conducted in other states and tolling authorities. Of the basic organization models examined, most states are using or adopting a DOT-managed tolling model rather than an independent toll authority model due to factors explained in Chapter 3. Therefore, for purposes of this report, most of the focus is placed on the readiness of the Connecticut Department of Transportation (CTDOT) to develop and manage a tolling program.

The assessment consists of a review of CTDOT's organizational structure, relevant CTDOT plans and studies, Connecticut statutes, and the history of tolling in Connecticut. The assessment is intended to identify (at a high level) constraints that could limit CTDOT's ability to implement a tolling program, and to make recommendations for moving forward in the development of such a program.

1.2 Background

Prior to 1989, toll roads and bridges were an integral part of the Connecticut roadway system and generated revenue for transportation needs. However, a movement to remove tolls on Connecticut's bridges and roads began during the eighties. In 1980, the toll on the Mohegan-Pequot Bridge was removed after the bonds issued for its construction had been paid off. In 1983, the Connecticut legislature voted to tolls on the Connecticut Turnpike and Hartford area bridges by certain specified dates. In 1986, the legislature voted to remove tolls on the Merritt and Wilbur Cross Parkways. By April 28, 1989 all tolls had been eliminated. During the last year of operation, toll collections amounted to $72 million, which in 2013 dollars is equal to $135 million.

A key factor in the decision to remove tolls in Connecticut was the delays and accidents at toll plazas. The old toll collection methods at toll booths required drivers stop to pay tolls, which resulted in traffic backups and accidents. In the late 1980's, Connecticut experienced a rash of accidents at toll plazas, which outraged the traveling public and stirred governmental actions.

With the advent of technological solutions that eliminated toll booths and allowed toll collection at highway speeds, tolling again is being considered by many states. These include states that did not have toll roads or eliminated tolling in the past. Washington, Texas, Virginia, Florida, Colorado, Georgia, North Carolina, and others are adding new toll roads or considering reauthorizing toll collection on former toll facilities.

Technology also has allowed tolling to be used not only to finance projects but to manage congestion on overcrowded highways, bridges and tunnels. High Occupancy

Toll (HOT) lanes and Express Toll Lanes (ETL) lanes are examples of tolling techniques that can used to help manage congestion. These lanes can be added to existing overcrowded facilities and require single-occupant vehicles to pay a toll that varies based on demand and time of day. By charging higher tolls during peak demand periods, this type of congestion pricing can manage demand and ensure good travel speeds in the tolled lane. Where these lanes have been implemented, travel times in the non-tolled lanes have also been reduced and the entire roadway operates at a higher level of service. These lanes are becoming real tools for congestion management in urban areas with over fifteen now operating across the nation and another eighteen under development.

In 2013, Connecticut applied for and was awarded a federal grant to study various tolling initiatives on I-84 in Hartford and I-95 between New Haven and New York. The studies are exploring a variety of tolling and congestion pricing options such as general tolling, express toll lanes, HOT lanes, and tolling during times of peak congestion.

Initiating a program of tolling will require the reestablishment of a tolling organizational structure that no longer exists in Connecticut. If CTDOT is challenged to begin a tolling program for the state, the state will have to adopt new laws and develop new policies and practices.

1.3 History of Tolling in the United States

In the late 19th century the "Good Roads Movement" began as a bicycle transportation initiative. Coincidently, the use of motor vehicles grew rapidly and the need for longer and better roads increased. Following World War I, the Federal Highway Act of 1921 provided financial assistance to the states to build roads and bridges. World War II created even greater reliance on highway systems that served as defense routes for the war effort. After the war, automobile use and traffic increased dramatically. With only limited funding by the federal government, many states turned to tolls as a means to pay for new highways, with the Pennsylvania Turnpike being the first of several constructed after the war. However, with the start of the Interstate Highway System in the mid 50's, the construction of new toll roads all but ceased.

By the 1980's, a new era of toll road construction began. As traffic continued to grow, states and the federal government exhausted their ability to maintain the existing roadways and at the same time build new capacity. Many areas turned to tolling to provide new revenue sources for their highway programs. In Houston, Texas, the 22-mile Hardy Toll Road and the 88-mile Sam Houston Toll Way are the products of the Harris County Toll Road Authority, created in 1983 after voters approved the issuance of $900 million in bonds for building toll roads. In Denver, Colorado, the E-470 project has begun to serve the new airport to the east of the city. In Florida, the Turnpike System, operated by the Florida Department of Transportation, is authorized to begin construction of several new facilities in various parts of the state. By the 1990's new projects all over the United States were constructed or being planned.

2.0 Tolling Readiness: Identification of legal, financial, and budgetary constraints to the establishment of a tolling unit within CTDOT

2.1 Legal and Policy Constraints

The development of a tolling program is often a multistage, multiyear process with statutory authority, policy, and operational decisions guiding the implementation. Connecticut is currently without a legal or policy framework to guide the development of tolling in the state. To begin the process of developing the necessary framework, legislation will be needed. This legislation may be general and provide CTDOT with broad authority to initiate tolling within the state, or more specific with details defining where and how tolling should be established. If only general authority is provided, more detailed policy development will be necessary. Most states have developed laws and policies which define:

- Scope, purpose and organizational structure, including governance
- The projects or project types on which tolls may be charged
- Definition of terms
- Legal powers
- The authority to establish toll rates, fees and other charges
- Any limitations on toll rates and fees
- The authorized uses of revenues
- Authority to issue bonds or other indebtedness
- The authorized use of bond proceeds, including investment activities
- The ability to continue tolls after bonds have been paid off
- The ability to operate ancillary services such as concessions
- The use of private partnerships for construction and operation
- The ability to use the Design-Build approach for construction projects
- The design standards used in the construction
- The exemption from tax on customer toll payments
- Any required methods of toll collection such as electronic toll collection
- Any required intra or inter-state interoperability
- Any covenants by the state such as “doing no harm to bondholders”
- The authorized users of the facility roadway and any prohibited users
- The requirement to pay and any exemptions
- Fines and other enforcement activities for failure to pay
- Acquisition of property and property rights

2.2 Financial and Budgetary Constraints

a. Start-up Phase: If CTDOT pursues even a moderate tolling program, it is likely that additional state resources will be necessary during the start-up phase. This will require funding and budget authority. Environmental studies and permits, preliminary traffic and revenue studies, financial assessments, identification of rights-of-way and design activities will be necessary. All major permits will need to be obtained prior to construction. Prior to the issuance of bonds to fund the construction phase, an investment-grade traffic and revenue study will be required. Typical startup costs can be several millions of dollars for a significant tolled project

b. Construction Phase: Sufficient funding and budgetary authority will be needed to put the project into service. Rights-of-way and utility relocations, if deemed necessary, will need to occur prior to construction. The funding amount and length of construction will vary depending upon the project. Major projects will need significant funding from bonds and will require budget authority to expend these funds. Smaller projects may be funded from sources other than new bonds but these also will require budget authority.

c. Operational Phase: Prior to operation, the State must carefully plan and implement the accounting, customer service center, violation process center, and external interfaces with banks, law enforcement etc. Funding will again be necessary to implement the operational phase. Like the other preliminary phase activities, the development of operational capability must be accomplished without the advantage of the start of toll revenue collection. In addition, bond proceeds are not usually available for most operational activities, especially if performed by in-house staff.

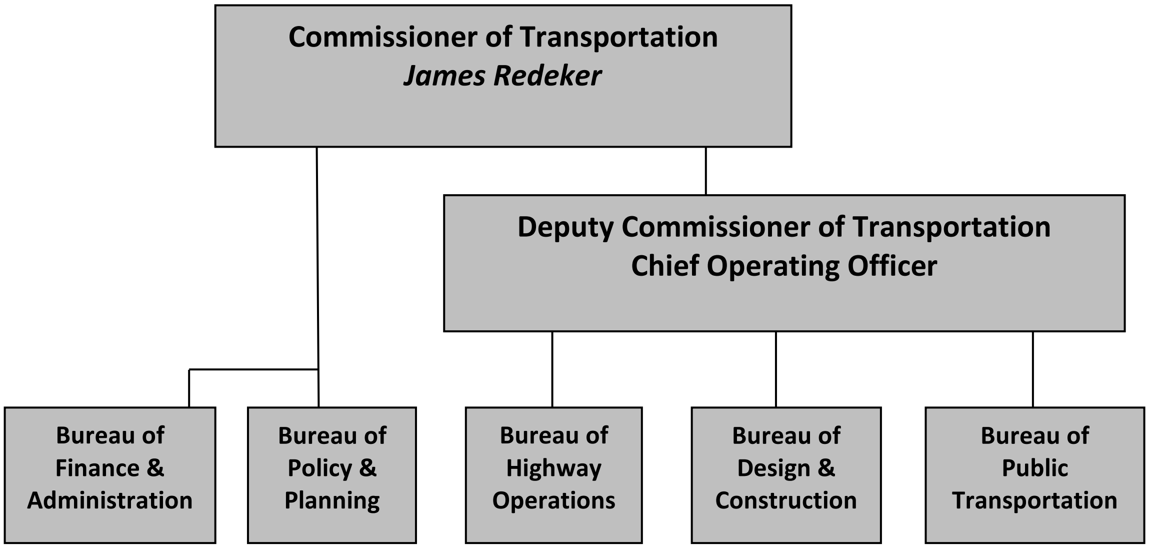
2.3 Identification of CTDOTS's Administrative, Engineering, Planning, Financial & IT Systems that Might Support a Tolling Organizational Unit

CTDOT is headed by a Commissioner of Transportation who appoints deputy commissioner(s). The CTDOT is organized into five bureaus: Finance & Administration, Highways Operations & Maintenance, Public Transportation, Engineering & Construction, and Policy & Planning. Each bureau is headed by a bureau chief, each of whom manages several offices composed of various divisions. The following units also report directly to the Commissioner; Legal Services, Strategic Planning and Employee Development, Legislative Office, Communications, Equal Opportunity and Diversity, and Consultant Selection.

CTDOT's current organizational structure should be able to support the delivery of major functions such as planning, general administration, design, construction, and maintenance necessary to implement projects that become part of a tolling program. If tolling is to be used to help finance major new projects, CTDOT's existing organizational units could perform some of these basic project delivery functions.

CTDOT does not currently have the organizational capability to perform many of the more specialized functions required for a tolling system. These include the information system resources or infrastructure to support the collection of tolls. Tolling requires an extensive information system, unique infrastructure, and special technical support - especially in an electronic toll collection environment. These are discussed in more detail below.

CT Department of Transportation Organization Chart



2.4 Identification of Processes Unique to Tolling not Currently Supported by CTDOT's Current Programs

While some of the processes and activities needed for a successful tolling project and operation already exist within CTDOT, no organizational unit within CTDOT exists to handle certain unique functions. Some of these programs and activities include:

Toll Collection Back-Office Operations

- Customer Service Activities
- Customer Account Management
- Customer Relationship/Communications
- Payment Processing Activities
- Violation Processing
- Mailroom Operations
- Document Management

IT/Toll Systems

- Payment Collection Systems
- Toll Electronics/Software
- Toll Equipment Acquisition, Installation and Maintenance
- Equipment Performance Testing
- Application Development
- Database Development and Maintenance
- Equipment/Software Integration
- Security

Financial

- Toll Feasibility Studies
- Unique Financial Management Systems

- Financial Statement Preparation
- Customer Account Management
- Debt Issuance and Repayment Activities
- Internal and External Audit Activities

Toll Collection Back Office Operations. Toll Collection Back Office operations require a significant manpower effort and are frequently outsourced. Call center operations alone may require a large number of call center operators for a substantial tolling effort to be successful.

IT Systems. IT Systems for tolling will likely require new investments in equipment and staffing. Customer and revenue focused transactional data base development and maintenance will be required, and is unlikely available within CTDOT's current IT system. Acquiring these capabilities through outsourcing is a generally accepted practice. However, it should be noted that CTDOT will have to carefully monitor the process for any outsourcing to ensure success.

While many of these activities can and should be contracted out to specialized firms, CTDOT should develop and maintain necessary internal systems to ensure that such services are performed accurately and completely, with particular attention to the revenue collection and financial accountability aspects of the tolling program.

Traffic & Revenue Studies. Prior to the implementation of tolling, independent traffic and revenue studies are generally performed to:

a. identifies toll rates or a tolling "regime" such as variable tolling based on the level of congestion that minimizes negative impacts on traffic while generating sufficient toll revenues;

b. forecast the amount of revenue that will be collected; and

c. determine the extent of diversion onto other roadways.

These studies are always independently performed and, if used to support the issuance of revenue bonds, are performed by nationally recognized Traffic and Revenue Engineering firms.

Financial. The additional workload for proper financial tracking and reporting imposed by the assumption of a tolling program will need to be reviewed. To an extent, this workload depends upon the size of the tolling program. In-house staff may be capable of absorbing the efforts, or there may be a need to hire or outsource addition resources. Regardless of whether the financial activities are performed by in-house or external resources, CTDOT will need to establish a process to insure accountability for the financial activities.

3.0 Preliminary Options for Establishing CTDOT's Tolling Function

3. I Organizational Models Currently Operating within the United States

Toll roads in the U.S. are operated by state, local, and private entities. They share many common functions. They charge tolls to help finance debt for roadway construction, management, operations, maintenance, and rehabilitation. However, they differ in organizational structure and purposes. The organizational structure selected must be the model that best manages the anticipated responsibilities of and the type of facility or systems to be managed.

Typical organizational models and specific example in the United States include the below examples that are each summarized in more detail in Appendix 1:

1. **State-level 'Independent' Public Toll Authorities**

   State toll authorities are typically established by state law and governed by an independent board appointed by the governor and state legislature. The board is responsible for selection of the CEO, improvements to the existing system and administration of the agency. Authorization for new routes is frequently the responsibility of the state legislature.

   The existing state-level independent public toll agencies were created many years ago. The trend since the late 1980s has been to either move an existing state-level independent toll agency into the DOT (Florida, Texas and North Carolina as examples), create the toll agency as part of the state DOT (Washington state as an example) or to create regional public toll agencies. See appendix for more information on the following state level independent public toll agency examples:

   - Illinois State Toll Highway Authority
   - New York Thruway Authority

2. **Regional Level Independent Public Toll Authorities**

   The authority for the establishment of regional tolling authorities usually begins with authorization by the state legislature or local governmental unit. A board consisting of local business leaders and public official appoints a CEO, establishes administrative procedures, and identifies needed improvements and new projects. Regional Independent Toll Agencies are traditionally created initially for a specific project or group of projects in a concise geographical area such as a county. Some of the regional independent toll agencies have become larger geographically such as multi-county in a major urban area such as Dallas-Fort Worth and the New York City metro area as shown in the two examples below.

   Regional independent toll agencies have been in existence for many years and are still being created in recent years. The use of regional independent toll agencies is normally initially focused on one or two major projects that may expand into more projects as system toll revenues support new projects. Regional independent toll agencies normally don't have other funds outside of toll revenues and have to partner with others such as state DOTs to get projects moving forward as many projects cannot fully support themselves solely from toll revenues. This has been especially difficult for new toll financed projects since the economic/financial challenges in 2008. See appendix for more information on the following examples:

- North Texas Tollway Authority
- Port Authority of New York and New Jersey

3. State DOT Toll Entities

A tolling function could be re-established within CTDOT. In states that use this model, the tolling function is overseen by a state transportation commission or the state transportation commissioner. The commissioner either acts as the toll entity director or appoints one who reports to him. Generally the entity is guided by state policies and practices with only those exceptions as necessary for tolling and issuance of debt. See appendix for the following examples:

- North Carolina Turnpike
- Florida Turnpike Enterprise
- Washington State DOT Toll Division

4. Public-Private Partnerships (P3's)

Several states have legislation in place to encourage private sector participation in the various aspects of the development and operation of a toll facility. A public-private partnership can be defined as one in which the private sector plays a larger than normal role in the financing or operation of the facility.

The public owner (state DOT as an example) typically owns the toll facility and via contractor or lease contracts with the private entity. The public owner is "in charge" of the procurement, contracts documents, negotiations and typically may stop the process at any time during the procurement process. The public owner monitors the contract during the design-construction and operations-maintenance period of the P3 term. Public entities generally enter into P3's to help secure financing or transfer a portion of the risk to the private sector. Generally, public operated toll facilities have a goal of operating in the public's best interest by providing an essential service at the least cost with the highest level of transparency. Private entities have a goal of maximizing returns to equity partners while providing an acceptable level of service.

When public entities enter into P3 arrangements they have the responsibility of ensuring that contractual provisions of the relationship maintain a proper balance between their public service interest and profit motives of the private party. Several variations of P3's have been executed:

a. *Public-Private Partnerships for Capital Projects* In this arrangement, the private sector usually leads the financing, construction and operation of a facility while the public sector frames the agreement and retains ownership of the road. This is generally the traditional type of P3 envisioned when the concept of public private partnership is discussed. These can be either new projects (greenfields) or monetization of existing projects. See appendix for more information on the following examples:

- 495 Express Lanes (Capital Beltway, VA)
- Northwest Parkway (CO)

b. *Blended Public-Private Partnership* Frequently the public entity desires to maintain more control over the operation of a project than is usually available under a traditional P3 approach. Design-Build-Finance projects are examples of blended P3's.

c. *Privately Supplied New Facility* The private sector develops the new facility, providing all the finance and bearing all the risk.

Dulles Greenway. In Virginia, the Bryant/Crane family and Kellogg, Brown and Root formed Toll Road Investors Partnership II (TRIP II) for the purposes of financing, constructing and operating the Dulles Greenway. The Greenway is a 14-mile toll road connecting Leesburg to the Dulles Airport. Brown & Root constructed the road with all private funds, opening it for traffic in 1995.

91 Express Lanes. Another project, the 91 Express Lanes, in the median of the Riverside Freeway in California, were privately owned and operated by a private consortium (one of the members of which was Cofiroute, which is France's largest private highway operator) from 1995 to 2003.

5. States with Multiple Types of Toll Agencies/Authorities

In some states, more than one type of entity is authorized to operate toll facilities. Texas and Florida are two such states.

Texas. In Texas, the Texas Department of Transportation and independent Regional Authorities are authorized to operate toll facilities. Texas also uses P3's to deliver projects.

Florida. In Florida, several entities have been authorized. The Florida Turnpike System is operated as part of the Florida Department of Transportation (FDOT). Various Expressway Authorities operate local systems in Tampa, Orlando and Miami. Florida also has several tolled bridges which are operated by both FDOT and local bridge authorities. In addition, the Florida Legislature has authorized the construction and operation of tolled facilities by private entities. While Florida has entered into several P3 contracts, none to-date includes the collection of tolls by the private sector, although the legislation clearly allows for this.

3.2 Potential Models for a CTDOT Operated Toll System

States have developed and operated tolling programs with their state DOT using many different organizational structures. Based on CTDOT's current organizational model, several possible organizational structures appear possible. The study considered the toll agency organization options previously discussed in section 3.1.

Based on findings from the review of other states, and from CTDOT's two studies on congestion relief and congestion pricing (I-95 between New Haven and New York and I-84 in Hartford), the organizational options were narrowed down to either a toll agency within CTDOT or a public-private partnership managed by the CTDOT. The primary reasons for focusing on these two options are: (1) the congestion pricing studies are on existing roadways owned by CTDOT, and (2) the projects likely will need both traditional CTDOT funding and toll revenues to finance the projects. Numerous variations and permutations of these structures are possible, but for the most part they can be grouped into three types described below.

1. **In-House Model –** A tolling unit would be set up within CTDOT's existing organizational structure. It could be established at the office, division or bureau level. Current state laws, policies and procedures would apply, but some will need modification and some new ones need to be created for tolling activities. Employees would be CTDOT employees. Finances for the toll facilities would generally be separate from normal CTDOT funds. A "wall" or "trust fund" will be needed to keep toll revenues separate from other funds in CTDOT's accounts.

2. **Semi-Autonomous Model** –A semi-autonomous tolling group could be established within CTDOT. This would require appending a tolling unit to CTDOT's existing organization that would operate independent of other CTDOT units and functions. The Commissioner of Transportation would be the CEO with a Director of Tolling reporting to the Commissioner. Employees may or may not be CTDOT employees, but would be state employees. Separate laws, policies, procedures, finances, etc. would be developed for the management and operation of the tolling unit.

3. **Outsourced Model (Public-Private Partnership)** – CTDOT could contract with private sector partners to deliver and operate toll facilities. CTDOT may or may not contribute financially to the project, and may or may not receive financial benefits. CTDOT would own the project and it would be "turned over" or "handed back" to the CTDOT at the end of the contract term (30 to 50 years).

Table 1: This table compares the advantages and disadvantages of the three models for toll facilities

Model	Advantages	Disadvantages
In-House	Consistent procedures and practices within CTDOT and the tolling unit Few special laws and policies Standard practices understood by vendor community and the public	More difficult to grant exemption for certain policies and practices necessary for the development and management of toll facilities
Semi-Autonomous	Can be more easily exempt from state procurement practices; use different employee hiring practices and compensation plans; develop streamlined practices; and additional powers; all of which may be necessary to implement and develop toll facilities	Difficult to establish and manage Can create unrealistic expectations Can create friction within CTDOT
Outsourced (Public Private Partnership	CTDOT policies and practices not applicable to operation unless imposed by contract Employees not state employees Can have streamlined practices Private sector powers May speed delivery of project	New area for CTDOT with no prior experience with P3s and laws are untested May have public opposition May need CTDOT eminent domain help RFP and contract development will require outside expertise May require CTDOT funds for shortfall in feasibility Would not be able to provide cross project financial subsidy

3.3 Examples of Two State DOT Operated Toll Facilities

State departments of transportation that operate toll facilities within their organizational structure generally operate under one of two models: (1) a division-level model, or (2) a self-functioning model. The models are not necessarily completely distinct, and may operate with elements of one model and some elements of the other as needed.

1. In-House Division Level Model: *Example – Washington DOT Toll Division*

Tolling organizations can be operated at the division level or lower within an existing DOT structure. This type of structure works well when the number of tolled projects and the volume of tolling transactions are relatively small, and tolling duties do not distract from the focus on the existing non-tolled highways and other facilities.

The Washington State DOT (WSDOT) had toll facilities a generation ago that were primarily toll bridges. These tolls were eliminated when the debt associated with the toll facilities was retired.

Washington studied using tolls for proposed new or replacement bridges, and for managed lanes in the middle 2000s. The State Legislature enacted general tolling policies in 2007, and in subsequent years for specific tolling projects. Under this structure, the State Legislature approves each project to be tolled; the Washington

State Transportation Commission sets and manages the toll rates; and WSDOT develops, implements and operates the toll facilities. As of June 2014, WSDOT had implemented two toll bridges, (Tacoma Narrows Bridges and SR-520 Bridge) and one HOV conversion to HOT lanes (SR-167). The Washington State Legislature has authorized other toll facilities that are currently in development or under construction by WSDOT. More details can be located in Appendix 1.

WSDOT Toll Division. WSDOT created a Toll Division to manage key elements of the State of Washington toll program. These key elements include:

- **toll project planning**
- **toll financial strategy and operations**
- **toll systems development and procurement**
- **toll operations management**

The Toll Division's organizational structure is consistent with these four major functional areas of responsibility. The Division reports to the Deputy Secretary/Chief Operating Officer on the same level as a District operation in WSDOT. This is consistent with the structure adopted by most departments of transportation that house a turnpike or tolling function within their organizational structure. Unlike regular DOT districts that have geographically defined areas of responsibility, the toll division operates anywhere in the state where tolling systems are proposed or operating.

The Toll Division partners with regular line units of WSDOT for many traditional DOT services. These include project planning, engineering, land acquisition, construction, roadway/bridge maintenance; and support functions such as accounting, information technology and related support functions.

The WSDOT Toll Division performed a study of possible structures for the toll functions in WSDOT prior to moving forward with the current structure. The study findings could provide useful information to Connecticut officials as they consider organizational options. The study is further summarized in Appendix 2.

The WSDOT Toll Division is still in a "ramp-up" phase for toll project development, and requires a much higher level of resources than agencies that are in a "steady state" of operating existing facilities. This places WSDOT in a unique situation for the level and type of resources required compared to other toll agencies. WSDOT has adopted a strategy of outsourcing the toll operations just like many other growing toll operations such as the Florida Turnpike Enterprise and the Texas Department of Transportation. The tolling functions outsourced include:

- *General Toll Support Functions:* traffic and revenue forecasts, toll planning, feasibility analysis, etc.
- *Toll Collection Functions*: technology, equipment, and staffing resources
- *Toll Collection Backroom Functions:* technology, equipment, accounting, reporting, customer service, customer account management, etc.

There have been some growing pains for WSDOT that CTDOT should consider. They are listed here and described in more detail in Appendix 1: Vendor Cost and Quality; Reducing Uncollected Tolls and Improving Enforcement; Interoperability; Toll Administration and Overhead; and Use of Toll Revenue.

Applicability to Connecticut. The WSDOT experience is current and similar to the start-up problems that will face Connecticut if it chooses to implement tolling.

Some new skill sets may need to be acquired within CTDOT through training or contracted services. However, many tolling activities are similar to those currently performed in CTDOT and these responsibilities could be added to existing bureaus or divisions. CTDOT's Bureau of Highway Operations and its Bureau of Engineering and Construction could manage the roadway and bridge activities for toll facilities. They can use their existing skill sets with minor adjustments for construction and maintenance of toll collection structures. The Bureau of Policy and Planning could manage many of the required studies as well as draft needed policies.

It may be desirable to establish additional offices or divisions within the existing bureaus to manage certain unique tolling activities as previously discussed and managed by the WSDOT Toll Division.

2. Semi-Autonomous Self-Functioning Model: *Example – Florida Turnpike Enterprise*

States with larger toll systems operating within their DOT could benefit from establishing a semi-autonomous tolling group. The Florida Turnpike System has been operated by the Florida Department of Transportation (FDOT) since it was transferred by the State Legislature after the dismantling of the State Turnpike Authority in 1969. From 1969 to 1989, FDOT managed the state's toll operations mostly within the existing district structure of FDOT. However, after an aggressive expansion plan was authorized by the Florida Legislature, FDOT reorganized all its tolling activities. In the early 2000s, FDOT established Florida Turnpike Enterprise (FTE) as a semi-autonomous unit of FDOT.

The FTE is a self-functioning entity within FDOT that has its own Finance, Engineering, and Operation Divisions, which manage the activities of the turnpike system within the guidance and policy direction of the FDOT Central Office. The Executive Director of the Turnpike Enterprise reports directly to the FDOT's Secretary of Transportation. Each division reports to the Executive Director and the FTE staff are employees of FDOT. The FDOT does provide policy guidance and other support activities to the FTE. The FTE is supported by General Engineering Consultants.

A semi-autonomous tolling group provides more focus on activities and skill sets required for toll operations than the division model. It also allows existing DOT bureaus to focus on their current responsibilities for non-tolled highways. The semi-autonomous model can support a large and comprehensive tolling program for an extensive system like the Florida Turnpike Enterprise.

4.0 Preliminary Recommendations for Organizational Structure, Programs, and Policies

4.1 Toll Agency Organizational Recommendations

The conclusion of this initial assessment is that the most appropriate model for implementing tolling in Connecticut is to establish a "toll agency" within CTDOT. The primary factors favoring the lodging of the tolling function within CTDOT are:

1. Connecticut is a small state any initial toll system is likely to be small. The small scale means it should be manageable within CTDOT's organization with modest modifications.
2. The two highways being studied for congestion relief, congestion pricing and tolling are both CTDOT-owned facilities (I-95 from New Haven to NY and I-84 in Hartford)
3. The I-95 and I-84 studies are evaluating major improvements that are apt to costly enough to require a combination of funding resources: (1) traditional CTDOT funding, and (2) toll revenues.
4. A state-level independent toll agency would create confusion for the public and elected officials regarding the respective roles of two different agencies both responsible for highways. It could also create confusion and competition regarding the use of traditional CTDOT funds for highways assigned to any new statewide toll agency that is independent of CTDOT..
5. An approach based on regional independent toll agencies could require the creation of at least two agencies, one for the I-95 corridor and one for the Hartford area (based on the ongoing congestion pricing studies for I-95 and I-84). Multiple regional toll agencies would be inefficient and cause confusion among the public and elected officials on who is responsible for the roadway system.

These factors favor the creation of a toll entity within CTDOT, or a P3 approach for toll facilities.

Dual Objectives of Tolling. Tolling is typically initiated for either or both of two objectives: revenue generation and/or congestion management.

Revenue Generation Objective. One objective of tolling is revenue generation. Revenues are typically used to fund the capital cost of new facilities and to pay the operation and maintenance costs of existing toll facilities.

Revenues have been used in limited circumstances to help fund transit in the same or similar corridors to the toll facility such as in New York City.

Congestion Management Objective. The other main purpose of tolling is congestion management, particularly in urban areas. The ability to add new roads or widen existing roads is limited and the "build more" solution does not always provide lasting relief. Latent demand sometimes quickly consumes any capacity added to the system. In these cases, the primary purpose of tolling is traffic management. Tolling has proven its ability to shift traffic from one facility to another and to shift travel times from one time of day to another, thus maximizing the system as it exists.

Connecticut Seeking to Achieve Both. Connecticut is currently dealing with the need to satisfy both objectives. Portions of the urban roadway network are under stress from traffic congestion, while intra-city roadways need to be repaired and upgraded. In order to serve both objectives, CTDOT should consider developing a robust organizational structure. The tolling unit could be developed as a Division reporting to the Bureau of Finance and Administration as in Texas; or it could be developed as at a self-functioning entity reporting directly to the Commissioner of Transportation as in Florida. While establishment a semi-autonomous tolling group might be a desired goal, the ability to re-organize CTDOT's structure might require legislative and executive approvals and could prove difficult.

In Florida, the tolling operation was originally established at the division level. Subsequent legislative action created the Florida Turnpike Enterprise at the self-functioning level reporting directly to the agency head. This may be an appropriate path for CTDOT to follow. In either case, the CTDOT may wish to establish offices within the tolling unit that are responsible for the toll planning, financial, administrative, and toll operations functions.

4.2 Toll Program Organization and Delivery Recommendations

a. In-House Delivery with Outsourcing – While it is possible for CTDOT to conduct the needed studies, perform the public outreach, and develop the necessary resources for implementation of toll facilities, this would take a great deal of time, staff hours, expertise and other resources. Most tolling agencies rely upon expert outsourced resources to assist in the delivery of their tolling program. Planning toll facilities requires expertise unique to tolling projects.

   Bond indentures usually require the hiring of an independent general engineering consultant (GC) to monitor the use of bond proceeds for the construction of the projects and to report periodically on the condition of the project during the term of the bond. Bond indentures also require that a traffic and revenue report be prepared by a nationally recognized Traffic and Engineering Firm. The scope of general consulting engineer and traffic engineer can be limited to the requirements of the bond indenture or expanded to provide general assistance with project delivery, maintenance, tolling, and even public outreach. The use of a general engineering consultant and other specialists would allow CTDOT's tolling unit to operate with minimum in-house staff, and still the overall accountability for project delivery and management to remain with CTDOT.

   It will be very important to review basic items in CTDOT such as job classifications, accounting, and outsourcing that may need significant changes to accommodate a toll program within CTDOT.

Table 2: Examples of In-House and Outsourcing Delivery Options

SERVICES	ACTIVITIES	DELIVERY OPTIONS
Traffic and Revenue Studies	Traffic counts, origin and destination studies, revenue forecasts, etc.	Preliminary assessments can be in-house; advanced studies are outsourced to T&R engineer
Other Technical Studies	Planning, PDE, Design	Outsourced to various specialists with in-house oversight
Legal	Condemnation proceedings , legislative coordination, bill drafting, legal actions, contract review	In-house with CTDOT legal support
Procurement/Contract Development	Acquisition of products and services	In-house with GC support
Right of Way	Acquisition of needed ROW	In-house or Outsourced with in-house oversight and DOT legal support
Contract Management	Oversight of design, construction, tolling systems, etc.	GC and other specialists with In-house support and oversight
Human Resource Development (HRD)	Hiring in-house staff, other HRD activities	In-house with DOT support as needed
Toll Equipment and Operations	Toll equipment acquisition, installation, testing, maintenance, etc.	Outsourced with in-house oversight
Toll Operations	Lane operations, maintenance, system monitoring, report production, etc.	Outsourced with in-house oversight
Financial Services	Accounting, financial record keeping activities and ongoing financial reporting	In-house
Financial Studies	Financial Feasibility Studies, Innovative Financing Studies, Public Private Partnership development assistance	Outsourced
Information Technology	Systems development, web site and on-line payment, systems management, activity reporting, trouble shooting, etc.	Outsourced with in-house oversight and monitoring. Period third party reviews of system security and performance
Customer Service Center	Call center, account initiation and maintenance	Outsourced with in-house and third party monitoring
Marketing and Public Relations	Advertising, press releases, public outreach	In-house with GC support
Maintenance	Pavement and roadside, building	Outsourced

b. Public Private Partnership (P3) Delivery – Some projects have risk or financial characteristics that lend themselves to development by a private sector partner. Even when the state has robust ongoing tolling operations, the use of P3 as a delivery tool may deliver the project earlier and with less risk.

According to an October 2012 review by the National Conference of State Legislatures, 36 states and Puerto Rico have some form of transportation P3 enabling legislation. However, many of these are rather limited or are project-specific.

Connecticut's General Assembly passed HB 6801 in October 2011. It authorizes the state and other government entities to enter into up to five P3 projects in transportation and/or social infrastructure. The state can provide up to 25% of a project's budget, with the balance being financed based on the project's revenue stream. However, toll projects are not allowed unless the legislature approves tolling for the specific project.

4.3 Toll Program Policy Recommendations

If a toll agency unit is created within CTDOT, existing policies and procedures should be applied to any tolling unit that is established. Minor modifications to certain policies, such as design standards, signage, etc. will be helpful to accommodate unique tolling requirements but can be developed on an as needed basis. Some new policies that will be needed or helpful for tolling are:

a. Debt Management Policy – Revenue bonds are generally the primary financial instrument used for capital construction. Prior to the sale of bonds, rating agencies evaluate the project's revenue potential, based in large part upon a special traffic and revenue study and other information available.

   A debt management policy addresses many issues and provides transparency to how the agency will approach future debt issuances. The Government Finance Officers Association of the U.S. and Canada suggests that a debt management policy address: debt limits, debt structuring practices, debt issuance practices, debt management practices and the use of derivative products. While there is no mandatory requirement to have a debt management policy, having one will be helpful in obtaining a favorable bond rating and also as guidance to in-house financial planning staff when developing a future debt program.

b. Toll Collection Policies – Most toll collection policies address who pays and how much they pay, which are referred to as classification policies. Policies can be very simple such as "all vehicles pay the same toll, but trucks pay a toll based on some multiple of the passenger car rate." Many toll policies exempt emergency vehicles. While this appears to be a fairly simple issue, questions requiring policy decisions abound, such as "Do unmarked police vehicles pay?" Some toll roads exempt other governmental agencies from payment, some exempt funeral processions, etc. Policies and possibly legislation will be necessary to address these issues.

c. Enforcement Policies – Enforcement policies are critical to a toll agency. The inability to enforce, or the failure to adequately enforce the payment of tolls will have both financial and political effects on the toll program and CTDOT.

d. Special Roadway Policies – Special conditions such as U-turns, heavy vehicles, and service plaza operations also need to be addressed, and depend greatly upon the facility that is being tolled.

e. <u>Administrative Changes</u> – Items like job classifications, pay levels, accounting, procurement, and related administrative areas need to be adjusted to accommodate a toll program within CTDOT.

4.4 Summary

This report reviewed all types of structures for toll organizations across the United States, and also key policy items associated with the start-up and management of toll facilities. Based on the review, it is recommended that the Connecticut Department of Transportation (CTDOT) establish a toll "unit", which could be a division or other operating entity within the CTDOT. If Connecticut decides to implement tolling, the toll unit can start small and grow as required. Further, it is recommended that CTDOT keep the internal staffing for the toll unit small, and contract for the specialized expertise required to develop, implement, and manage toll facilities. This recommendation is primarily based on the following key points:

- The State of Connecticut is small and compact and the major urban areas are connected through shorter distances.
- CTDOT currently has major functions such as planning, engineering, roadway maintenance, and administration that can provide support to the toll unit without the need to duplicate these functions and resources.
- The key projects being reviewed in this study are I-95 and I-84, which are key expressways owned, operated, and maintained by CTDOT.
- The national trend has been for new toll functions to be housed in the state DOTs such as in Washington State, or to merge legacy statewide toll authorities into the state DOT such as Florida, North Carolina and Texas. The combination of the overall DOT resources and the ability for tolling statewide provides the maximum efficiency and effectiveness for development of toll facilities.
- CTDOT can ramp up quickly to develop, implement, and manage toll facilities without the need to create a new legal entity or bureaucracy.

It is important to address key startup issues during the discussion of toll facilities. Fortunately, there are peer agencies such as Washington State DOT that have recently been through the "learning curve" and that can provide solid examples for Connecticut. In addition, most states around Connecticut have toll facilities and created consortiums for items like electronic toll collection (EZ-PASS) that can be drawn upon to help facilitate efficient tolling in Connecticut.
The advent of all electronic or "open road tolling" matched with key improvements such as managed lanes and point specific tolling can help Connecticut address congestion and finance major replacement projects like the I-84 Viaduct in Hartford. If done appropriately, congestion pricing using electronic tolling can provide congestion relief as well as a "user-financed" revenue source to help fund needed infrastructure improvements.

The question of whether or not to implement tolling is a major policy issue that the State must fully discuss before deciding. However if the State does decide to implement tolling, the course of action recommended above provides a flexible approach that allows Connecticut to start small and ramp up as needed.

Appendix 1

Review of Toll Agency Models in the U.S.

Summary of Toll Agency Models

A review of nine different toll agencies was conducted to compare and contrast different organizational model options. Examining and comparing how current tolling agencies operate provides insights into the strengths and weaknesses of each organizational model. The tolling agencies surveyed into the four categories:

- Statewide Independent Public Toll Authorities
- Regional Independent Public Toll Authorities
- DOT-Owned Toll Agencies
- Public-Private Partnerships (P3's) operating under agreement with a State DOT

Statewide Independent Public Toll Authorities

These Authorities are established by state law and governed by an independent board appointed by the governor and state legislature. Examples of statewide independent public toll authorities include:

- Illinois State Toll Highway Authority
- New York Thruway Authority

Strengths:

- Sole focus on toll facility development and operation
- Authority to establish and raise toll rates
- Authority to issue toll-backed debt (revenue bonds)

Weaknesses:

- Objectives can conflict with those of state DOT
- Sometimes limited to specific projects or regions, thus reducing financial growth potential and requiring more reliance on local economic conditions.
- Limited geographic diversification and primary reliance on toll revenue may expose the authority to regional economic downturns.

Regional Independent Public Toll Authorities

Usually the authority for the establishment of regional tolling begins with authorization by the state legislature or local governmental unit. A board consisting of local business leaders and appointed public officials appoints a CEO, established administrative procedures, and identifies needed improvements and new projects. The examples of Regional Level Independent Public Toll Authorities include the following:

- North Texas Tollway Authority
- The Port Authority of New York and New Jersey

The perceived strengths and weaknesses of a Regional Level Independent Public Toll Authority include:

Strengths:

- Created for a specific mission/objective
- Debt issuance is supported by toll revenues
- Closer connection to end users
- Can be more nimble in addressing key changes such as technology, toll rates, and planning and developing new projects

Weaknesses:

- Financial resources limited to tolls and concession revenue
- Geographically-limited system that can limit options for future system expansion
- Sometimes stray from original mission and toll revenues are “bled off” for other local priorities
- Can be seen as a “competitor” to state DOTs or local governments that can strain relationships and the ability to partner on projects

DOT-Owned Toll Agencies

Toll agencies owned and administered by state DOTs are established in state law, overseen by a state transportation commission and/or a state commissioner/secretary of transportation. The DOT Commissioner acts as the toll agency director or appoints one who reports to him. Examples of DOT-owned toll agencies include the following:

- Florida Turnpike Enterprise
- North Carolina Turnpike Authority
- Washington State Department of Transportation – Toll Division

Strengths:

- Being part of a larger State DOT generally provides the best statewide coordination on transportation improvements
- Funding partnerships (with State) are easier to obtain
- State DOT resources can be available to the agency
- Can generally operate throughout the state
- Toll revenues are generally restricted to transportation uses. In many cases bonds are issued and outstanding where the toll revenues are pledged to repay the bonds that wall off the use of the toll revenues from other general uses.

Weaknesses

- Legislative budget approval requirement adds a dimension of complexity

- Raising toll rates may be more challenging, needing approvals of DOT, Governor, Transportation Commission, Legislature, etc.
- Can be constrained by bureaucratic requirements of a state agency that can reduce flexibility and increase response times over an independently run entity
- More approvals for debt issuance can hinder financial leverage opportunities
- In the case of Washington State, the law governing the toll entities has restricted the use of toll revenues to only the project being financed with the toll revenues. This could limit the ability to leverage toll revenues to build new projects in a "toll system" approach.

Public-Private Partnerships (P3's)

Public-Private Partnerships for capital projects are the traditional type of P3 project envisioned when the concept is discussed. Usually, the private sector leads the financing, construction, and operation of a facility while the public sector frames the agreement and retains ownership of the road. Public-Private Partnerships can be useful in securing financing and transferring risk from the public entity. Examples of P3's for capital projects are:

- The I-495 Express Lanes (Capital Beltway, Virginia)
- The Northwest Parkway (Colorado)

The perceived strengths and weaknesses of a Public-Private Partnership are as follows:

Strengths:

- Single-focus entity
- Ability to bring private equity into funding mix
- Construction costs and schedules are focused to ensure efficient delivery
- Contract terms can provide flexibility to react and adapt to needs
- Life-cycle approach to design, construction, operation and maintenance lowers the overall project cost of the facility
- Very customer focused, if the concession payments are derived from the toll revenues

Weaknesses:

- May require legislative action to authorize
- Potential "loss of control" over operations and toll rates – unless more control is provided for in the concession agreement
- If the concessionaire has the ability to adjust toll rates the "profit motivation" may be perceived as in conflict with the public good
- In some cases, "non-compete" agreements can limit the expansion of publically-owned non-tolled corridors near the P3 toll facility

1. ILLINOIS STATE TOLLWAY AUTHORITY

(Statewide Independent Public Toll Authority)

Overview:

The Illinois Tollway Highway Commission was created in 1953 to provide for the construction, operation, regulation, and maintenance of a system of toll highways within the State of Illinois. The Commission officially became the Illinois State Toll Highway Authority (the Tollway) in March, 1969, when Illinois courts upheld the constitutionality of a new toll road act (Toll Highway Act) passed in 1967.

The Tollway Authority assumed all the obligations, powers, duties, functions, and assets of the Commission. Today, the Tollway Authority maintains and operates 286 miles (460 km) of Interstate tollways in 12 counties in Northern Illinois.

Primary Sources: Website: http://www.illinoistollway.com

Contact Info:

Headquarters
2700 Ogden Avenue, Downers Grove, Illinois
630-241-6800

Governing Body:

- Statewide Independent Public Toll Authority
- The Tollway has an 11-member Board, including the Governor and Secretary of Transportation who serve as ex-officio members. The Chair and Directors are appointed by the Governor and serve four-year terms; no more than five of the members may be from one political party.

Year Created: 1968

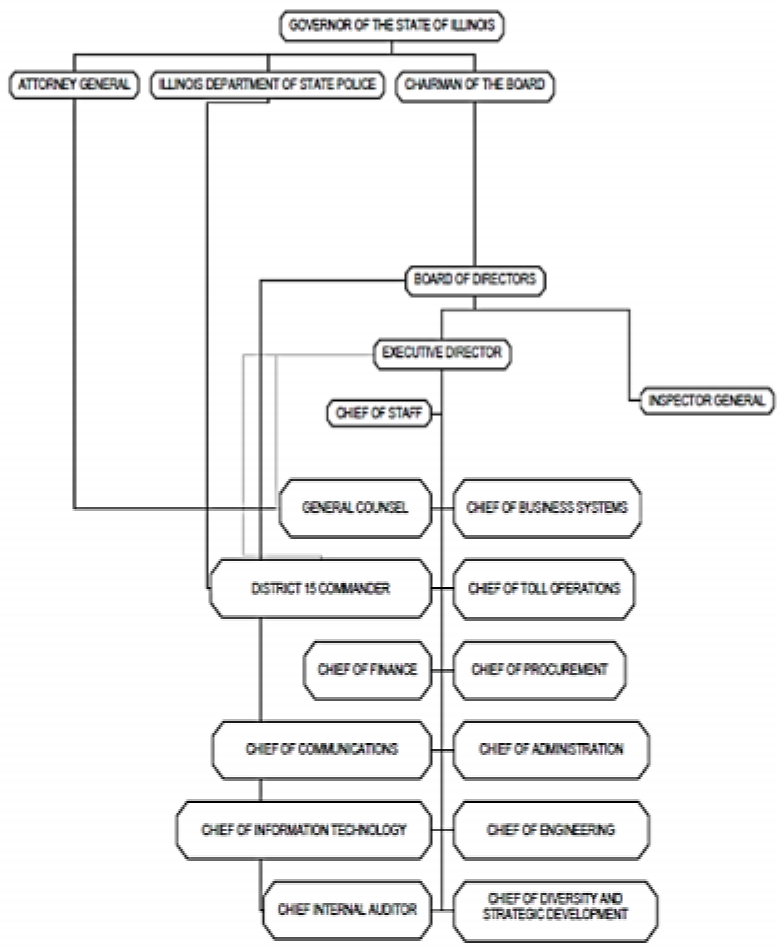
Size: 286 Miles

Type: *(Single Facility or a System of Facilities):* System of Toll Facilities

Operating Structure:

The Tollway Board appoints an Executive Director and employs other personnel to administer the system and implement the policies of Board. The Tollway organizational structure consists of 14 primary departments: Executive, Legal, Engineering, Diversity and Strategic Development, Toll operations, Finance, Admin, Communications, IT, Inspector General, Internal Audit, Business Systems, Procurement and Illinois State Police District 15 as shown in the chart below.

ILLINOIS TOLLWAY TABLE OF ORGANIZATION



May 1, 2013

Authorizing Legislation:

- State Law established the Highway Authority and granted the powers to provide for construction, operation, regulation and maintenance of the system of toll highways in Illinois: Toll Highway Act, 605 ILCS 10/
  http://ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1746&ChapAct=605%26nbsp%3BILCS%26nbsp%3B10%2F&ChapterID=45&ChapterName=ROADS+AND+BRIDGES&ActName=Toll+Highway+Act%2E
- Amended and Restated Bonds Trust Indenture:
  http://www.illinoistollway.com/documents/10157/e41abbd9-22ee-4895-91d5-71dffde9f2a4
- Administrative Code:
  http://www.ilga.gov/commission/jcar/admincode/092/09202520sections.html

Budgetary Control:

- The Tollway prepares a budget for the ensuing fiscal year. The budget is used for control of operating and capital expenses and for financial planning and is prepared in accordance with provisions of the trust indenture, not on the basis of generally accepted accounting principles. The budget is approved by the board.
- The Tollway is solely responsible for financing any obligations it may incur and for the disposition of any surplus funds its operations may produce in accordance with the Act.
- The Tollway collects revenues (tolls and concessions), controls disbursements, and has title to all its assets.
- The Tollway is empowered to enter into contracts, acquire, own, use, lease, operate, and dispose of personal and real property, including ROW, franchises, and easements. It can establish and amend resolutions, by-laws, rules, regulations, and toll rates; acquire, construct, relocate, operate, regulate, and maintain the Tollway system; exercise powers of eminent domain and condemnation; raise and lower rates; and contract for services and supplies. The latter includes services and supplies for the various patron service areas on the Tollway system.

Toll Rate Setting:

- Legislation empowers the Authority Board to approve and modify toll rates which includes public hearings before adjusting toll rates.

Toll Collection Method:

- 86% of Tollway drivers use I-Pass (electronic)
- Cash collections are employed as this is a legacy system that was in place prior to electronic toll collection systems.
- Back Room: (In-House/Contracted)
    - Combination of in-house resources and contracted through Electronic Transaction Consultants Corporation (ETCC) provides the back room operation for the Toll Authority.

Operations and Maintenance: (In-house/Outsourced)

- Maintenance is primarily performed by in-house staff

Operations and Maintenance Costs:

- Total O&M in 2012: $253M

Annual Operating Revenues and Expenses:

- Operating Revenues: $970 Million (FY 2012)
- Operating Expenses: $583 Million (FY 2012)

Total Debt Outstanding:

- Current Liabilities: $652 Million (FY 2012)
- Non-Current Liabilities: $ 4,121 Million (FY 2012)

2. New York Thruway Authority

(Statewide Independent Public Toll Authority)

Overview:

The New York State Thruway is a Public Benefit Corporation created by the New York State Legislature in 1950 to build, operate and maintain the Thruway System. The Board consists of seven members, appointed by the Governor, with the consent of the New York State Senate. The Authority's 426-mile Thruway mainline connects New York City and Buffalo, the state's two largest cities. Other Thruway sections provide for connections with Connecticut, Massachusetts, Pennsylvania, New Jersey, and to highways that lead to the Midwest and Canada.

Primary Sources:

- Main Website: www.thruway.ny.gov/
- Annual Report: www.thruway.ny.gov/about/financial/ar/2013-audited-financial-statements.pdf
- Guidelines, Organization and Compliance Reports: www.thruway.ny.gov/about/compliance/index.html

Contact Info:

Administrative Headquarters:
New York State Thruway Authority/Canal Corporation
200 Southern Boulevard
P.O. Box 189
Albany, NY 12201-0189
518-436-2700

Governing Body:

- Public Benefit Corporation created by NY State Legislature in 1950 to build, operate and maintain the Thruway System
- Appointed Board: The Thruway Board consists of 7 members who are appointed by the Governor with the approval the New York State Senate to finance, construct, reconstruct, improve, develop, maintain or operate a thruway system.

Year Created: 1950

Size: 570 Miles

Type: *(Single Facility or a System of Facilities)***:** System of toll facilities

Operating Structure:

- The Board appoints an Executive Director
- Organizational Structure : www.thruway.ny.gov/about/compliance/organization-chart.pdf
    - o A listing of major Departments, functions, and department head :

DEPARTMENTS AND STAFF		
DEPARTMENT	**FUNCTION**	**DEPARTMENT HEAD**
Engineering	Engineering including traffic, design and construction; development, management and delivery of the Capital program; transportation planning; and environmental services.	Chief Engineer
Maintenance and Operations	Management of Divisions; maintenance of highways, bridges, facilities and equipment; inventory management; toll collection; traffic management; management of travel plazas; and State Police liaison.	Director of Maintenance and Operations
Administrative Services	Personnel administration; labor relations; employee safety and health; training; equal opportunity; and office services.	Director of Administrative Services
Finance and Accounts	Investments, asset management and insurance; accounting and disbursements; fiscal audit; budget; and purchasing.	Chief Financial Officer
Legal	Legal affairs; government relations; and advice and counsel to the Authority Board, Staff and employees.	General Counsel
Audit and Management Services	Audit and review of administration and operations; management analysis; information security; internal controls; liaison with State Inspector General; procurement integrity; and vendor responsibility.	Director of Audit and Management Services
Information Technology	Application and technology development and systems management.	Director of Information Technology

Authorizing Legislature:

- Throughway Authority Act - www.thruway.ny.gov/about/compliance/thruwaystatutes.pdf
- Authority By-Laws - www.thruway.ny.gov/about/compliance/bylaws.html

Budgetary Control:

- The Authority is a legally and fiscally separate organization solely responsible for its finances. The credit of the State of New York is not pledged to the operation of the Authority.

Toll Rate Setting:

- The Board has the authority to increase establish and adjust toll rates in order to provide sufficient budget to meet its financial obligations.

Toll Collection Method:

- E-ZPass electronic toll collection
- Cash collections are also used as this is a legacy system that existed prior electronic toll collection.
- Back Room: (In-House/Contracted):
  - Xerox provides the backroom processing for the Thurways EZ Pass electronic toll collections system. This is part of the overall E-Z Pass system for New York that is partnered with other toll entities in the state and overall region.

Operations and Maintenance: (In-house/Outsourced)

- In- house

Annual Operating Revenues and Expenses:

- Operating Revenue: $681 Million (FY 2013 Annual Report)
- Operating Expense: $279 Million (FY 2013 Annual Report)

Total Bonded Debt Outstanding:

- Long Term $ 5,097 Million
- Bond Detailed Info:
  http://www.thruway.ny.gov/about/financial/bond/scheduleofdebt/2013debt.pdf

3. North Texas Tollway Authority

(Regional Independent Toll Authority)

Overview:

The North Texas Tollway Authority's began in 1953 with the creation of the Texas Turnpike Authority (TTA), a state agency charged with building and operating the Dallas Fort Worth Turnpike between Dallas and Fort Worth. The project was opened in1957. In 1977 the road was transferred to the Texas Department of Transportation as a toll-free highway after all debt was retired.

The TTA began its second project, the Dallas North Tollway, in 1966 and opened the first segment to motorists in 1968. In 1977, the TTA initiated construction on the two-mile Mountain Creek Lake Toll Bridge in Grand Prairie, which opened to traffic in 1979. Throughout the years, the TTA also began projects in other areas of Texas, including the Houston Ship Channel Bridge which was opened in 1982.

The NTTA was created on Sept. 1, 1997 to finance, construct and oversee turnpike projects in North Texas. At that time, the TTA's assets and liabilities in North Texas were transferred to NTTA. With expansions of the Dallas North Tollway and construction of new facilities in the region, NTTA now operates over 140 miles of toll roads in five counties. The NTTA has the first option to develop toll roads planned in North Texas.

Primary Sources:

- Main Website: www.ntta.org/Pages/default.aspx
- Annual Report: www.ntta.org/whatwedo/fin_invest_info/financial_Info/Documents/NTTA_System_2012_Comprehensive_Annual_Financial_Report.pdf

Contact Info:

NTTA Administrative Offices
5900 W. Plano Parkway
Plano, TX 75093
214-461-2000

Governing Body:

- The North Texas Tollway Authority represents Collin, Dallas, Denton and Tarrant counties and is governed by a nine-member board of directors. Each of the four counties within the service area of the NTTA appoints two members. The governor of Texas appoints one member from a county adjacent to the NTTA's four-county service area. The members of the board of directors serve staggered two-year terms, and no member may be an elected official.

Year Created:

1953

Size:

100.52 Miles

Type: (Single Facility or a System of Facilities)

System of Toll Facilities

Operating Structure: See the below organizational chart.

Authorizing Legislation:

- Chapter 366: Regional Tollway Authorities: www.ntta.org/whatwedo/govtaff/Documents/2011_Updated_366.pdf
- By-Laws www.ntta.org/whoweare/policies/Documents/BylawsFinalasAmended102010.pdf
- Relevant Legislation
  - Toll Enforcement Remedies www.ntta.org/whatwedo/govtaff/Documents/SB01792F.pdf
  - First Option for Local Toll Authorities www.ntta.org/whatwedo/govtaff/Documents/SB00019F1.pdf
  - Toll Collection Process www.ntta.org/whatwedo/govtaff/Documents/SB469.pdf
  - Tolling Services Agreements www.ntta.org/whatwedo/govtaff/Documents/SB00246F1.pdf
  - New Law Impacting NTTA www.ntta.org/whatwedo/govtaff/Documents/SB%20882.pdf
  - Transportation/Toll Projects www.ntta.org/whatwedo/govtaff/Documents/SB%20792.pdf
  - Changes in Governance of the Board www.ntta.org/whatwedo/govtaff/Documents/SB%20964.pdf

Budgetary Control:

- The Authority is authorized to design, construct, finance, operate and maintain turnpike projects in Dallas, Collin, Denton and Tarrant counties and any other contiguous county, pursuant to the Regional Tollway Authority Act (the "Act"), codified as Chapter 366 of the Texas Transportation Code (see Appendix A). The Authority, acting through its Board, without state approval, supervision, or regulation, may among other things:
  - Adopt rules for the regulation of its affairs and the conduct of its business.
  - Study, evaluate, design, acquire, construct, maintain, repair, and operate turnpike projects, individually or as one or more systems.
  - Impose tolls for the use of each of its turnpike projects and systems and the different parts or sections of each of its turnpike projects and systems.
- It might be noted that the NTTA is self-supporting with no outside funding of ongoing operations and maintenance. Various types of financing arrangements have been made with TxDOT to

reduce bonding requirements for development of recent new projects which involve credit enhancement, toll equity loans and repayment of initial construction costs.

Toll Rate Setting:

- Toll Rate Setting Policy
  www.ntta.org/whoweare/policies/Documents/Toll%20Rate-Setting%20Policy.pdf
  - Pursuant to the Act, tolls are not subject to supervision or regulation by any state agency or other local governmental entity, but must be set so that the aggregate of tolls from an Authority turnpike project or system, together with other revenue of the turnpike project or system provides revenue and creates reserves sufficient to pay:
    - The cost of maintaining, repairing, and operating the turnpike project or system.
    - The principal of and interest on the bonds issued for the turnpike project or system as those bonds become due and payable.

Toll Collection Method:

- Toll Tag - Electronic Open Road Tolling
- NTTA also uses a ZipCash method that allows for payment by mail.
- In 2013 NTTA completed conversion to All Electronic Toll collection.
- Back Room: Combination of In-House/Contracted

Operations and Maintenance: (In-house/Outsourced)

- Combination of In-House/Contracted

Annual Operating Revenues and Expenses:

- Operating Revenue: $514 Million (2012)
- Operating Expenses: $159 Million (2012)

Total Debt Outstanding:

- Non-Current Liabilities: $7,653 Million (FY 2012)
- Debt Policy
  www.ntta.org/whoweare/policies/Documents/Debt_Policy_March_2013.pdf

4. Port Authority of New York and New Jersey

(Regional Independent Toll Authority)

THE PORT AUTHORITY OF NY & NJ

Overview:

The **Port Authority of New York and New Jersey** (**PANYNJ**) is a joint venture between the States of New York and New Jersey and authorized by the US Congress, established in 1921 (as the *Port of New York Authority*) through an interstate compact, that oversees much of the regional transportation infrastructure, including bridges, tunnels, airports, and seaports, within the Port of New York and New Jersey.

The Bridges, Tunnels, and Terminals Division of the Port Authority operates the George Washington Bridge, the Lincoln Tunnel, and the Holland Tunnel, which all connect Manhattan and Northern New Jersey; the Goethals Bridge, the Bayonne Bridge, and the Outerbridge Crossing which connect Staten Island and New Jersey, as well as the Port Authority Bus Terminal in New York. The Bridges, Tunnels, and Terminal Division had 881 employees of a total of 6,777 authorized Port Authority positions.

Primary Sources:

- Main Website: www.panynj.gov/
- Annual Report: www.panynj.gov/corporate-information/pdf/annual-report-2012.pdf

Contact Info:

Corporate Office
225 Park Avenue South
New York, NY 10003
212-435-3772

Governing Body:

- The governor of each state appoints six members of the agency's Board of Commissioners, subject to state senate approval. Commissioners serve as public officials without pay for overlapping six-year terms. The governors retain the right to veto the actions of the Commissioners from his or her own state. Board meetings are public.
- An Executive Director, appointed by the Board of Commissioners, is responsible for managing the operation of the Port Authority in a manner consistent with the agency's policies, as established by the Board.

Year Created:

1921

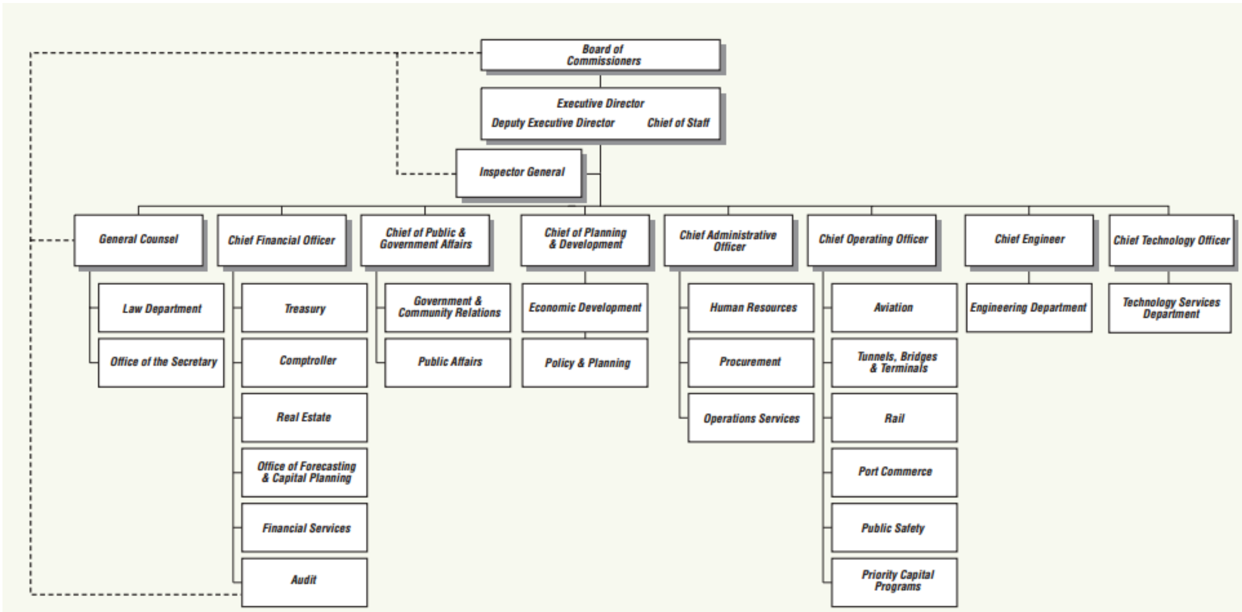
Size:

The Port Authority serves an area of 1,500 Square Miles. It consists of Seaports, Airports, Heliports, Bridges and Tunnels, Bus and Rail Transit, and Real Estate.

Type: (Single Facility or a System of Facilities)

System of toll facilities

Operating Structure: The overall organizational structure is shown in the graphic below. Note that Tunnel and Bridges are an operating entity under the Chief Operating Officer.



Authorizing Legislation:

- By-Laws of The Port Authority of New York and New Jersey
  www.panynj.gov/corporate-information/pdf/by-laws-pa.pdf

Budgetary Control:

- The Port Authority's annual budget is prepared on a basis consistent with agency bylaws. The Board approves an annual expenditure budget comprising operating expenses, debt service, gross capital expenditures and other expenditures such as heavy vehicles and computer systems that are deferred and amortized in future periods. The Board also approves the long-term strategic plan and updated capital plan of the agency, and approves amendments to the current year's budget as necessary.
- The Port Authority is financially self-sustaining and must raise the moneys necessary to operate its facilities and provide services to the public through tolls, fares, rentals and other user charges. Funds needed for capital improvements, construction and acquisition of facilities are raised on the basis of the Port Authority's own credit rating. The Port Authority cannot pledge the credit of either of the states of New York and New Jersey or any municipality, nor can it levy taxes or assessments.

Toll Rate Setting:

- Public Hearings section of the Authority By-Laws:
  - Pursuant to direction by the Board of Commissioners, the Executive Director schedules public hearings, in connection with the budgeting, planning, and programming of the Port

Authority, including proposals for instituting or changing tolls and fares imposed for use of the Port Authority's vehicular tunnels and bridges and passenger rail facilities.

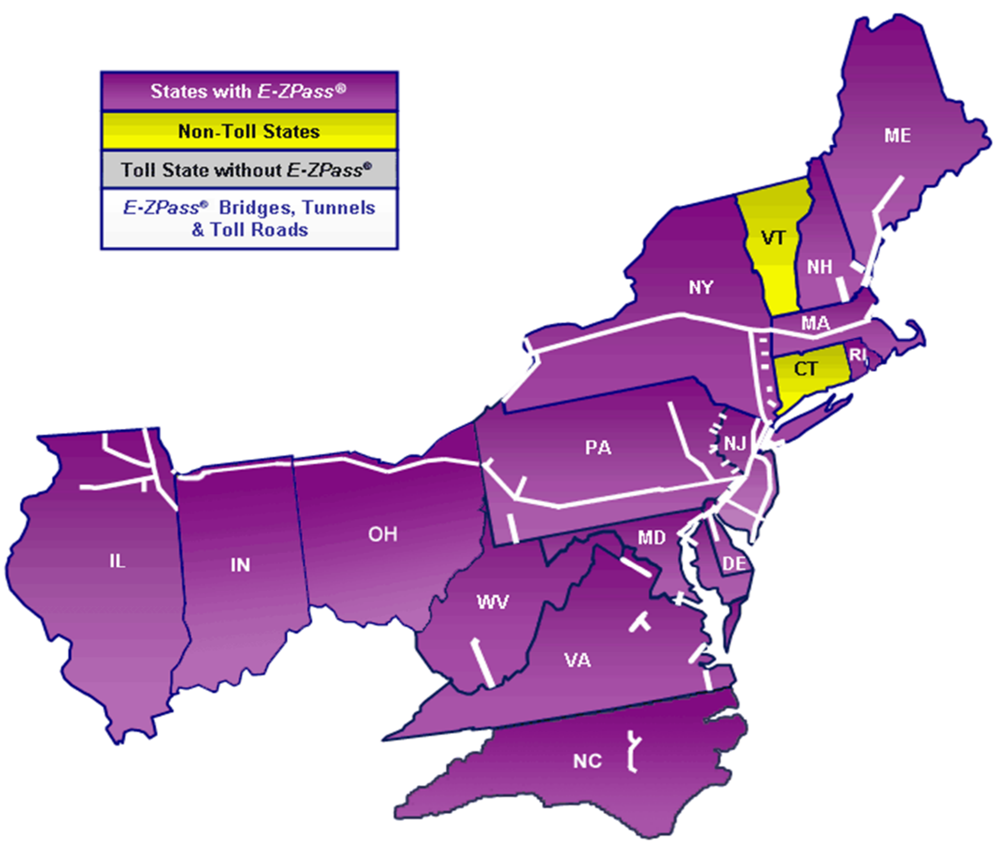
Toll Collection Method:

- E-Z Pass electronic toll collection and cash toll collection
- E-Z Pass is accepted in the major northeast area as shown below:

Toll Facilities Participating in *E-ZPass*®

Many toll facilities participate in *E-ZPass*®. For details, please click on the map or one of these links:

- Delaware
- Illinois
- Indiana
- Maine
- Maryland
- Massachusetts
- New Hampshire
- New Jersey
- New Jersey - Delaware
- New York
- New York City Area
- North Carolina
- Ohio
- Pennsylvania
- Rhode Island
- Virginia
- West Virginia



Interagency Group

25 Agencies located in 15 States

- Buffalo and Fort Erie Public Bridge Authority (Peace Bridge)
- Burlington County Bridge Commission
- Chicago Skyway Concession Company
- Delaware Dept. of Transportation
- Delaware River Joint Toll Bridge Comm.
- Delaware River Port Authority
- Delaware River & Bay Authority
- Illinois State Toll Highway Authority
- Indiana Toll Road Concession Company
- Maine Turnpike Authority
- Maryland Department of Transportation
- Massachusetts Department of Transportation
- MTA Bridges & Tunnels
- New Hampshire Dept. of Transportation
- New Jersey Turnpike Authority
- New York State Bridge Authority
- New York State Thruway Authority
- North Carolina Turnpike Commission
- Ohio Turnpike Commission
- Pennsylvania Turnpike Commission
- Port Authority of NY & NJ
- Rhode Island Turnpike & Bridge Authority
- South Jersey Turnpike Authority
- Virginia Dept. of Transportation
- West Virginia Turnpike Authority

- Back Room: (In-House/Contracted)

  As noted above the Port Authority of New York and New Jersey is part of the interagency group for E-ZPass and the entities in New York have partnered to have a service provided by a contractor operated for E-ZPass with the web link below showing the site for New York. www.e-zpassny.com/en/home/index.shtml

Operations and Maintenance: (In-house/Outsourced)

- This is a combination of in-house and outsourced services for the operation and maintenance of the toll bridges and tunnels.

Annual Operating Revenues and Expenses, Bridges, Tunnels and Terminals Division:

- Operating Revenues: $1,258 Million (FY 2012)
- Operating Expenses: $ 468 Million (FY 2012)

Total Debt Outstanding, Consolidated Authority:

- Debt is consolidated for the overall entity and not just for the toll bridges and tunnels

Special Interest

- Goethals Bridge Replacement – In April 2013 The Authority approved a 40-year design-build-finance-maintain contract as part of a $1.5 billion Public Private Partnership to replace the Goethals Bridge. The Port Authority is utilizing a P3 to allow the agency to maintain control of bridge while transferring construction risk and minimize impact to the agency's debt capacity.
- It should be noted that revenues from the toll bridges and tunnels are used to leverage for improvements for the overall facilities including transit within the authority of the Port Authority of New York and New Jersey.

5. Florida Turnpike Enterprise

(DOT-Owned Toll Agency)

Overview:

The Florida Turnpike Enterprise (FTE) operates as a separate business unit of the Florida Department of Transportation (FDOT). Originally opened as the Florida Turnpike Authority, an independent statewide toll authority, in the 1950's, it was transferred to the Florida Department of Transportation in 1969 during a general reorganization of state government. In 1990 it began a period of major expansion by adding new projects and widening the existing system.

Primary Sources:

Main Website: www.floridasturnpike.com

Contact Info:

Orlando Headquarters
Turkey Lake Service Plaza, Milepost 263
Ocoee, FL 34761
407-532-3999

Governing Body:

- The Florida DOT Secretary of Transportation heads the Department and appoints an Executive Director in consultation with the Governor's Office to manage the Turnpike Enterprise. Governor appoints Secretary from 3 nominated by the Florida Transportation Commission. Secretary serves at the pleasure of the Governor

Year Created:

- The Florida State Legislature created the Florida's Turnpike Authority in 1953, which subsequently became part of FDOT in 1969.

Size:

- 460 Miles as of FY 2013. The system has two expansion projects under construction that will add 16 miles to the system by March 2016.

Type: *(Single Facility or a System of Facilities)* System of toll facilities

Operating Structure:

- Organizational history:
  The Florida Turnpike Enterprise (FTE) turnpike system is expansive - consisting of 460 miles of limited access toll facilities. It is financed primarily by toll and service plaza revenues. More than any state in the U.S., tolling is truly an integral part of transportation financing in Florida. In their current form, FTE has many similar characteristics to the WSDOT Toll Division. However, FTE is strong evidence that finding the right structure for a tolling entity within a state DOT is not an easy solution. The entity that is now known as FTE began life in the early 1950's as the Florida State Turnpike Authority (Turnpike) operating independently until it was brought under the purview of the Florida Department of Transportation (FDOT) in 1969 as the Turnpike District. The Turnpike retained an identity, but decisions were largely managed by the districts. In 1988, the Turnpike was reorganized as an Office within FDOT. (from WSDOT study located at - http://www.wsdot.wa.gov/NR/rdonlyres/21AED54C-58CD-40B6-9EAB-81D58A9CA649/0/20131127TollDivisionOperationalReview.pdf)

  In 1989, major legislation was passed giving FDOT the ability to leverage revenues for the Turnpike's main line, build new projects, bond projects, and raise toll rates. In 1994, the Turnpike became a standalone district of FDOT and was no longer managed by the districts.

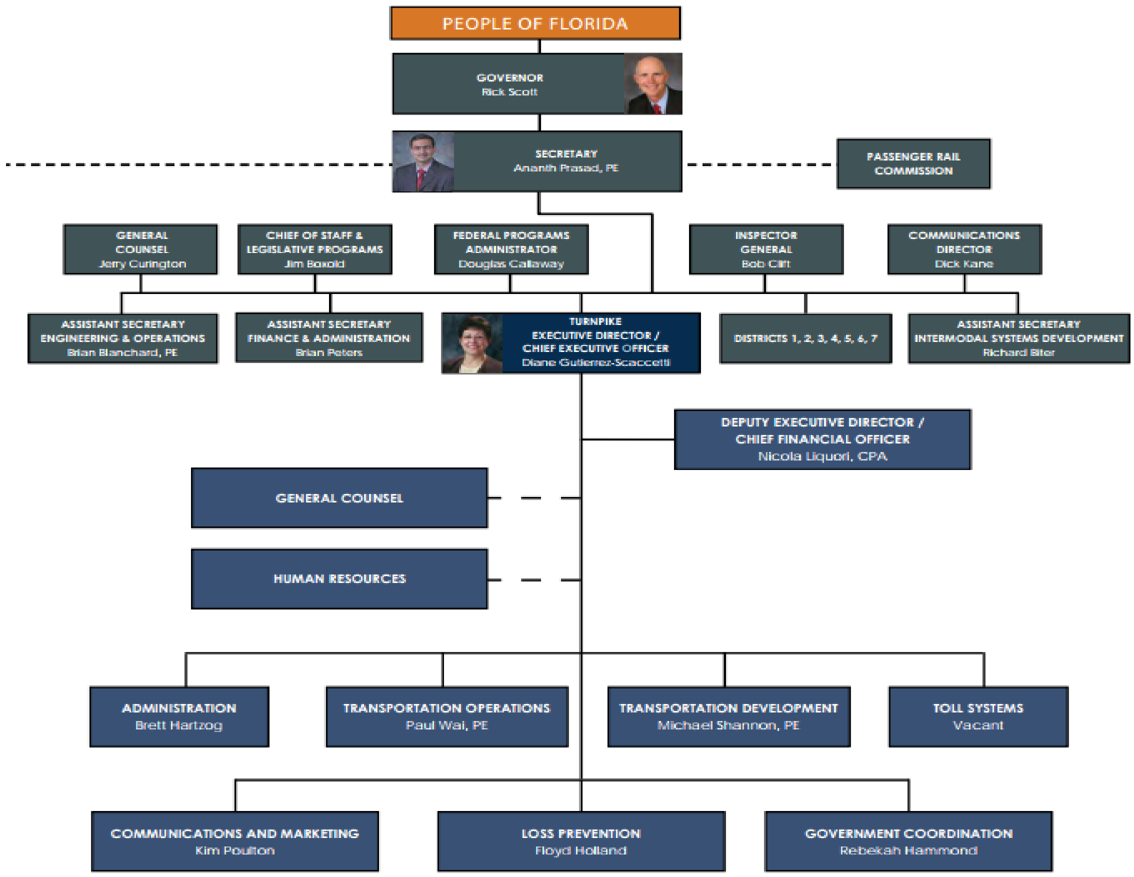
  In 2002, the Florida legislature passed HB 261 changing the Turnpike District into the Florida Turnpike Enterprise. One of the major changes under this legislation was exemptions from FDOT policies and procedures. The Legislature made these changes to "fully leverage the Turnpike asset by pursuing innovation and best practices found in the privates sector, especially in the areas of management, finance, organization and operations". There are seven major functional areas which report to the FTE Executive Director: the Chief Financial Officer, the Director of Communications and Marketing, the Government Affairs Liaison, the Director of Loss Prevention, the Director of Administration, the Director of Transportation Operations, the Director of Transportation Development, and the Director of Toll Systems.

  Based on information from their former executive director, FTE was successful within FDOT. He credited this largely to the on-going communication and coordination with the seven other transportation districts within FDOT. FTE works closely with the other districts on broader transportation issues and decisions at monthly meetings with the FTE executive board. Although it operates as an enterprise, FTE is not independent, rather it is a significant part of FDOT as this maximizes coordination and cooperation of projects.

  The FTE website describes their organization as follows: An innovative experiment combining the best of both the government and business worlds, Florida's Turnpike Enterprise utilizes the best practices of the private sector while operating in the public interest. FTE has expanded and increased revenue, while continuing to protect bondholders and improve customer service across the board. The results have been improved efficiency, cost-effectiveness, and timely project delivery.

  One of the key elements that FTE considers as a cornerstone for its success is its approach to outsourcing. Based on information made available in 2004, out of 4,600 individuals employed through the FTE, only 1 in 9 was a FDOT employee. They take seriously the approach of "running like a business" by retaining only a small in-house staff and increasing/decreasing contract staff as necessary. Most contracts are for five-year terms with five-year renewable options. Contract staff performs such FTE responsibilities as toll road concessions, troopers, operations, etc. This outsourcing approach allows the FTE maximum efficiency and flexibility.

- See the organizational chart below for the current structure.



Authorizing Legislature:

- Florida Statute 338: Limited Access and Toll Facilities www.flsenate.gov/Laws/Statutes/2012/Chapter338/All
- Florida Statute 339, Section 135: Work Program www.flsenate.gov/Laws/Statutes/2012/339.135

Budgetary Control:

- The Florida Turnpike Enterprise (FTE) develops a 5 year capital which is included as part of the FDOT 5-year work program and annual appropriation request.
- FTE has authority to plan, construct, maintain, repair, and operate the Florida Turnpike System.
- FTE's budget is developed according to state law and balanced to available revenues of the system, primarily tolls and concessions. It is submitted to the Governor and Legislature as part of FDOT's budget.

Toll Rate Setting:

- Pursuant to Section 338.165(3), Florida Statutes, toll rates were indexed on all Department toll roads and bridges, including FTE's, on June 24, 2012. The law requires that the Department index toll rates on existing toll facilities to the annual Consumer Price Index (CPI) or similar inflation indicator no more frequently than once a year, and no less frequently than once every five years. On July 1, 2013 the SunPass electronic toll rates and TOLL-BY-PLATE rates were increased by the annual CPI increase of 2.1%. Going forward CPI adjustments will be on an annual basis for all electronically collected tolls and every 5 years for cash based tolls.
- Toll rates may be increased by the FTE after consultation with the FDOT Secretary (and Governor's Office) through the State of Florida Administrative Rule process. This process requires the posting of the proposed new toll rates in public notices similar to the Federal Administrative Rule public notices and after holding one or more public hearings in the geographic area or areas of the planned toll increases. Public comments must be discussed and addressed in the final rule making process and publication.

Toll Collection Method:

- 81% use SunPass electronic toll collection as of 2013.
- Toll By Plate is also available for sections that are all electronic (no cash collections)
  - Cash collections are being phased out section by section converted to full electronic. The Homestead Extension in Miami Dade County has been fully converted to All Electronic Tolling (AET). Efforts are underway to convert other facilities to AET. They include the southern section of the Southern Coin and the Sawgrass Expressway in FY 2014, Veterans Expressway in FY 2015, and the Ticket System in FY 2019. These conversions remove cash collection at toll booths, which significantly reduce toll collection costs, but may increase the "diversion" percentage for non-payment of tolls.
- Back Room: (In-House/Contracted)
  - Currently mostly outsourced with a few public employees to manage the functions. FDOT selected Xerox Corporation to begin negotiations leading to the award of a Centralized Customer Service System (CCSS) contract. The CCSS Center will manage the tolling back room operation for the Florida Turnpike Enterprise as well as for all other FDOT toll facilities, the Orlando County Expressway Authority, the Miami Dade Expressway Authority and the Tampa Hillsborough Expressway Authority. Operation is planned to begin in 2014. Two protests of the award have been filed.

Operations and Maintenance: (In-house/Outsourced)

- Operations are 95% outsourced, maintenance is outsourced.

Operating Revenues and Expenses:

- Operating Revenue: $768 Million
- Operating Expenses: $274 Million

Total Debt Outstanding:

- Total Non-Current Liabilities $2,861 Million (FY 2013)

6. North Carolina Turnpike Authority

(DOT-Owned Toll Agency)

Overview:

The North Carolina Turnpike Authority ("NCTA") was established by G.S. 136 Article 6H on October 3, 2002. Effective July 27, 2009 the North Carolina General Assembly adopted Session Law 2009-343, transferring the NCTA to the North Carolina Department of Transportation ("NCDOT") to conserve expenditures and improve efficiency. The NCTA is a business unit of the NCDOT and is subject to and under the direct supervision of the Secretary of Transportation.

The Turnpike Authority is authorized to study, plan, develop, construct, operate and maintain up to nine projects. The mission of the Turnpike Authority is to supplement the traditional non-toll transportation system serving the citizens of North Carolina by accelerating the delivery of roadway projects using alternative financing options and facilitating the development, delivery and operation of an integrated, creative system of toll roads.

Primary Sources:

- Main Website: www.ncdot.gov/turnpike
- Annual Report: www.ncdot.gov/turnpike/download/NCTurnpikeAuthorityReport2013.pdf

Contact:

NC Turnpike Authority
1 South Wilmington Street
Raleigh, NC 27601
919-707-2700

Governing Body:

- Governed by a 9 member board of directors. Four members of the board are appointed by the Governor; two members are appointed by the President Pro-Tem of the Senate; and two by the Speaker of the House of Representatives.
- Authorized to study, plan, design, establish, purchase, construct, operate, & maintain projects.

Year Created: 2002

Size: 18.8 Miles

Type: (Single Facility or a System of Facilities)

- While the Turnpike has been authorized to study several projects and ultimately operate as a system, at this time only the Triangle Expressway is in operation as a toll facility in North Carolina under the North Carolina Turnpike.

Operating Structure:

- The Turnpike Authority is headed by a Turnpike Executive Director, who is appointed by and reports to the North Carolina Secretary of Transportation.
https://apps.dot.state.nc.us/dot/directory/authenticated/UnitPage.aspx?id=9574

- In 2009, the governor decided to bring NCTA under NC Department of Transportation (NCDOT) to conserve expenditures and improve efficiency. Effective June 1, 2010, NCTA was fully integrated into NCDOT operations. NCTA is shown as an enterprise fund in the NCDOT financial statements. The senior staff at NCTA was organized to report directly to unit heads within NCDOT instead of a separate reporting structure. Additionally, NCTA staff moved into NCDOT's headquarters at the Transportation Building in downtown Raleigh. (from WSDOT Study at http://www.wsdot.wa.gov/NR/rdonlyres/21AED54C-58CD-40B6-9EAB-81D58A9CA649/0/20131127TollDivisionOperationalReview.pdf

Authorizing Legislature:

- Creation of Turnpike Authority
  www.ncdot.gov/turnpike/download/HB644v9.pdf
- Establish Toll Enforcement Procedures
  www.ncdot.gov/turnpike/download/S1697_RATIFIED.pdf
- Provides gap funding for four Turnpike Projects
  www.ncdot.gov/turnpike/download/H2436v9.pdf
- Turnpike Gap Funding and Debt
  www.ncdot.gov/turnpike/download/S750v3.pdf
- Authorizes conversion of part of I-540 to toll facility and requires legislative approval for future toll projects
  www.ncdot.gov/turnpike/download/SB1381v6.pdf
- Authorizes 9 Toll Projects State-Wide
  www.ncdot.gov/turnpike/download/HB253v7.pdf
- By-Laws
  www.ncdot.gov/turnpike/download/turnpike_about_Bylaws.pdf

Budgetary Control:

- The Turnpike Authority is authorized to study, plan, develop, construct, operate and maintain up to nine projects.
- The Authority shall annually develop a plan of work for the fiscal year, describing the activities and projects to be undertaken, accompanied by a budget. This annual plan of work shall be subject to the concurrence of the Board of Transportation

Toll Rate Setting:

- The Authority Board has ability to:
  - To fix, revise, charge, and collect tolls and fees for the use of the Turnpike Projects. Prior to the change of any toll or fee, the Authority submits a the proposed toll or fee to the Board of Transportation, the Joint Legislative Transportation Oversight Committee, & the Joint Legislative Commission on Government Operations for review.

Toll Collection Method:

- NC Quick Pass (Electronic)
- Bill by Mail (video tolling)

- The NCTA recently executed agreements with E-Z Pass and Florida's SunPass to ensure compatibility with their electronic toll collections systems. This agreement allows for seamless toll interoperability between North Carolina and the other states along the east coast.
- Back Room: (In-House/Contracted)
    - Contracted (Xerox and URS)

Operations and Maintenance: (In-house/Outsourced)

- Performed by NCDOT

Annual System/Facilities Toll Revenues:

- Total Operating Revenues: $ 13.5 Million (FY2013)
- Total Operating Expenses: $24.7 Million (FY 2013)
    - Note: New system

Total Debt Outstanding:

- Non-Current Liabilities $1,657 Million (including $ 1.204M of revenue bonds payable)

7. Washington State Department of Transportation

(DOT-Owned Toll Agency)

Overview:

Washington State is using tolling as a strategic tool to help finance capital improvement projects, manage congestion, enhance mobility and generate revenue for ongoing operations and maintenance. The Washington state Legislature determines which facilities are authorized for tolling. The Washington State Transportation Commission determines the toll rates and policies.

Current toll facilities:
- Tacoma Narrows Bridge
- SR 167 HOT Lanes
- SR 520 Bridge

Legislatively authorized toll facilities:
- I-405 Express Toll Lanes (in development)
- SR 99 Alaskan Way Tunnel (under construction)

Under study:
- SR 509/I-5/SR 167 Puget Sound Gateway Project
- I-5 Express Toll Lanes from Tacoma to Everett
- I-90 Floating Bridge

Primary Sources:
- Main Website: www.wsdot.wa.gov/Tolling/
- 2013 Annual Report: www.wsdot.wa.gov/NR/rdonlyres/348E3EED-1D8F-44CC-AC1E-2A9EBD45774F/0/TollDivisionAnnualReport_FINAL_031114_WEB.pdf
- Toll Division Operational Review: www.wsdot.wa.gov/NR/rdonlyres/21AED54C-58CD-40B6-9EAB-81D58A9CA649/0/20131127TollDivisionOperationalReview.pdf

Contact Info:

Toll Division
401 Second Avenue South, Suite 300
Seattle, WA 98104
206-464-1222

Governing Body:
- The State of Washington Legislature selects toll projects in specific legislation, the Transportation Commission sets the toll rates and Washington State DOT plans, implements and manages the toll facilities for state facilities.

Year Created:
- In 2007, WSDOT reintroduced tolling as a tool to help fund completion of the new Tacoma Narrows Bridge. It had been a generation since tolls were collected on Washington state highways and bridges, ultimately funding 14 bridges with tolls under the Washington State Toll Bridge Authority.

Size: Two bridges and the SR-167 Managed Lanes pilot project.

Type: (Single Facility or a System of Facilities)

- The three current toll facilities have been financed and operated as individual toll facilities

Operating Structure:

- **WSDOT Toll Division Functions**: The Toll Division is a WSDOT business unit responsible for the operations of revenue producing projects, including the following functions:
  - **toll project planning**
    - project planning
    - operational feasibility
  - **financial strategy and operations**
    - traffic and revenue projections
    - financial planning and feasibility
    - coordination and advice on bond issuance and reporting
    - responsible for revenue collection and accounting
    - total project cost accounting and overhead allocation toll
  - **systems development and procurement**
    - procurement of toll related services
    - hardware and software development, maintenance and interface to DOT systems
    - toll technology standards
    - toll operating reports and statistics
  - **toll operations management**
    - day-to-day operation support
    - staffing and training
    - business rule development
    - marketing and communications

Authorizing Legislation:

- In 2008, the Legislature passed legislation providing a framework for tolling in Washington, establishing the purposes of tolling, governance roles, and guidelines for use of toll revenues. By law, "it is the policy of the state of Washington to use tolling to provide a source of transportation funding and to encourage effective use of the transportation system." The legislature reserves authority over the establishment of new tolls on state facilities, and over how toll revenues may be used. The Transportation Commission is delegated authority to set toll rates, exemptions, and fees. WSDOT is the designated agency to plan, implement, and operate toll facilities on state
- Link to Laws on Tolling: http://apps.leg.wa.gov/rcw/default.aspx?cite=47.56

Budgetary Control:

- The Toll Division prepares their budget under their normal WSDOT and State of Washington budgetary process.
- WSDOT has authority to plan, construct, maintain, repair, and operate the various toll facilities authorized by the State Legislature.

Toll Rate Setting:

- Toll Rates are set by the Washington State Transportation Commission. For more information on the rate setting process refer to the following web link:
  http://www.wstc.wa.gov/HighwayTolling/default.htm

Toll Collection Method:

- The Tacoma Narrows Bridges are tolled with electronic tolls “Good to Go!”, pay by mail and cash tolls.
- The SR-520 Bridge and the SR-167 HOT Lanes are tolled with electronic tolls “Good to Go!” and payment via mail options with only open road tolling allowed (no cash payment) on the facilities.
- Back Room: (In-House/Contracted)
  - Currently outsourced.

Operations and Maintenance: (In-house/Outsourced)

- Operations and maintenance for toll collections are outsourced, roadway/bridge maintenance is with in-house WSDOT resources.

Operating Revenues and Expenses:

- Tacoma Narrows Bridge
  - Operating Revenue: $58.7 Million (2013)
  - Operating Expenses: $9.6 Million (2013)
- SR-167 HOT Lanes
  - Operating Revenue: $1.1 Million (2013)
  - Operating Expenses: $0.7 Million (2013)
- SR-520 Bridge
  - Operating Revenue: $55.4 Million (2013)
  - Operating Expenses: $10.2 Million (2013)

Total Debt Outstanding:

- Note that all bonds issued for the Tacoma Narrows Bridge and the SR-520 Bridge are backed by general tax sources and not the toll revenues. The toll revenues do pay the annual debt service for the bonds on these bridges.

8. I-495 Express Lanes (Virginia)

(Public-Private Partnership)

Overview:

The **495 Express Lanes** are a 14-mile segment of I-495 extending from the Springfield Interchange to a point north of the Dulles Toll Road. The 495 Express Lanes are the product of a public-private partnership between the Virginia Department of Transportation, the Virginia Department of Rail and Public Transportation, the Federal Highway Administration and Transurban. The lanes opened on November 17, 2012. The toll rates change dynamically according to traffic conditions, which in turn regulates demand for the lanes and keep them operating at high speeds. Tolls are collected solely via electronic means using E-ZPass transponders. No cash toll booths are offered. All vehicles using the Express Lanes must have a transponder. The project cost $1.4 billion.

Primary Sources:

- Main Website: www.495expresslanes.com/project-background

Year Created:

- HOT Lanes P3 Project operational in 2012.

Size:

- Entire Beltway is 64 Miles
- HOT Lanes is 14 miles of two new lanes each direction

Type: (Single Facility or a System of Facilities)

- Single

Project Overview from FHWA Website:

Location	Fairfax County, Virginia
Project Sponsor / Borrower	Virginia Department of Transportation (VDOT)
Fiscal Year Approved	Fiscal Year 2008
Mode	High Occupancy Toll (HOT) Road
Description	The Capital Beltway High Occupancy Toll (HOT) Lanes project (officially the 495 Express Lanes) is a public-private partnership between VDOT and Capital Beltway Express, LLC (a joint venture of Fluor and Transurban) that opened in

	November 2012. The project limits are from the Springfield Interchange (south) to just north of the Dulles Toll Road (14 miles). Previously, the Capital Beltway had four lanes in each direction. Improvements included: 14 miles of two new lanes in each direction First time introduction of High Occupancy Vehicles (HOV) lanes to the Capital Beltway and reliable transit options to the Beltway and Tysons Corner, Virginia Congestion-free network for carpools, vanpools, transit and toll-paying motorists Replacement of more than $260 million of aging infrastructure, including more than 50 bridges and overpasses Construction of carpool ramps connecting I-95 with the Capital Beltway to create a seamless HOV network
Cost	$2.068 billion
Funding Sources	Private Activity Bonds - $589 million TIFIA Loan - $589 million Commonwealth of Virginia grant - $409 million VDOT change-order funding - $86 million Interest income - $47 million Private Equity - $348 million
Project Delivery / Contract Method	DBFOM (design, build, finance, operate, and maintain)
Private Partner	Capital Beltway Express, LLC - Joint venture between Fluor and Transurban
Project Advisors / Consultants	Virginia Department of Rail and Public Transportation ATCS/CH2M Hill (GEC) To USDOT TIFIA JPO: TIFIA Legal Advisor: Nixon Peabody, Michael Vaccari and Virginia Wong TIFIA Financial Advisor: Infrastructure Management Group: Sasha Page
Lenders	Bondholders, USDOT TIFIA

Duration / Status	Construction began in spring 2008 and reached substantial completion on November 8, 2012. The facility opened to traffic on November 17, 2012. The total length of the concession is 85 years - five years of construction and 80 years of operation.
TIFIA Credit Assistance	Direct Loan: $589 million The TIFIA loan holds a subordinate lien on a pledge of the project's toll revenues and interest income, after operations and maintenance expenses, certain capital expenditures, senior debt service reserve, and debt service payments to senior lenders.
Financial Status / Financial Performance	Financial close and TIFIA credit agreement signed on December 20, 2007; Senior Bonds marketed in June 2008 TIFIA interest payments are expected to begin in 2018. Loan repayments are scheduled to begin in 2033 and conclude in 2047. The TIFIA loan is structured with five years of capitalized interest during construction followed by five years of partially capitalized interest during ramp-up; then current interest only for 15 years followed by 15 years of interest plus principal.
Innovations	Fully electronic toll collection using transponder technology Dynamic tolling based on real-time traffic conditions First HOT lane implemented in the state of Virginia Largest financing of a HOT lanes project First time a Private Activity Bond (PAB) was used for HOT lanes in the U.S. and the first time combined with TIFIA financing
Related Links / Articles	495 Express Lanes Website VDOT Project Website Virginia Mega Projects Website Virginia Public-Private Partnership Act of 1995
Contacts	Larry O. Cloyed, PMP Senior Project Manager

	Virginia Department of Transportation Virginia Megaprojects Office 6363 Walker Lane, Suite 500 Alexandria, VA 22310 Tel: (571) 483-2584 Larry.Cloyed@VDOT.Virginia.gov

Contact Info:

- General Contact Info for the P3 Firm: 1-855-495-XPRS (9777)
- Virginia Department of Transportation
  Virginia Megaprojects Office
  6363 Walker Lane, Suite 500
  Alexandria, VA 22310
  Tel: (571) 483-2584

Governing Body:

- This project is the result of a public-private partnership between the Virginia Department of Transportation and Fluor-Transurban. Under this partnership agreement, VDOT owns and oversees the lanes and Fluor-Transurban built, operates and provides routine maintenance on them.

Operating Structure:

- Concessionaire is responsible for operations

Authorizing Legislature:

- Public/Private Transportation Act of 1995
  http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC56000000022000000000000
- Comprehensive Agreement
  www.495expresslanes.com/~express/uploads/ARCA_with_ExhibitA-Defintions-1(1).pdf

Budgetary Control:

- The Concessionaire is required to file an annual budget document with VDOT which details projected revenues, operating and maintenance expenses, debt service, contributions to individual reserves, projected total return on investment, projected payments to VDOT, distributions of equity and other related items.

Toll Rate Setting:

- Tolls are dynamically priced to maintain traffic flow. Tolls change approximately every 15 minutes. Buses, motorcycles, and vehicles with three or more people are able to use the express lanes for free; other vehicles must pay a toll. Cash is not accepted.

Toll Collection Method:

- EZ-Pass
- Back Room: (In-House/Contracted)
    - Concessionaire

Operations and Maintenance: (In-house/Outsourced)

- Concessionaire operates and maintains the project

Annual System/Facilities Toll Revenues:

- The financial performance of the 495 Express Lanes is below the original expectations of Transurban. The following is an excerpt from their 2013 financial report.

> "The 495 Express Lanes opened to tolled traffic in November 2012, 6 weeks ahead of schedule. Traffic performance on the lanes has been lower than expected, but has continued to grow. It is still considered too early to determine any reliable traffic trends.
>
> Total toll revenue generated to 30 June 2013 is $7.2 million. 495 Express Lanes has recorded an EBITDA loss since opening of $8.1 million to 30 June 2013. In respect of Transurban's proportional result, this contributed a loss of $5.4 million.
>
> The weekend of 6-7 April 2013 was toll free on 495 Express Lanes, with the view to increasing public awareness of the benefits of using the lanes. This public education and engagement proved positive, with traffic growth increasing after this and other initiatives"

9. Northwest Parkway (Colorado)

(Public-Private Partnership)

Overview:

The Northwest Parkway is an 8-mile (13 km) toll road running from the intersection of I-25 and E-470 to 96th Street north of US 36. Both termini are in Broomfield, Colorado, northwest of Denver. In combination with E-470 (47 miles) and SH 470 (27 miles), the Northwest Parkway forms a partial beltway of approximately 85 miles (137 km) around the Denver-Aurora Metropolitan Area.

The Parkway was constructed by the Northwest Parkway Authority and opened to traffic in 2003. In 2007 the Authority leased the Parkway to a private concessionaire Brisa Auto-Estradas S.A. ("Brisa") and Companhia de Concessões Rodoviárias(CCR). Brisa/CCR will operate and maintain the toll road for 99 years. While the Authority will continue to own the road Brisa/CCR will be responsible for toll collection, maintenance and improvements to the Parkway.

Primary Sources:

- Main Website:
  www.northwestparkway.org/

Contact Info:

Northwest Parkway LLC
3701 Northwest Parkway
Broomfield, CO 80023
303-533-1200

Year Created:

- Opened to Traffic 2003

Size:

- 8-Miles

Type: (Single Facility or a System of Facilities)

- Single

Operating Structure:

- The Concessionaire is responsible for operations

Authorizing Legislature:

- Summary of Northwest Parkway Concession and Lease Agreement:
  www.northwestparkway.org/PDF/SummaryCLA.pdf.pdf
- Northwest Parkway Concession and Lease Agreement
  www.northwestparkway.org/PDF/FinalCLA.pdf

Budgetary Control:

- The Parkway is a public road and was 100% privately funded.

Toll Rate Setting:

- The agreement allows Brisa/CCR to raise toll based on inflation with a minimum of 2%. Parkway tolls are subject to specific tolling limits set forth in a tolling schedule in the agreement. The Concessionaire may charge lower tolls and offer discount programs. The concessionaire may utilize time-of-day variable rate tolling or congestion related tolling.

Toll Collection Method:

- "Go-Pass"
  - Toll by Plate method and account created
- "Express Toll"
  - Pre-Paid transponder based

Back Room: (In-House/Contracted)

- Contracted - Indra (a large Spanish multifaceted company manages the backroom operations)

Operations and Maintenance: (In-house/Outsourced)

- Operations and Maintenance are provided by the Concessionaire.

Annual System Financial Information

- Toll Revenues - $10.8 Million Euros (parent company Brisa reports consolidated financial statements out of Europe in Euros)
- The expenses were part of the overall company consolidation in the publically available financial statements.

Appendix 2

Summary of Washington DOT Studies on the Organization of Toll Programs

The State of Washington DOT (WSDOT) created a toll program in 2007. Prior to and after the creation of the toll program related to the organizational structure of the toll program and also some of the challenges faced getting the toll program up and running.

- **Analysis of Organizational Structure:**

  When the governance decision was reached to establish the Toll Division as part of WSDOT, it was based on the following: (1) the acknowledgement of the value of being able to leverage the technical resources of an existing agency, (2) the ability to assure optimal synergies in integrating long-range goals and transportation system improvements, and (3) maintaining control from a centralized transportation agency to make more effective decisions. These are all consistent with Lean principles. Recent trends with other state DOTs throughout the U.S. support this approach as there have been no actions to separate tolling entities from state DOTs and, in many cases, standalone agencies have been incorporated. In Florida, Texas, and North Carolina they started with independent statewide tolling agencies and then incorporated them into the State DOT.

  The choice to locate tolling with WSDOT is supported by the following primary factors:

  - The Washington State Legislature has developed a statutory tolling framework that retains authority to authorize individual toll facilities rather than delegate authority to state or regional toll entities;
  - As highway construction costs have increased nationally, tolls alone can no longer fully support major projects, so tolls and other state revenues must often be integrated in toll facility financial plans;
  - Washington's urban highways form a network that is tightly interconnected and has little redundancy, favoring an integrated highway management by a single agency; and
  - There are economies of scale in using existing engineering and organizational resources to build and maintain toll facilities rather than to develop separate and redundant capabilities in separate agencies.

- **WSDOT "Virtual" Toll Organization**

  When tolling was limited to the Tacoma Narrows Bridge, the single bridge toll operation was managed from the Headquarters Traffic Operations Division. Once it was known that tolling could provide funding for the SR 520 project, I-405 Express Toll Lanes, I-5 Columbia River Crossing and potentially other megaprojects under consideration, WSDOT began evolving toward a statewide toll program by using matrix management to staff toll-related projects from various work groups into a "virtual" toll organization.

Development of new toll systems for SR 520 and a statewide customer service center was managed from the Seattle-based Urban Corridors Office, which oversaw megaprojects funded through the legislature's 2003 and 2005 fuel tax increases. In 2008, Toll Operations was consolidated into the Urban Corridors Office to provide a unified approach to tolling statewide.

As a new tolling agency beginning a major project to implement tolls on SR 520, WSDOT engaged consulting assistance to bring industry experience and expertise in-house. WSDOT began developing an integrated team approach with a variety of consultants to assist in all aspects of tolling. WSDOT has also benefitted from including active advice and expertise from peer agencies through FHWA's peer-to-peer program, as well as membership in the International Bridge Tunnel and Turnpike Association.

WSDOT was directed to dissolve its Urban Corridors Office to reduce overhead. To maintain continuity and focus on tolling functions, WSDOT engaged consultants to build on the earlier Transportation Commission work, assess organizational models at peer agency toll entities, and propose an organization structure for a new Toll Division.

The resulting consultant report identified strengths and weaknesses of locating tolling within WSDOT and recommended that "if toll authority for SR 520 is enacted by the legislature during this session, the organizational shifts to create the Washington State Toll Division within WSDOT should begin immediately. Most of the changes to form this division can come from existing staff and facilities, focusing on efficiencies and with reassignment of duties."

The report proposed near-term, intermediate, and long-term organization structures. In the near term the consultants proposed that the following functional groups be established within the new division: toll planning, toll project development, toll finance, and toll operations. WSDOT established the Toll Division in July of 2009.

- **WSDOT Toll Division Functions**: The Toll Division is a WSDOT business unit responsible for the operations of revenue producing projects, including the following functions:
    - **toll project planning**
        - project planning
        - operational feasibility
    - **financial strategy and operations**
        - traffic and revenue projections
        - financial planning and feasibility
        - coordination and advice on bond issuance and reporting
        - responsible for revenue collection and accounting
        - total project cost accounting and overhead allocation toll
    - **systems development and procurement**
        - procurement of toll related services
        - hardware and software development, maintenance and interface to DOT systems
        - toll technology standards
        - toll operating reports and statistics
    - **toll operations management**
        - day-to-day operation support
        - staffing and training
        - business rule development

- marketing and communications

The Toll Division current organizational structure is consistent with these four major functional areas of responsibility and reports to the Deputy Secretary and Chief Operating Officer on the same level as a District operation. This is consistent with the structure adopted by most departments of transportation that house a turnpike or tolling function within their organizational structure. As compared to DOT districts, rather than a geographical area of responsibility, these toll organizations become involved only as revenue producing projects are conceptualized across the state.

The Toll Division selected a general tolling consultant in mid-2010.

It should be noted that several studies were performed early on and later as toll facilities were planned and implemented from 2008 to 2011. These studies noted a number of operational issues, but a key element is outlined below:

> "*The authority for full decision-making has never been given to the Toll Division. … The current organization was adequate to successfully deliver tolling to the SR 520 but opportunities for improvement exist. The ERP strongly suggests that the long-term success of the toll systems will require that the Toll Director position be strengthened to allow for the level of decision-making shown needed. Additionally, incorporating the finance/accounting and IT elements into the tolling organization is also our recommended solution, but we realize that this is not a short-term adjustme*nt."

These are examples of challenges that can be encountered when implemented a totally new function like tolling within an existing DOT.

The WSDOT Toll Division is still in a ramp-up phase for toll project development and requires a higher level of resources than agencies that are in a "steady state" of operating facilities. This places WSDOT in a unique situation for resourcing, when compared to other toll agencies.

WSDOT has adopted a strategy of outsourcing the toll operations just like many other growing toll operations such as the Florida Turnpike Enterprise and the Texas Department of Transportation. Texas is the only state DOT that has a rapidly growing program of new toll projects in the pipeline. However, Texas has opted to develop many of these projects as public-private partnerships. This means a much greater portion of the work of project delivery is placed on the private sector.

- **WSDOT: Unique Requirements:** Some of the unique characteristics of WSDOT tolling that impact their organizational and staffing needs include the following:
    - WSDOT is still in a "ramp-up" mode of delivering new facilities on a statewide basis.
    - Each facility must be accounted for separately and has its own constituency. Consequently, there is no opportunity to leverage funding on a network basis.
    - Planning for possible new facilities must come from non-tolling funding sources.
    - Proceeds from civil penalties are accounted for in a separate fund for SR 520, but are combined with toll revenue for Tacoma Narrows Bridge.
    - All financing is conducted by the state Treasurer's office and, to-date, no debt issued has been non-recourse toll revenue debt.
    - Vendor accounting requirements include an unprecedented level of real-time transaction recording along with daily transaction reconciliation.

- **WSDOT: Operational Challenges:**
  - *Vendor Cost and Quality.* The 2009 WSDOT Statewide CSC procurement resulted in a contract price much lower than market value. WSDOT has struggled openly with vendor system delays and operating quality issues in its relationship with its statewide customer service vendor (CSC Vendor). While most system functionality is complete, key reports necessary for the required daily accounting reconciliation remain unfinished by the CSC Vendor, as do automated write-offs and collections functionality. At the same time, WSDOT has been informed by the CSC Vendor that their actual expenses exceed the value of the original contract. Errors and customer service shortcomings continue to require additional costs by WSDOT staff and consultants for intervention and support. With the current CSC Vendor contract nearing an end (June 30, 2014), and the potential options for extension, changes to contracting and contract costs are likely, although the nature and timing of these changes cannot be accurately forecasted. While the CSC Vendor system is not complete, work to date has resulted in a system that is closer to meeting WSDOT requirements than is readily available from other vendors in the industry. Still, with the current CSC contract expiring, WSDOT expects an increase in CSC vendor costs.
  - *Use of Infrequent User Payment Options.* The least costly method to collect tolls is through the use of transponders attached to prepaid customer accounts. Collecting cash tolls requires significant labor expense, while "Pay By Mail", based on recording license plate images, requires issuance of toll bills and accounts receivable that are not always paid. There are two ways to look at infrequent user payment options such as Pay By Mail. On one hand, they raise the average cost per transaction, making that option seem more expensive. Conversely, is that their incremental costs are designed to be covered by higher toll rates paid by the customer. Approximately 70 percent of tolls on the Tacoma Narrows Bridge and 80 percent of tolls on SR 520 are paid with a *Good To Go!* account. Review of the cost to collect analysis shows that Tacoma Narrows Bridge costs an average of a dime more per transaction than SR 520. Preliminary analysis suggests WSDOT could reduce toll costs on the Tacoma Narrows Bridge by eliminating cash payment, however *Good To Go!* toll rates on Tacoma Narrows Bridge have been subsidized by other payment methods, including cash collection. The elimination of cash collection would likely result in need to raise the *Good To Go!* transponder rate.
  - *Reducing Uncollected Tolls and Improving Enforcement.* Since electronic tolls were introduced in Washington, a small percentage of toll customers have chosen not to pay their Pay By Mail toll bills. Preliminary estimates show that 98% of tolls on the Tacoma Narrows Bridge and 95% of tolls on SR 520 are resolved; the remaining tolls are pursued through enforcement methods. With transponders and other prepaid accounts, almost all transactions are collected immediately. With Pay By Mail photo tolling, where cameras and optical character recognition equipment read customer license plates, a portion of those plates cannot be accurately translated into valid Washington State license plate numbers. Pay By Mail customers do not have accounts and, even with a license plate number, some of these customers cannot be traced to a valid address. A key question being explored by the Toll Division is how much transaction loss can be reduced by strategies such

as more aggressively marketing transponders or working with the Department of Licensing to provide transponders to all Washington vehicle owners through the licensing process.

- *Interoperability.* As described above, Federal law requires states to develop toll technologies and practices that will ultimately allow toll payment in every state using a single account. Several competing models for interoperability are under consideration nationally, including the non-proprietary "6C" transponder standard used in Washington. Washington is an active participant in these discussions, which will become more urgent if Oregon institutes tolling on the Columbia River Crossing of I-5. Should that happen, we may find that residents in King, Pierce, and Snohomish Counties will have accounts with WSDOT's *Good To Go!* program, and residents in Clark County and southwest Washington will establish accounts with the state of Oregon. This strays from the goal to have a single statewide system and the concept of one. If a federal standard is mandated, WSDOT may be required to invest in different technologies and business practices to comply with this unfunded mandate.
- *Carpool Recognition.* For toll facilities with special toll treatment for carpools, such as on express toll lanes, WSDOT will need to determine a method to identify eligibility. WSDOT defines carpools based on the number of people in a vehicle, which cannot currently be determined by cameras or electronic detection. At present, even if an electronic option were available, there is no legislation available to enforce on that basis. WSDOT is examining two options for customers to indicate their carpool status, both of which require visual inspection by Washington State Patrol officers to enforce. The first method would require customers to purchase a transponder with a two-position switch to indicate their carpool eligibility; the second method allow customers to use any one of the current transponder types offered, but would require customers to register their carpool status through a smart phone application, over the phone, or on the internet prior to making a trip.
- *Pre-paid Customer Accounts or Bank-backed Payments.* Technology for payments of all types is rapidly evolving and many customers now prefer to control payments using mobile applications. While new technologies are under development to allow customers to use smart phones in place of a toll transponder, the attraction to mobile payment would instead be the ability to make a payment in real time rather than to maintain a prepaid account or receive a bill. One of the issues that WSDOT will need to consider is whether to allow tolls to be paid similar to the Apple iTunes model on a pay-as-you-go basis, rather than requiring customers to establish a pre-paid account with WSDOT. Under this new model customers would provide a debit or credit card number that tolls could be batched and processed on a daily basis. Another option is to expand WSDOT's retail program to provide more in-person account replenishment locations for customers, reducing the need for walk-in customer service centers, which are expensive to operate.
- *Toll Administration and Overhead.* During the start-up period for the Toll Division, the majority of work was to develop and install capital facilities for tolling, funded in part by WSDOT megaprojects. Over time as tolling matures, funding for administrative positions within the Toll Division will need to shift to operating funds.

However, as described in the new trends and challenges discussed in this section, the tolling systems and approaches are constantly evolving and there is a continual need for investment in new systems and equipment.

- *Use of Toll Revenue.* Traditional tolling has focused on repaying bonds used to fund large capital projects such as bridges and tunnels where construction cannot be effectively staged over a longer period. Increasingly, however, WSDOT faces funding shortages for basic needs such as operations, maintenance, safety, and preservation. Additionally, other agencies face shortfalls maintaining and operating transit and local streets. Consideration could be given to the use of toll revenues for maintenance and preservation, corridor improvements, transit, or local transportation facilities.
- *Use of Tolls for System Planning and Development.* WSDOT relies on the Legislature to fund development of transportation plans and toll proposals, but the Legislature is reticent to fund studies until convinced that a proposal has support. To conduct preliminary planning and assess feasibility of new tolling projects or approaches WSDOT has relied primarily on federal grants that are no longer available. To develop and test future toll proposals, WSDOT will require funding.

- **Functions of the Toll Program** *(current WSDOT Toll Division structure)*

  Consistent with the principles above, the Assistant Secretary, Toll Division, is accountable for the leadership, policy, planning, development, implementation, education, operations, and performance of toll roads, toll bridges, and tunnels, and express toll lanes. The Assistant Secretary will be held accountable for the success or failure of these activities. Specific responsibilities should include the following:
  - Develop, contract, and operate toll road and bridge roadway and back office systems;
  - Develop, contract, and operate express toll lane roadway and back office systems;
  - Conduct traffic and revenue estimating and reporting;
  - Report on toll program performance, including financial plans;
  - Advocate and promote advancement of tolling/pricing;
  - Communicate with toll customers, stakeholders, and the public;
  - Collect all forms of roadway pricing (tolls, VMT, congestion pricing, etc.);
  - Develop long-range planning for tolling;
  - Evaluate impacts of toll facility proposals;
  - Support the Washington State Transportation Commission rate setting and policy work;
  - Determine toll payment methods, practices and technologies;
  - Establish operating concepts and set standards for design and maintenance of toll systems;
  - Establish business rules and operate the *Good To Go!* Program;
  - Manage a toll enforcement program to maximize collection of toll revenues; and
  - Establishing toll agreements with other agencies including FHWA.

- **Shared Roles & Authorities** *(Toll Division shares roles with other WSDOT divisions)*

  While the Toll Division has ultimate responsibility for tolling outcomes, the Toll Division shares authority with other groups within the agency. In some cases, the Toll Division is the lead, and will seek concurrence of others where appropriate; in other cases, the Toll Division plays a support role and will set appropriate standards. As a result of the SAO report, WSDOT will review the following areas of responsibility:

  - Financial planning: Headquarters Financial Planning is responsible for ensuring that toll-backed bond financing analyses and plans will comply with state financial policies and meet the needs of bond agencies and the Office of the State Treasurer. Their concurrence is required for financial plans for any project when bond sales are pending, and for any deliverable or communication with Office of the State Treasurer.
  - Accounting: While the Toll Division is accountable for the content of accounting statements for tolled facilities (the financial performance of tolling), it relies upon Headquarters Accounting and Financial Services for toll customer accounting, financial reconciliation, and to produce accurate and compliant financial statements.
  - Information Technology (IT), contracting, purchasing: Support groups within WSDOT have established standards and guidelines to which the Toll Division must adhere. However, because tolling was not anticipated when regulations and standards were developed, sometimes changes or departures will be requested to accommodate unique tolling requirements (for example, contracts that combine IT functions with operating services or with public works activities on the highway).
  - Toll-funded Projects: Project Directors for toll-funded engineering and construction projects are accountable for all elements of project delivery. The Toll Division will seek concurrence on toll system design elements that will affect the civil construction project design, cost, or schedule. The Toll Division will develop standards for toll collection systems to aid in project planning.
  - Region traffic and maintenance: When toll projects are complete, the regions assume operation and maintenance of the roadway as well as other non-tolling related facility improvements. The Toll Division will seek concurrence from region traffic and maintenance on any issue that affects traffic operation or toll contributions to meet operation and maintenance requirements as well as roadway performance regulations in the future.
  - System Planning: Where tolling is an essential element in order to be financially feasible or meet traffic management objectives the Toll Division supports system planning for the projects. This involvement is a concurrence role, providing strategic input and resources for determining revenues, tolling costs, as well as financial strategies and plans. Alternatively, for studies where tolling strategies or practices are the primary consideration, with project chartering required to establish participation roles by other WSDOT units, the Toll Division takes the lead. For express toll lanes, where tolling is the primary method of managing traffic and providing customer value, the Toll Division is lead for coordinating the development of concepts of operation and system policies.

- Program Management: When both tolls and other state funds are applied to finance a project, the Toll Division is accountable for preparing financial plans. With these projects the Toll Division will seek concurrence from the Region or megaproject program management and quality control and concurrence from WSDOT Headquarters Budget and Financial Analysis group. Region or megaproject program management offices are accountable for developing staging plans and the Toll Division plays a concurrence role.

- **Avoiding and Resolving Conflicts**

  WSDOT has successful models for managing overlapping roles and authorities in its traditional engineering program. For example, while WSDOT regions and project managers are responsible for delivering engineering and construction projects, they must work within design guidance and constraints defined in the Headquarters Design group, which has authority to assess and grant design deviations. Similarly, the Toll Division must meet established requirements of service providers such as the WSDOT IT and accounting services.

  As is true for engineering decisions, on occasion deviations will be requested from support groups when tolling needs differ from other customers, or when it is not cost-effective to comply and less costly, yet effective, approaches are available. Additionally, when regulations or standard procedures have not been issued, the Toll Division will work with these organizations to develop appropriate standards.

  Concurrence is limited in scope to specific areas of authority. The Toll Division will develop service level agreements with other groups to define the process for working together and resolving differences. The Toll Division will continue to seek a collaborative approach to decision making that aims to settle differences early and at the lowest organization levels. Where changes or deviations are needed from established policies, they will be evaluated and documented, similarly to engineering design exceptions. In all cases, a binding process will be in place to elevate issues when agreement is not forthcoming.

Complete information on these studies can be found at:

Toll Division Operational Review: www.wsdot.wa.gov/NR/rdonlyres/21AED54C-58CD-40B6-9EAB-81D58A9CA649/0/20131127TollDivisionOperationalReview.pdf

Connecticut I-95 Corridor Congestion Relief Study

Appendix E

Current Laws on Tolling Existing and New Facilities on Federal Interstate Highways

Prepared for

CONNECTICUT DEPARTMENT OF TRANSPORTATION

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Current Laws on Tolling Existing and New Facilities on Federal Interstate Highways

The purpose of this paper is to present a review of the federal laws on tolling, and how they relate to Connecticut and the two congestion relief studies that are currently being conducted through the Connecticut Department of Transportation (CTDOT). The findings presented in this paper are an important component of how tolling could be legally implemented in Connecticut under current Federal Law, if such a decision is made at the conclusion of these studies. This paper is organized into the following topics:

- Overview of Two Congestion Relief Studies
- Current Federal Law on Tolling
- Exceptions to the Federal Tolling Prohibition
- Restrictions on and Permitted Uses of Toll Revenue
- History of Tolling and Toll Removal in Connecticut
- Options to Implement Tolls in Connecticut
- Conclusion

1.1 Overview of Two Congestion Relief Studies

The Connecticut Department of Transportation (CTDOT) submitted two applications to the Federal Highway Administration (FHWA) Value Pricing Pilot Program (VPPP) for study of the I-95 (New Haven to Greenwich) and I-84 (Hartford) Corridors. Both studies were selected for funding and will be concluded by the end of 2015. The VPPP provides a potential mechanism for exception to the Federal tolling prohibition along these two selected study corridors. The two VPPP studies focus on Connecticut's two most congested highways (I-95 and I-84) to evaluate whether congestion pricing using electronic tolling, and in combination with other transportation system improvements can reduce traffic congestion. The goal is to find an appropriate combination of pricing and transportation improvements that achieve a noticeable level of congestion relief.

I-95 Corridor Congestion Relief Study

One of the planning grants awarded by FHWA is focused on the I-95 Corridor from the New York State border in Greenwich to New Haven. This is Connecticut's most congested corridor in terms of the severity, extent, and duration of congestion experienced by motorists on a daily basis. Providing congestion relief in the I-95 corridor has historically been viewed as a difficult undertaking due to the extremely high levels of travel demand, perceived challenge to expand highway capacity, and lack of parking availability at rail stations along the Metro North rail line. As a result, the I-

95 study will adopt a multimodal approach and explore a wide range of options to help address these challenges. More importantly, it will look at combinations of options that include highway improvements, transit improvements, and congestion pricing options to find a combination that can provide measurable relief. This will include examining new methods of pricing such as express toll lanes along I-95.

I-84 Hartford Congestion Relief Study

I-84 in Hartford has the highest traffic volumes in the state, and is one of the most congested corridors. However, I-84 through Hartford has additional challenges. This includes how to replace and pay for the major reconstruction of the I-84 Viaduct. The grant application submitted by CTDOT for this study specifically outlined the I-84 Viaduct through Hartford as a pricing candidate due to its high travel demand, significant congestion, and impending need for a costly replacement. The I-84 Viaduct, built in 1965, is a ¾ mile long section of elevated highway that needs to be reconstructed or replaced. As with I-95, a variety of physical and pricing alternatives will be evaluated, including "spot" pricing on the Viaduct, conversion of the existing HOV lanes to High Occupancy Toll (HOT) lanes, and the addition of express toll lanes through Hartford with possible connection to the existing HOV (potential HOT) lanes.

1.2 Current Federal Law on Tolling

Generally, current federal law prohibits the collection of tolls on Interstate Highways; however, in recent years, federal law has provided for exceptions to this tolling prohibition.

Generally, current federal law prohibits the collection of tolls on federal aid highways including Interstate Highways. This prohibition on tolling applies to most of the Interstate Highway System including the portions in Connecticut that are the subject of this project, that is, I-95 from the New York State line to the City of New Haven and the portion of I-84 that carries that Interstate Highway over a portion of downtown Hartford, Connecticut (the I-84 Viaduct).

Federal law is somewhat less restrictive about placing tolls on "non-interstate" highways like Route 2, Route 9, and Route 11. The focus of this paper is on "Interstate" highways, but a summary of tolling non-interstate highways is discussed briefly in "Exceptions under Section 129" below.

Exceptions to Federal Tolling Prohibition

In 1991, ISTEA made changes to the general prohibition on tolling, and in succeeding federal surface transportation authorization acts over the next 20 years further exceptions to the Section 129 prohibition on tolling were enacted, and new pilot programs were established.

Each is discussed below.

Exceptions under Section 129 (General Tolling Provision)

Interstate Highways

Under current federal law (23 USC Section 129, the general toll program), *new* highways, bridges, and tunnels (including on the Interstate System) can be constructed as tolled facilities; new tolled lanes can be added to *existing* highways (as long as the number of existing toll-free lanes is not reduced); bridges and tunnels reconstructed or replaced as tolled facilities; and, capital improvements can be made to existing tolled facilities with federal funds. Under MAP-21, tolling agreements between relevant state transportation agencies and FHWA are no longer required for Section 129 projects, although (as will be discussed in more detail below) tolling agreements are still required for the implementation of tolling pursuant to VPPP.

Non-Interstate Highways

Federal laws regarding tolling non-Interstate highways are somewhat less restrictive than those that govern Interstates. Under current federal law, Connecticut is allowed to institute tolls on any non-Interstate Highway such as Route 2, Route 9, or Route 11, if that road is being reconstructed or if it is a construction project. If the non-interstate road is not part of new construction or reconstruction project, the tolling is allowed only if it is part of the VPPP program. That is, Connecticut would have to add the project to the VPPP slot. The State could not take the action of tolling existing non-interstates under the general tolling provisions of Sec. 129 without reconstruction.

Section 129 exceptions:

1. ***New highways***
2. ***New bridges & tunnels***
3. ***New lanes on existing Interstate highways***
4. ***New non-interstate highways or as part of reconstruction***

Exceptions to the General Prohibitions on Tolling

In addition to Section 129, or the general toll program, three tolling programs exist under current federal law, all of which allow an exception to the general prohibition on tolling existing Interstate or other federal-aid highways. By selection for inclusion in any one of these pilot programs by FHWA, a state is allowed to impose tolls on those portions of its Interstate Highway System included in the relevant pilot program.

#1: High Occupancy Vehicle/High Occupancy Toll Lanes

The first of these federal tolling programs is the Section 166, high-occupancy vehicle/high-occupancy toll (HOV/HOT) lanes program that allows states to charge tolls to vehicles that do not meet the established high- occupancy requirements to use HOV lanes. This program is available for facilities both on and off the Interstate System, and there are no restrictions on the number of projects or states that may receive tolling authority under this program.

Several states have converted HOV lanes to HOT lanes under this provision. HOV lane conversions provide an opportunity to efficiently use excess capacity in HOV lanes and provide congestion relief for the entire facility. In Connecticut, there are two existing HOV lanes in the Hartford area that are eligible for conversion: (1) I-91 north of Hartford, and (2) I-84 east of Hartford.

Federal Tolling Programs:

1. ***HOV/HOT Lanes Program;***
2. ***Interstate System Reconstruction and Rehabilitation Pilot Program; and,***
3. ***Value Pricing Pilot Program***

#2: Interstate System Reconstruction and Rehabilitation Pilot Program

The second federal tolling program is the Interstate System Reconstruction and Rehabilitation Pilot Program (ISRRPP). This program allows the conversion of up to three (3) *existing* and currently free Interstate Highways to tolled facilities, in order to fund needed reconstruction or rehabilitation of the facilities that would not otherwise be possible without toll revenues. All three slots in this pilot program have been conditionally awarded by FHWA, but one or more of those slots may become available in the future, because the selected state(s) may be unable to meet the requirements of the pilot program and/or may be unable to proceed with the improvements and/or may be unable to institute tolling on the highway, pursuant to applicable state law.

#3: Value Pricing Pilot Program

The third, and final, federal tolling program that allows an exception to the prohibition on tolling the Interstate Highway System is the program for which Connecticut received funds to study the subject of this project, that is, VPPP. 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, including, but not limited to, tolling. 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. VPPP was continued under MAP-21, but did not receive a specific authorization for funding.

One of the benefits of VPPP is that as long as the state is acting under an active cooperative agreement with FHWA, there is no limit to the number of value pricing projects that can be studied and implemented under the slot.

<u>Connecticut's Designation as a VPPP State</u>.
Once a state has received one of the fifteen slots under VPPP, as Connecticut has, there is no limit to the number of value pricing projects that can be pursued under that slot, provided that the additional projects for study and/or implementation are added to VPPP while Connecticut still holds the VPPP slot and an active cooperative agreement with FHWA is still in effect. However, each implementation project would require a separate application and tolling authority approval from FHWA. This means that Connecticut could consider implementing other value pricing projects outside the two current VPPP study areas. If additional projects are to be considered, the projects

should be identified while Connecticut is under its cooperative agreement with FHWA.

Restrictions on Use of Toll Revenue

The general tolling (Section 129) and the pilot programs carry with them restrictions on the use of toll revenues generated by the highway facility or facilities. In general, toll revenues are to be used to pay for improvements on the highway facility, including debt service, to provide reasonable returns on any private investments made to pay for improvement projects, and to pay for the ongoing costs of toll collection on, and operations and maintenance of, the highway facility. Under Section129 and VPPP (but not under ISRRPP) surplus toll revenues can also be used for any other Title 23 eligible project. Title 23 is the section of the U.S. Code that deals with the federal 'highway' programs.

In general, toll revenues are to be used to pay for improvements on the tolled highway. Toll revenues can be used to pay for:

- ✓ ***Improvements on the tolled highway including debt service;***
- ✓ ***Costs related to toll collection; and,***
- ✓ ***Operations and maintenance of the tolled highway***

Also, surplus revenues can be used for any other Title 23 (highway) eligible project.

Under the VPPP and ISRRPP pilot programs, the state must execute a cooperative toll agreement with FHWA, in order to be able to impose tolls on the currently free existing facilities. This requirement will be discussed in more detail, below.

1.3 Value Pricing Pilot Program (Formerly called Congestion Pricing Program)

Current VPPP Study in Connecticut

In the Connecticut study, pricing is being considered as one part of a larger multi-modal strategy to reduce congestion. CTDOT, with the support of the consultant team, is currently evaluating variable pricing strategies to consider implementing one or more strategies on a pilot or permanent basis under VPPP. Under VPPP and in the case of this study, the intent is to identify and evaluate various value pricing alternatives as part of a congestion relief strategy that includes other highway and transit improvements.

Elements and Provisions of VPPP

As this project is taking place under VPPP, the terms of that program and the authority that it allows regarding the imposition and use of tolls are particularly relevant to this discussion.

Born as part of ISTEA in 1991, VPPP was originally called the congestion pricing pilot program. This program was reauthorized and renamed, as the "value pricing pilot program," in the Transportation Equity Act for the 21st Century (TEA-21) and has been reauthorized in each of the succeeding surface transportation acts, including MAP-21.

Since Connecticut was selected for VPPP under the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), the successor surface transportation act to TEA-21 and the predecessor surface transportation authorization act to MAP-21, the State received funding to study congestion pricing options and their effectiveness. Obtaining tolling authority from FHWA through a VPPP tolling agreement would further provide for an exception to the prohibition on tolling the Interstate Highway System, as long as the terms of VPPP are met (including, of course, that the tolls imposed are variable in nature).

Additional key elements of VPPP include:

- *Funding Options*. Costs to implement a value pricing program and related improvements, such as constructing and/or reconstructing highway travel lanes and implementing traffic control systems or transit projects, can be funded under other federal-aid programs, as well as from new revenues generated by the tolling project.

- *Mitigation for Low-Income Drivers*. The potential effects of value pricing projects on low- income drivers must be considered (discussed in more detail below). Where there may be potentially significant and negative impacts on such drivers, mitigation projects, such as funding new or expanded transit services, as an integral part of the value pricing project, and other mitigation options, including, but not limited to, credits for low-income drivers, who do not have viable transit alternatives, should be considered. These measures can be funded from the toll revenues on the project.
- *Reporting Requirement*., The Secretary of Transportation must monitor the effect of value pricing projects that have already been granted tolling authority by the FHWA for at least ten years and therefore requires that the State of Connecticut must report every year on the effects of such programs on driver behavior, traffic volumes, transit ridership, air quality, and availability of funds for transportation programs.

Of the 15 slots currently awarded under VPPP, seven states have permanent slots, that is, they have entered into tolling agreements with FHWA. The balance of the states selected for VPPP, including Connecticut, are considered "temporary," that is, there is not yet a tolling agreement with FHWA and no accepted plan for the imposition of variable tolls in either of the two VPPP study areas. Connecticut does not have the conditional VPPP slot in perpetuity. After the completion of the current study and the development of a pricing strategy, Connecticut will have to decide whether to toll the portions of the Interstate Highway System covered by this VPPP project. To do this, the state would apply for tolling authority under the VPPP and, if accepted, enter into a tolling agreement with FHWA.

Entering into a tolling agreement with FHWA would allow Connecticut to operate the highway facility or facilities either directly (through CTDOT) or through a third-party public authority or private entity, such as a public-private partnership (PPP), under the terms of a value pricing program. If the State does not enter into a tolling agreement with FHWA, Connecticut's VPPP slot could be reallocated to another State.

The cooperative agreement and the relevant statute require that the tolls imposed must be variable by time of day. Typically, tolls are set higher during peak traffic periods to encourage drivers to travel at less congested times or use alternate routes or modes of travel. Authorization for tolling under the cooperative agreement will also be contingent on completion of any required reviews under the National Environmental Policy Act (NEPA). Importantly, under the permanent cooperative agreement, Connecticut must agree to comply with all federal and state laws and policies. As discussed in Section 1.4, this requirement will require a change in Connecticut statutes to allow tolling.

Permitted Uses of Revenues

Under the terms of relevant federal law and the cooperative agreement, ***Connecticut would be committed to use the revenues received from the tolled highway to fund the capital costs of highway improvements and to support the costs of operating and maintaining the same facility.*** Operating costs include project implementation costs; maintenance of the toll facility; any reconstruction, rehabilitation, restoration, or resurfacing of the toll facility; and, debt service and reasonable returns on any private investments, related to financing the project(s). Eligible operating costs also include measures to mitigate any adverse economic impacts on low-income drivers, which are discussed in more detail below. There are no priorities required in the use of revenues for project operating costs.

Permitted Uses of 'Net' Revenues: any Title 23 (highway) eligible projects

Any net revenues (balance of revenues after capital and operating costs are paid) would be available to CTDOT for any other Title 23 (highway) eligible projects. FHWA guidance for the implementation of VPPP notes that states are encouraged to consider using excess toll revenues for projects designed to provide *benefits to those traveling in the corridor where the project is being implemented*.

Any net revenues on the VPPP project can be used for any eligible Title 23 project. VPPP participants are encouraged to use <u>any such net revenues on eligible projects within the same travel corridor</u> (in this case, in the corridor paralleling I-95 between the Connecticut-New York state line and the City of New Haven), in order to benefit those traveling in that corridor.

The application of any net toll revenues for such purposes is in addition to the requirement of VPPP that toll revenues should be used to invest in projects that mitigate impacts of value pricing on low-income individuals.

As discussed above, the VPPP statutory provisions require that measures be taken to mitigate the impact of tolls on low-income drivers. States are allowed a fair amount of latitude in defining and implementing measures to lessen or mitigate the impact of tolls on low-income populations. Measures can be as diverse as toll credit programs, transit credit programs, expanded or improved transit services, and even improvements to non-tolled roadways in the same travel corridor.

Of particular interest in Connecticut's two study areas are the options to use toll revenues to support transit service improvements. This is especially the case in the I-95 corridor, where rail transit service is an important travel option and likely to be a preferred alternative to paying tolls.

Transit

As discussed above, the VPPP statutory provisions require that measures be taken to mitigate the impact of tolls on low-income drivers. States can use a wide variety of measures to reduce the impact of tolls on low-income populations. For example, toll revenues could be used to expand commuter rail, bus, and ride- sharing services in the I-95 corridor to provide other travel choices for low-income drivers. Such projects and investments would be considered "operating expenses" of the VPPP project and would not depend on the existence of "excess" or "net" toll revenues. In other words, these expenses could be incurred from toll revenues even before net revenues, if any, are calculated. Simply put, the expansion of transit services could serve as mitigation of potentially adverse economic impacts on low-income persons, and thus, an appropriate operating expense of this VPPP project on I-95. In particular, the investment of these toll revenues into improvements to the New Haven commuter rail line could be a positive feature of the multi-modal congestion management project.

Possible uses for such commuter rail investment capital, derived from the variable tolling project on I-95, include the replacement or restoration of rail bridges; accelerating the replacement of the catenary wires and other upgrades to the electrical support system; improvements to track, switching, and signal systems; expanding the rolling stock of this commuter railroad; improvements to rail stations; and, expansion of rail parking facilities. Eligibilities for specific activities would need to be confirmed with the FHWA Division and FTA Region offices.

It should be noted that one of the most important preconditions to influencing demand for highway use on I-95 from the New York State line to the City of New Haven (in Fairfield and New Haven Counties) through the use of variable tolling is the necessity to greatly increase the availability of commuter parking spaces at the various rail stations on the New Haven Line. It is of no use to divert traffic from I-95 to an alternative mode, that is, the parallel commuter rail line, unless parking spaces are available for potential commuter rail riders at the stations along the Line. Generally, this is not the case today. In some cases, surface parking could be expanded at some of the stations and/or parking structures constructed. Such capital investments in commuter rail parking would seem to be both an eligible and necessary use of revenues, resulting from the implementation of variable tolling on I-95 from the New York State line to the City of New Haven under VPPP.

Route 1 and Merritt Parkway

Another possible VPPP project operating expense could be further investments in physical and operational improvements to US Route 1 and Merritt Parkway that parallel I-95 from the New York State line to the City of New Haven. Such improvements to parallel "free" roadways could also be viewed, as a project to mitigate potential impacts on low-income drivers.

Conclusion

As noted above, any net revenues on the VPPP project can be used for any eligible Title 23 (Title 23 of the U.S, code defines the Federal-Aid Highway Program) project. VPPP participants are encouraged to use any such net revenues on eligible projects within the same travel corridor (in this case, in the corridor paralleling I-95 between the Connecticut-New York state line and the City of New Haven), in order to benefit those traveling in that corridor. The application of any net toll revenues for such purposes is in addition to the requirement of VPPP that toll revenues should be used to invest in projects that mitigate impacts of value pricing on low-income individuals and provide alternative modes of transportation to them, as operating expenses of the project.

Any uses of toll revenues (either as operating expenses, or as applications of any excess or net toll revenues of the project) in order to provide benefits and alternative modes of transportation to those traveling in the I-95 corridor between the Connecticut-New York state line and New Haven, would meet the terms and conditions of VPPP and are likely to be popular as public policy initiatives.

1.4 Tolling in Connecticut

History of the Elimination of Tolls in Connecticut

Even if the terms of VPPP and Connecticut's designation under this pilot program allow tolls to be implemented under federal law, the use of tolling must still be allowed under Connecticut law (including any agreements between the State of Connecticut (presumably, acting through CTDOT) and the United States Department of Transportation (USDOT)).

Since the 1980s, Connecticut has had no tolls on any bridge, tunnel, or highway. In 1983 action was taken to remove tolls from the John Davis Lodge (or Connecticut) Turnpike and from several bridges over the Connecticut River (toll collection ended on the Connecticut Turnpike (for most of its length, currently known as I-95) in October 1985). In 1986, the legislature required the end of tolling on the Merritt and Wilbur Cross Parkways, and the last toll in Connecticut was paid on the Charter Oak Bridge over the Connecticut River in the Hartford area on April 28, 1989.

The Removal of Tolls on I-95 After the Mianus River Bridge Collapse

For most of its length, I-95 was constructed as the Connecticut Turnpike in the pre-Interstate era. It was subsequently incorporated into the federal Interstate Highway System. Thus, between the New York-Connecticut state line in Greenwich and Waterford, I-95 remained tolled until 1985. All other Interstate highways in Connecticut including the portion of what is now I-95 between Waterford and the Connecticut-Rhode Island border were originally constructed with federal-aid funds as part of the

Interstate Highway program and thus never had tolls. From the time of their construction, these highways (including I-84 and I-84 Viaduct) have been subject to the federal ban on tolling.

On August 30, 1983, in the wake of the collapse of the bridge that carried I-95 over the Mianus River in Greenwich in southwestern Connecticut, Connecticut and USDOT entered into an agreement that allowed mileage on what had been a tolled facility to be factored into the State's apportionment formula for resurfacing, restoring, rehabilitating, and reconstructing its highways (Interstate 4R Funds). The agreement was conditional on Connecticut's removing tolls from the Connecticut Turnpike (essentially, I-95 in Connecticut) no later than January 1, 1997, when all of the outstanding debt on the Connecticut Turnpike was to be retired. In fact, as noted above, all tolls were removed on the Connecticut Turnpike by 1985. The State's ability to include this mileage in the calculation of Connecticut's eligibility for formula Interstate 4R Funds was an important financial consideration for the State in the implementation of a broad and extensive program to reconstruct and restore its transportation infrastructure after the Mianus Bridge collapse.

When tolls were removed from I-95, Connecticut and USDOT entered into an agreement that allowed mileage on what had been this tolled highway to be factored into the state's apportionment formula for Interstate 4R Funds.

Connecticut's Ability to Re-Impose Tolls on I-95 Under Federal Law

The August 30, 1983 agreement between the State of Connecticut and USDOT has been the source of much discussion over the years. The primary focus of the debate has been whether or not this agreement would require Connecticut to repay the federal government hundreds of millions of dollars were it to re-instate tolls on those portions of I-95 from which they had been removed.

As a general matter, it had long been assumed that, once removed, Connecticut could not re-impose tolls on I-95 without violating federal law and the terms of the August 30, 1983, agreement.

Connecticut received an explicit confirmation of these circumstances in 1984. CTDOT Commissioner at the time, J. William Burns, asked FHWA's Connecticut division office several questions regarding retaining some of the tolls on I-95 and erecting a toll barrier on this Interstate Highway at the Rhode Island state line. The FHWA's Division Administrator responded to Commissioner Burns in a February 6, 1984 letter, as follows: "If Connecticut retained some of the tolls, it would have to enter a new Secretarial Section 105 that would require repayment of all of the federal funds it had received after the first agreement was signed and would also forfeit its right to receive the emergency relief funding it received following the Mianus River Bridge collapse." The Division Administrator went on to note that if Connecticut put up a toll at the Rhode Island border, all federal funds used for projects on I-95 from its juncture with the Connecticut Turnpike in Waterford to the Rhode Island border would have to be repaid.

Some had assumed that if tolls were reinstated on I-95, Connecticut would have to repay federal highway funds that the State received for I-95. However, such an interpretation is not appropriate. The 1983 agreement provides the following: "When freed of tolls, the Connecticut Turnpike toll road subject to this Agreement shall be treated the same as any other portions of the Interstate and Primary Systems which were constructed with Federal aid." This language suggests that were variable tolls implemented on any portions of I-95 between the Connecticut-New York state line and the City of New Haven, pursuant to the provisions of VPPP, there would be no consequences under the 1983 agreement. Under these circumstances, Connecticut would not have to return any Interstate 4R Funds or any other federal highway aid received since the execution of the 1983 agreement.

> ***The 1983 agreement provides the following:***
>
> ***"When freed of tolls, the Connecticut Turnpike toll road subject to this Agreement . . . shall be treated the same as any other portions of the Interstate and Primary Systems which were constructed with Federal aid."***
>
> ***This language suggests that CT could implement variable tolling on I-95 consistent with the terms of VPPP, relevant federal laws, and a cooperative agreement with FHWA <u>without having to</u> <u>return Interstate 4R Funds or</u> <u>any other federal highway aid</u> <u>received in the years since 1983.</u>***

Congress also has been more flexible in recent years in allowing states to modify or withdraw from toll removal agreements without having to repay federal funds. "As time has passed and new exceptions to the toll prohibition were enacted, some of these circumstances have changed. *There seems little doubt that if a toll project falling within one of the exception programs was pursued and the appropriate requirements met, federal fund repayment would not be an issue*" (emphasis added) (OLR Report 2009-R-0122, p. 17).

Thus, there seems to be no basis to believe that the repayment of federal funds would be required if tolls were re-imposed on any portion of Connecticut's Interstate Highway System as a consequence of implementing a variable pricing program under the provisions of VPPP. Moreover, pursuant to VPPP and consistent with the 1983 agreement, mileage on an Interstate Highway facility subject to tolls would not be deducted from the State's total highway mileage used in calculating Connecticut's eligibility for federal highway grants under Title 23 of the United States Code.

> ***Pursuant to VPPP, mileage on an Interstate Highway in CT subject to <u>tolls would not be</u> <u>deducted from the State's total highway mileage</u> used in calculating CT's eligibility for federal highway grants under Title 23 of the United States Code.***

Allowing Tolls Under Connecticut Law

As long as tolls are implemented pursuant to one of the exceptions to the federal prohibition on tolling the Interstate System, Connecticut would not suffer any consequences under federal law including the loss of, or the necessity to repay, federal funds. However, the implementation of tolls – even variable tolls subject to VPPP – would require Connecticut to enact legislation allowing it. This appears necessary given the language of the several Connecticut statutes that removed tolls from various facilities in the State in the 1980s. In addition, the issuance of revenue bonds related to the implementation of value pricing projects on specific facilities in which toll revenues on the applicable facility or facilities are pledged or dedicated to the servicing and repayment of the bonds would have to be authorized under Connecticut law.

Public Private Partnerships

If Connecticut were to utilize a public private partnership (PPP) to undertake the development and management of a tolled facility (as is allowed under VPPP and, presumably, under any related cooperative agreement between Connecticut and FHWA), such a venture would have to be specifically approved by the State (ultimately, by the Governor) pursuant to the provisions of Sections 4-255 to 4-263 of the Connecticut General Statutes. The use of tolls in any such PPP would have to be specifically authorized. In addition, should such a PPP wish to issue private activity bonds and/or to borrow funds under a program, such as the federal TIFIA credit and credit enhancement program, additional specific approvals would be required for any such financing and for the imposition and dedication of tolls to service such financing.

The issuance of revenue bonds related to the implementation of value pricing projects on specific facilities in which toll revenues on the applicable facility or facilities would be used to secure, service, and ultimately pay off the bonds would have to be authorized under Connecticut law.

Electronic Toll Collection

Finally, "the legislature also will need to establish the terms and conditions governing the use of Electronic Toll Collection (ETC) systems and requirements for account holders. This legislation needs to allow ETC operators access to motor vehicle registration data and allow the use of video technology for prosecution of toll violators" (Cambridge Systematics, Inc., *Connecticut Electronic Tolls and Congestion Pricing Study, Final Report – Volume 2: Background Report,* p. 2-9).

Conclusion

To implement a value pricing program in Connecticut, the Connecticut General Assembly would have to change state statutes. The necessary changes include: (1) adopting enabling legislation that allows tolls to be charged, and (2) establishing terms and conditions for electronic toll collection. Additional changes might be needed to authorize public-private partnerships for toll projects, if there is a desire to adopt a PPP approach to implement and finance a project.

1.5 Implementing Tolling in Connecticut and Obtaining Federal Approval

This section describes the most likely legal avenues through which Connecticut can seek federal approvals for instituting various forms of tolling in the project areas. Since the options are somewhat different in each project area, the section is organized into two parts:

1. **I-84 Viaduct & nearby HOV lanes**
2. **I-95 Corridor from New York state line to New Haven**

I-84 Viaduct & nearby HOV Lanes: Tolling Law Considerations

In the Hartford study area, there are several options for instituting tolling. Two are specific to the I-84 Viaduct, and a third is related to the two existing HOV lanes that are not part of the viaduct, but were included in the study due to their close proximity. The tolling options discussed below are:

1) VPPP option for the I-84 Viaduct
2) Section 129 option for the I-84 Viaduct
3) HOV/HOT conversion option for existing I-91 & I-84 HOV lanes

#1: VPPP Option for I-84 Viaduct

By virtue of the study grant awarded to Connecticut, the state could seek approval for tolling on I-84 under the special provisions of the VPPP program. However, it must convert its current 'temporary' exclusion from the tolling prohibition into a 'permanent' exclusion. This requires the state to apply for tolling authority under the VPPP and enter into a tolling agreement with FHWA. Such a tolling agreement with FHWA would allow Connecticut to implement tolled or managed lanes on a new or rebuilt I-84 in Hartford. However, pursuant to the terms of VPPP, tolling must be part of a 'congestion pricing' program that varies toll rates by setting the rates higher during peak travel periods. Additionally, the state must comply with other provisions of VPPP such as a ten-year monitoring period and consideration of the effects of value pricing on low-income drivers. (VPPP requirements are discussed in more detail in section 1.3 above.)

#2: Section 129 Option for I-84 Viaduct (Bridge Replacement)

Tolling I-84 in Hartford might also be possible under the general tolling provisions of Section 129 since the I-84 Viaduct might qualify as a bridge. The ¾-mile long Viaduct is an elevated structure that carries I-84 over city streets, Amtrak, and large sections of Hartford. Most previous implementations of tolls on bridges under Section 129 have involved large bridges over rivers or other bodies of water. However, federal officials indicated that they would consider a request from Connecticut to allow tolls on I-84 under this provision of Section 129. If granted, the reconstruction, improvement, or replacement of the Viaduct would permit tolls to be imposed on some or all lanes, as a matter of right.

Under the Section 129 option, tolls on the new or replacement facility, whether on some or all lanes, would *not* have to be variably priced. Additionally, permission from FHWA would not be necessary, nor would a tolling agreement between Connecticut and FHWA be required. Under Section 129, tolling on the new or replacement facility on I-84 could be implemented and the federal prohibition on tolling Federal-aid highways could be waived, as a matter of right, under federal law. However, such tolling would still have to be authorized under Connecticut state law.

#3: HOV/HOT Conversion Option for Existing I-91 & I-84 HOV Lanes

There are two existing HOV (High Occupancy Vehicle) lanes in Hartford area: the I-91 HOV lanes from downtown Hartford north to Windsor/Windsor Locks, and the I-84 HOV lanes from the Connecticut River east to Vernon. Both are being evaluated as part of the current study, and both are eligible to be converted from HOV lanes to HOT (High Occupancy Toll) lanes under current federal law. Under the HOV/HOT provisions of federal law, vehicles that do not meet the carpool or minimum number of occupants) requirement of the HOV lane can be allowed into the lane, but they are charged a fee or toll electronically to do so.

HOV/HOT conversions have been successful in cities where there was excess capacity in the HOV lane and congestion in the regular or general purpose lanes. Typically, they do not generate large revenue streams, but they can help reduce congestion by taking some traffic out of the general purpose lanes. The two HOV lanes in the Hartford area were built in a manner that would make conversion to a HOT lane relatively easy.

Conclusion

Whichever option is adopted, the spirit of the selection of Connecticut for one of the fifteen slots under VPPP (and its choice to include the I-84 Viaduct study in the pilot program) suggests that the congestion and demand management features of variable tolling should be at the core of imposing tolls on some or all of the lanes of the facility that replaces the I-84 Viaduct.

I-95 from NY State line to New Haven: Tolling Law Considerations

The primary option for instituting tolling on I-95 is through the special authority of the VPPP. However, Connecticut would be allowed to institute tolling under Section 129 on new lane capacity along I-95, so long as the number of existing non-tolled lanes remained in place. Any new lane(s) would likely be in the form of what is called tolled managed lanes. Tolling the existing lane(s) under Section 129 would not be permissible under current law. The tolling options discussed below are:

1) VPPP option for tolling I-95
2) Section 129 option for tolling I-95

#1: VPPP Option for Tolling on I-95

If Connecticut decides to place tolls on any of I-95's existing lane capacity, it must be done through VPPP, and all users of the facility must be subject to a 'congestion pricing' program that would vary toll rates such that the cost of tolls would be higher during peak travel periods. This requires the state to enter into a cooperative agreement with FHWA. Such a tolling agreement with FHWA would allow Connecticut to toll any or all of the existing lane capacity on I-95 and/or to construct and implement tolls on new, or 'managed,' lanes on I-95 (although, as discussed in the next option, managed lanes on I-95 could be introduced under the general tolling provisions of Section 129). Conversion of an existing lane to an HOV/HOT lane would have to be undertaken pursuant to Section 166, the statutory provisions that define and establish the terms of such a conversion. It should be noted that it is FHWA's policy to reserve VPPP tolling authority for projects that would not be eligible under either Section 129 or Section 166. Tolling I-95 would also make it subject to other provisions of VPPP such as a ten-year monitoring period and consideration of the effects of value pricing on low-income drivers. (VPPP requirements are discussed in more detail in section 1.3 above.)

#2: Section 129 Option for Tolling on I-95(Managed Lanes)

Tolling I-95 anywhere between New Haven and the NY State line would also be possible under the general tolling provisions of Section 129. ***However, Section 129 only allows the tolling of new additional lanes on existing Interstates, while preserving the current number of non-tolled lanes.*** The new lanes would be operated as tolled managed lanes, with variable time of day pricing in order to keep the managed lanes free of congestion.

Additionally, permission from FHWA would not be necessary, nor would a tolling agreement between Connecticut and FHWA be required. Under Section 129, tolling on the new lane capacity on I-95 could be implemented and the federal prohibition on tolling Federal-aid highways could be waived, as a matter of right, under federal law. However, such tolling would still have to be authorized under Connecticut state law.

Conclusion

As noted earlier, any net revenues on the VPPP project can be used for any eligible Title 23 project. VPPP participants are encouraged to use any such net revenues on eligible projects within the same travel corridor (in this case, in the corridor paralleling I-95 between the Connecticut-New York state line and the City of New Haven), in order to benefit those traveling in that corridor. The application of any net toll revenues for such purposes is in addition to the requirement of VPPP that toll revenues should be used to invest in projects that mitigate impacts of value pricing on low-income individuals and provide alternative modes of transportation to them, as operating expenses of the project.

Any uses of toll revenues (either as operating expenses, or as applications of any excess or net toll revenues of the project) in order to provide benefits and alternative modes of transportation to those traveling in the I-95 corridor between the Connecticut-New York state line and New Haven, would meet the terms and conditions of VPPP and are likely to be popular as public policy initiatives.

1.6 Conclusion

Nothing in federal law would appear to prevent the introduction of variable tolls, as a congestion management tool, on a rebuilt I-84 Viaduct in Hartford and on I-95 from the New York State line to the City of New Haven under Connecticut's VPPP slot.

Under the general tolling provisions of Section 129, CTDOT might consider adding capacity, in the form of new tolled managed lanes on either the rebuilt I-84 Viaduct or I-95 from the New York State line to the City of New Haven, while preserving the current number of non-tolled capacity or lanes. In addition, the I-84 Viaduct is likely classified as a Bridge, allowing all the lanes of the replacement facility to be tolled if Connecticut so desired. Under the provisions of Section 129, the variable pricing and other requirements of VPPP would not apply, and no tolling agreement between Connecticut and FHWA would be required.

Alternatively, Connecticut may seek an exclusion from the federal prohibition on tolling the Interstate Highway System through the conversion of its current temporary exclusion under VPPP to a permanent slot through a tolling agreement between the State and FHWA. In these circumstances, any tolls imposed on this Interstate facility or these facilities would have to be variable, and the other requirements of VPPP would be applicable.

In these circumstances, greater public understanding and acceptance of the following factors and opportunities are likely to be critical to overcoming the challenges to implementing tolls in Connecticut:

- The connections between the use of variable tolls, in influencing demand and in managing highway congestion;
- The ability to use toll revenues to make improvements to I-95 and I-84 to help reduce congestion and to maintain the infrastructure in a good state of repair;
- The ability to use toll revenues to make improvements to other nearby roadways, such as Route 1 and the Merritt Parkway, and help reduce congestion in the same corridor;
- The possibility to use toll revenues to help finance the reconstruction of the I-84 Viaduct and to do so on a more accelerated schedule than is possible using regular transportation funds; and,
- The possibility to use toll revenues to improve and enhance commuter services on the New Haven rail line (both the main line and the branch lines) in Fairfield and New Haven Counties, and for additional bus and ridesharing services in both the Hartford region and southwestern Connecticut.

Connecticut I-95 Corridor Congestion Relief Study

Appendix F

Public Private Partnership Overview Report

Prepared for

Connecticut Department of Transportation

September, 2014

CDM Smith

Table of Contents: Public Private Partnership Overview Report

Prepared 9/19/14

1.0 Introduction, Definitions and Report Contents

This Report covers four topics: Public Private Partnership (PPP) Delivery Models, PPP Programmatic Issues, PPP Procurement Best Practices and PPP New Developments. The following definitions are offered to help introduce the concept of PPP delivery.

Definitions of terms as used in this Report:

Public Private Partnership: This Report defines a Public Private Partnership as, "A contractual relationship between a public entity, such as a State Department of Transportation (DOT), and a private, for profit business entity to provide some or all of the services needed to develop a public project, such as a highway facility."

Design-Build: This Report uses the Design Build Institute of America (DBIA) definition of design-build delivery:

"Design-Build is a method of project delivery in which one entity – the design-build team – works under a single contract with the project owner to provide design and construction services. One entity, one contract, one unified flow of work from initial concept through completion – thereby re-integrating the roles of designer and constructor. Design-build is an alternative to the traditional design-bid-build project delivery method. Under the latter approach, design and construction services are split into separate entities, separate contracts, separate work. Across the country and around the world, design-build successfully delivers both horizontal and vertical construction projects with superior results – no matter what the project type."

Developer: This Report uses the term "Developer" for the entity which contracts directly with the DOT for PPP project delivery. The entity may include engineers, contractors, joint ventures, operation and maintenance companies, financial analysts, equity investors, traffic forecasters and other service providers. The entity may be an integrated company that provides many of the project roles internally or through related companies, or an entity that subcontracts various project roles to other companies.

Constructor: This Report uses the term "Constructor" to refer to the construction contractor in a PPP team. The constructor may be directly affiliated with the developer, or may be a separate construction firm under contract to the developer.

Concession: This Report uses the term "Concession," when used in the Toll Concession model, to describe a contract with a public agency which allows a private company to use the public agency's facilities to run a business that will earn a profit under contractual terms agreed to by the private company and the public agency.

There are many examples of concession contracts. Municipal airports often rent space on airport property to private companies to operate restaurants, book and magazine stores and other profit-seeking businesses. Federal and state agencies often grant concessions to private companies to operate recreational or lodging facilities at state and national parks. These concession contracts have specific terms regarding length of the contract and the private business's responsibilities to operate a business that benefits the public. State and local governments recognize that private businesses can sometimes provide services to the public more efficiently than the government can.

Managed Lanes: This report uses the term "managed lanes" to refer to special purpose, limited access, highway lanes that are tolled to control traffic on these lanes and to generate revenue, which can be used to finance the non-tolled, adjacent highway lanes. Managed lanes are similar to "High Occupancy Vehicle Lanes, (HOV)," except for the tolling component. The managed lanes are tolled to limit traffic on these lanes to ensure the driver a minimum travel speed, thus making travel times more predictable. If a driver has a plane to catch or a critical meeting to attend, that driver may be willing to pay the extra cost to use the managed lanes.

Most managed lane tolling rates are designed to achieve a minimum 50 mph speed for the driver. In order to limit traffic to accomplish minimum speeds, managed lanes use variable pricing. The toll rates increase during periods of high traffic volume to discourage drivers, who may not be willing to pay the higher rates when free lane alternatives are available. During off-peak hours, toll rates are reduced to encourage use of the managed lanes to generate revenues from those drivers willing to pay some amount for increased travel speeds.

Report Contents:

Section 2.0 of this Report addresses the main types of PPP delivery models. Section 2.0 includes a graphic, Exhibit 2.1, showing the contractual relationships in a conventional design-bid-build (DBB) project delivery model and compares the conventional approach to the contractual relationships in PPP delivery models. This Section presents project characteristics of the PPP models to help determine which model is suitable for a given project. The Section addresses risk transfers and cost sharing inherent to each model and provides project examples of each model. Section 2.0 includes a discussion of sources of funding for PPP projects.

Section 3.0 addresses PPP programmatic issues associated with incorporation of PPPs into a state's transportation program. Some issues, such as legislative authorization to use PPP delivery, can cause public concern about government fiscal responsibility and transparency. Additionally, the selection of some major projects for PPP development can cause stakeholder anxiety. The paradigm shift of contractors and engineers working on the same team can present challenges to successfully implementing a program as this contracting arrangement is outside the "comfort zone" of many state DOT project managers. Some engineers and construction contractors (constructors) are also challenged by the new concept of working together to deliver a project, when historically they are often at odds with each other.
Section 4.0 addresses PPP Procurement Best Practices. Over the past 10 years in the United States (US), the PPP procurement process has evolved to achieve the states' objectives for efficient project delivery while also recognizing the legitimate commercial interests of potential private partners. The Section presents the steps involved in PPP procurement and the approaches state DOTs use in selecting developers to deliver PPP projects. This Section includes a graphic, Exhibit 4.1, which presents a flow chart and timeline for PPP procurement.

Section 5.0 addresses a new design-build (DB) model that has gained wide acceptance in the water/wastewater industry and may take hold in the transportation industry in the future. The model is referred to a "Progressive Design-Build." This model reduces the time and cost to procure a PPP contract and gives an owner maximum involvement in project development through all project phases. However, this model is new to most highway constructors and highway design firms and the public may be concerned about awarding major contracts without traditional low-price bidding practices.

2.0 Public Private Partnership Delivery Models

2.1 Overview of Design-Build and other Public Private Partnerships

Design-Build-Maintain (DBM), Design-Build-Finance (DBF) and Design-Build-Maintain-Finance (DBMF) are variants of the Design-Build (DB) delivery model with maintenance/operations and/or finance added to the basic DB contract to achieve additional owner objectives. With respect to a state's transportation program, the State DOT contracts with a single entity to provide these services. The contracting entity (developer) is either an integrated design-build firm or a joint venture consortium of multiple firms. The DB delivery model is substantially different from the traditional DBB delivery model, which most DOTs and other public sector clients have been using for many years. The key difference in DBB and DB delivery is the contractual relationships of the various parties that deliver and possibly operate, maintain and finance a transportation project.

Exhibit 2.1 shows the contractual relationships in a traditional DBB delivery model in comparison with PPP delivery models. As shown in the PPP models, the entity that contracts with the DOT is referred to as the "developer" and the entity that provides construction services in a PPP model is referred to as the constructor.

2.2 Design-Build Delivery

2.2.1 Project Characteristics: DB delivery, including its PPP variants, is best used on large, complex projects where there are greater opportunities for project innovation, leading to a reduction in construction and/or lifecycle costs. DB delivery benefits the public by shortening overall project schedules, reducing construction-related delays and solving traffic problems sooner.

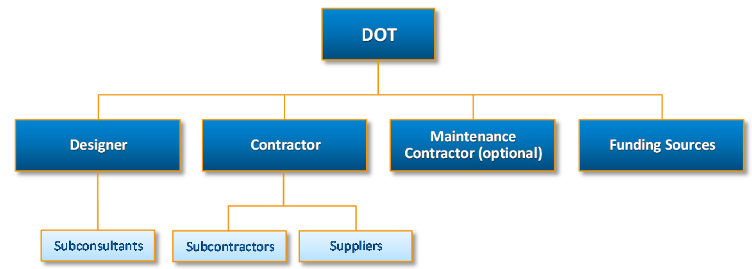
With respect to project size, some states set minimum estimated project costs where DB delivery may be used. For example, the Texas Department of Transportation (TxDOT) allows DB only on projects with estimated costs of $50 million or greater. This limitation does not apply to projects procured under the laws in Texas allowing for PPP delivery, which could include a DB project without a maintenance or finance component. This PPP exemption provides substantial latitude to TxDOT in choosing delivery methods. However, TxDOT has not used DB or other PPP delivery on projects less than $50 million.

DB delivery is more suitable on urban projects with complex interchanges, utility constraints and limited available ROW, and on urban bypass projects. DB delivery generally does not achieve its maximum value on simple, straight forward roadway projects with limited opportunities for innovation.

Another important project characteristic is that DB projects benefit the public because of significantly shorter project completion schedules. Benefits include avoidance of the cost impacts of inflation, and the ability to generate toll revenues earlier. DB delivery reduces overall project schedules by overlapping activities. For example, if the developer chooses to take the risk, the DB constructor can initiate some construction work (early start activities) while the DB designer is finishing construction drawings. DB constructors often start

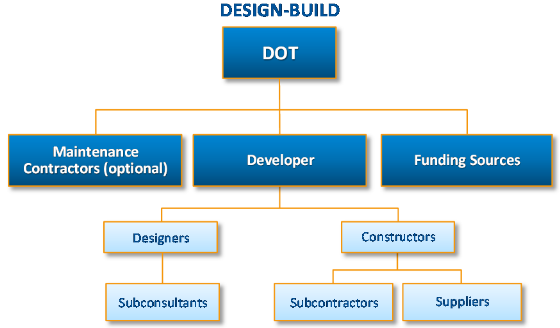
2.1 Comparison of Contractual Arrangements: Design-Bid-Build vs. PPPs

Traditional Design-Bid-Build Project Delivery Contractual Relationships

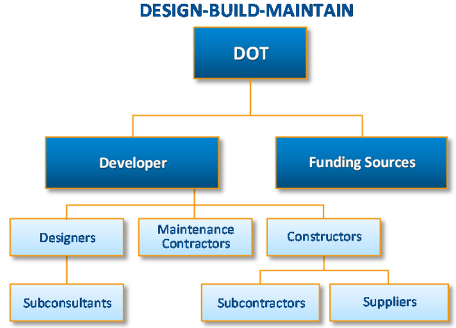


PPP Project Delivery Contractual Relationships

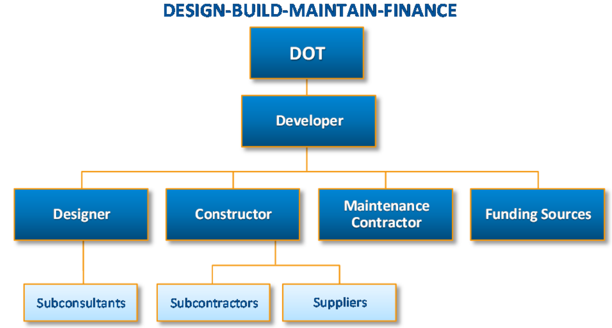
DESIGN-BUILD



DESIGN-BUILD-MAINTAIN



DESIGN-BUILD-MAINTAIN-FINANCE



Applies to Short-term Gap Financing, Availability Payment Models and Toll Concession Models earthwork activities or utility relocations before all of the design drawings are completed, as these early start activities are generally considered low risk. Also, if the developer chooses to take the risk, long lead time project components can be ordered or fabricated before the design drawings are complete.

There are five primary characteristics associated with the development, procurement and implementation of DB projects by a DOT:

- ***Final Design and Construction Risk Belongs to the Developer.*** *Both the designers and the constructors are contracted by the developer, who is responsible for performance of the entire team. The DOT has no direct contractual relationship with either the designers or the constructors individually, but rather the DOT contracts with the developer as a distinct entity.*

- ***Designers and Constructors Work in Collaboration for the Developer to Generate Innovative Solutions.*** *As part of the procurement process the designers and constructors have worked with the developer to incorporate innovation into the developer's proposal in order for the developer to be selected as the "best value" proposer and being awarded the DB contract.*

- ***The DOT has an Oversight Role to Ensure that the Design-Builder is in Compliance with the DB Contract.*** *The DB contract incorporates both the DOT's requirements for the project including project safety and quality, and the innovations that the developer included in its proposal that was evaluated and selected as the "best value." The DOT's team has to understand its duties and limits under the DB contract and must avoid altering the contractual requirements by exercising its oversight role as if the project were being delivered as a traditional DBB project. If the project has federal funding, the Federal Highway Administration (FHWA) also serves in an oversight role.*

- ***The Developer Needs to Retain Flexibility to Deliver the Project.*** *Since the developer generally has a guaranteed price and schedule for the project, the DB contract provides the developer considerable flexibility in the means and methods used to achieve those guarantees. The Technical Provisions (TPs) set forth the standards by which the developer is held accountable. The DB contract is generally based more on Performance Specifications rather than Prescriptive Specifications generally included in DBB procurements.*

- ***Added Value is Created by Improved Project Cost Certainty, Greater Schedule Assurance, and Reduced Construction Claims to the DOT.*** *This combination of guaranteed price and fixed schedule provides significant added value to the DOT. Greater schedule certainty minimizes the project's beneficial impact on the public. Having the designer and the constructors work directly for the developer, who is solely responsible for delivery of the project on schedule and on budget, leads to reduced construction claims since issues between designers and constructors are the developer's problems, not the DOT's.*

2.2.2 Risk Transfer and Cost Sharing: Unlike a more conventional DBB contracting arrangement where separate contracts are issued for design and construction, the DOT executes a single contract for these services and transfers much of the project risk to the developer. Generally, the developer accepts full risk for cost and schedule through contract guaranties. Developers accept this additional project risk, because they control the means and methods of delivering the project. Control of means and methods allows the developer to mitigate the additional risks. An example of risk transfer is accepting responsibility for the quality of the design drawings and specifications. Under conventional DBB project delivery, the DOT is responsible for the quality of the drawings and specifications the construction contractors are given to prepare their bids and execute the project. If the drawings and specifications have errors or omissions, the DOT is responsible for additional contract cost, which the DOT may attempt to recover from the separately contracted design firm. Conversely, under a DB contract, the developer is responsible for any errors or omissions in the drawings and specifications.

Under a DB contract that does not include maintenance or finance components, there is generally no cost sharing involved, unless unforeseen situations occur beyond the developer's control. The DOT generally contracts with the developer to design and build the project for a fixed price. The DOT generally pays the developer based on progress achieved on a monthly basis. Under a DB contract without maintenance or finance, the DOT must have all needed funds available or committed to pay the full fixed price of the contract before the contract is executed. While change orders on a DB contract are rare in comparison with DBB contracts, situations do arise that may result in change orders affecting price or schedule. Situations that may require change orders include the following:

- Unforeseen site conditions including unanticipated geological issues and the possible presence of hazardous substances;
- Problems with utilities not fulfilling contractual obligations regarding utility relocations;
- New rules, policies or directives from government resource agencies or other third parties; and
- Earthquake, tornado, hurricane, rebellion, epidemic or any other Force Majeure events.

DB contracts often included cost sharing formulas for these unforeseen events. For example, the developer may be obligated to absorb the cost of the first $5 million of unforeseen hazardous waste and the DOT is responsible for any amounts above this $5 million allowance.

2.3 Design-Build-Maintain

2.3.1 Project Characteristics: Under a DBM contract, the developer is required to design, build and maintain the transportation facility. DOTs can include routine maintenance and/or capital maintenance in the DB contract resulting in a DBM contract. DOTs use DBMs when internal staff resources are constrained, or if the DOT believes that contracting out the maintenance may provide a cost savings to the State, or if the DOT is looking to effectively create a long-term warranty for the DB work. Due to limitations on long–term contracts under federal tax law, there is a limit on the duration of the maintenance contract term to 15 years, when those projects are partially financed with tax-exempt debt. Typically, DOTs ask developers to submit a price for some or all of the 15-year period. *Note this 15-year limit does not apply to availability* *payment and full concession PPP models.* The maintenance bid can be further broken down into interim maintenance periods such as five or ten years to allow the DOT to opt out of the remaining maintenance period if the DOT no longer needs the effective long-term warranty (if applicable) and/or if the DOT can obtain more competitive pricing by re-competing the maintenance work. Adding a maintenance component may incentivize the developer to build a quality project up front to avoid costly repairs during the maintenance period and lower maintenance costs though competition for maintenance work for an asset the developer will know very well. The DOT can then choose to accept the maintenance component of the bid, or choose to provide maintenance with internal resources once the project construction and any warranty obligations are completed.

Capital maintenance for a DBM contract may include life cycle maintenance overlays and periodic reconstruction based on roughness index and other statistics. It may include routine maintenance that is critical for maintaining the capital asset (eg. drain cleaning, armor joint inspection, maintenance and repair).

DBM contracts can also include "Operations." The level of operations a DOT may want to include is project-specific and depends upon the local jurisdictions' involvement in operating adjacent facilities. For example, the DOT may want the developer to operate traffic signals for frontage roads and cross streets, but the local city may want to retain control of signal timing to better manage traffic. Some DOTs may want the developer to operate changeable message signs, while other DOTs may have a central traffic management center that can handle broadcast alerts more efficiently.

2.3.2 Risk Transfer and Cost Sharing: Adding a 15-year maintenance component to a DB contract can transfer substantial risk to the developer. Long-term maintenance costs are difficult to price and many maintenance contractors lack sufficient financial resources to absorb that risk. Large developers are starting to create in-house maintenance capabilities to better control the risk for long term maintenance contracts. However, developers are still routinely bidding maintenance contracts with 5, 10 and 15-year periods. These periods are far less than the 50-years+ maintenance periods often found in toll concession projects.

Cost sharing under a DBM model is similar to the DB model where cost sharing may be included in the contract to cover unforeseen construction situations such as unanticipated site conditions. In this case the cost sharing takes the form of an allowance structure as described in the DB model above. Under most DBM contracts, the developer is responsible for all maintenance and possibly all operations of the new facilities constructed by the developer. Cost sharing could be used, however, if the DOT wants the developer to assume responsibility for existing facilities that may be included in the project ROW or adjacent to the project. To mitigate risks associated with maintaining older facilities, where the conditions cannot be fully investigated, the DOT and the developer may negotiate a cost sharing or cost limiting arrangement.

2.3.3 DBM Example Project*:* The **DFW Connector** project provides an excellent example of a DBM. The project is located in the Dallas/ Fort Worth (DFW) area on the north side of DFW International Airport. The initial DFW Connector project spans 8.4 miles in Grapevine, Southlake and Irving, Texas and it doubles the size of the existing highway system around the north DFW Airport entrance. The project features a combination of new mainlanes, frontage road lanes and managed lanes. The managed lanes will have dynamic toll pricing to keep traffic moving at a minimum of 50 mph. Motorists can choose to use these tolled lanes to achieve a predictable travel time, or they can use the free mainlanes. Toll rates are discounted for vehicles with two or more occupants, and no charges are applied to mass transit vehicles.

This $1.1 billion project was simultaneously designed and built by NorthGate Constructors (Joint Venture of Kiewit Texas Construction and Zachry Construction) under contract to TxDOT. The project opened in November 2013, approximately one year ahead of schedule. Upon completion, TxDOT exercised the first of three, five-year maintenance contracts with NorthGate. The project has won numerous awards from the American Road & Transportation Builders Association (ARTBA) and the Associated General Contractors Association of America (AGC).

For more information about the DFW Connector, including DBM proposals and executed contracts covering maintenance obligations, go to:

http://www.txdot.gov/business/partnerships/current-cda/dfw-connector.html

2.4 Design-Build-Maintain-Finance/ Gap Financing

2.4.1 Project Characteristics: There are three types of DBMF projects: DBMF Gap Financing Model, DBMF Availability Payment Model, and DBMF Toll Concession Model. Under a DBMF contract, the developer is required to design, build, potentially maintain and operate, and finance some or all of the costs to complete the project. Finance periods can be set to coincide with revenues a DOT expects from motor fuel taxes or other funds. A DOT may ask the developer to provide "gap" financing for the duration of the construction period or for a few years after construction completion to meet short-term funding shortfalls. Gap financing periods are generally less than five years duration.

If the DOT is looking for more long-term financing, the DOT may use an Availability Payment or a Toll Concession model. The DOT may seek long-term financing to develop projects years sooner than forecasted public source revenues would allow. Most state highway projects are funded with state and federal motor fuel taxes. Revenues from these taxes have not kept pace with inflation as the tax amounts are fixed, per gallon charges that have not be increased in several years. As vehicles have become more efficient, and more vehicles use alternative fuels including all electric, gas tax revenues have levelled off while vehicle miles travelled have steadily increased. Fuel efficient vehicles use as much highway capacity and add as much wear and tear as their less efficient counterparts.

Some DOTs build on a "cash-flow" basis with no debt permitted. Some allow some limited debt, but the amount is usually constrained by state constitutional limits. Constrained motor fuel tax revenues and limitations on state debt financing are forcing some DOTs to seek alternative, long-term financing alternatives from the private sector.

A good source of current information on DBMF projects is the "Infra-Americas" periodical available only by paid subscription. Infra-Americas provides access to a user-friendly data base, "Infra-Deals," which can be used to provide a table of DBMF projects showing sources of project funding including public and private investments. The projects described in this Report are included in the Infra-Deals data base. For subscription information, send an email to:

BBirman@inframationgroup.com

Another excellent source of information on DBMF projects is "Public Works Finance," another periodical available by subscription. For subscription information, go to:

www.pwfinance.net

2.4.2 Risk Transfer and Cost Sharing under a DBMF Model with Gap Financing: Adding a financing component as well as maintenance can transfer substantial risk to the DB developer. Fluctuations in interest rates and availability of funds can impact the developer's profit.

Cost sharing under a DBMF model is similar to possible cost sharing under a DB or a DBM model as described above. Generally, the developer is expected to accept all finance risks, but in times of high interest rate volatility, the DOT and developer could share this risk by benchmarking the interest rates at the time of the proposal and sharing in the additional costs or savings associated with interest rate changes between the proposal date and a specified financing date. Under a rate cap method, the developer would be responsible for covering the increase cost of borrowing until the rate exceeded a contractual amount. At that point, the DOT would be responsible for the additional financing cost.

TxDOT is nearing completion of the procurement of a DBM with gap financing in the DFW area and may also use this approach on a project in Corpus Christi. Although these projects have not been completed, the contracting format may serve as a model for other states to use that have short term funding challenges.

2.4.3 DBMF with Gap Financing Project Example: The **SH 183** project in the DFW area is a good example of the DBMF with Gap Financing. In May, 2014, TxDOT selected SouthGate Mobility Partners (SouthGate) to rebuild State Highway 183, a contract valued at $847 million. S.H. 183, which serves as the southern entry to DFW Airport, has traffic volumes exceeding 150,000 vehicles per day and is one of the most congested roads in Texas. SouthGate is led by Kiewit Development Company and Kiewit Infrastructure. This 15-mile project will rebuild S.H. 183 from Industrial Boulevard in Euless, Texas east to I-35E in Dallas. The project includes 2.5 miles of Loop 12 from S.H. 183 to I-35E and 10.5 miles of State Highway 114 from S.H. 183 to DFW Airport. The project includes tolled managed lanes with variable pricing to maintain minimum speeds of 50 mph. Final design will be started in 2014 and project construction is expected to be completed by 2018.

SouthGate has assumed responsibility for the Operation and Maintenance (O&M) of S.H. 183 for a 25-year term. The 25-year maintenance term is allowed on this project, because the developer is not using tax-exempt debt. SouthGate will have to meet handback requirements at the end of the O&M period. Handback specifications dictate the quality/condition of the facility at the end of the maintenance period.

A portion of the project is proposed to be financed by deferring payments above $600 million to one year after scheduled substantial completion of the project. Payments will be made annually in $50 million installments until the full DB contract price is paid. As the DB work is completed, SouthGate will receive "notes" from TxDOT of amounts to be received after substantial completion. SouthGate may hold these "notes" or sell them to other financial institutions. This method of selling "notes" is called factoring receivables.

TxDOT will be required to contribute $600 million to the project. TxDOT's contribution coupled with the developer's gap financing results in completion of a $847+ million project years before that state would have been able to commit the necessary public funds. And, TxDOT gets the revenues from the tolls on the managed lanes, because this is a Gap Financing model rather than a Toll Concession model. Had TxDOT chosen a Toll Concession model, the DOT would have given up the toll revenues on the managed lanes in return for new, outside capital brought into the project. As new capital was not required to develop this project on the needed schedule, TxDOT chose the Gap Financing model.

2.5 Design-Build-Maintain-Finance/Availability Payment Model

2.5.1 Project Characteristics: Under this delivery model, the DOT selects a developer to finance, design, build, operate and maintain the project. The developer is paid a fee based on the availability of roadway capacity usually measured as lane miles of roadway available to accommodate traffic. Availability Payment projects do not involve private developer tolling. DOTs choose this model if tolling under a Toll Concession model is not viable or if it is not in the state's best long term interests, or if the public will not accept a privately tolled project.

Under the Availability Payment model, the developer hires and manages the designers, constructors, maintenance companies and other firms necessary to deliver the project. Some large roadway contractors have created their own finance companies to serve in a full-service development role. As an example, Kiewit Development Co. serves in the prime role as the developer while Kiewit Construction will serve as the DB construction contractor on the same project. As with most DB or other DBFM projects, Availability Payment projects are usually very large and complex offering opportunities for developer innovation.

Some states, such as Texas, do not permit use of the Availability Payment models. Others, such as Florida and Ohio, do allow it. Florida has some very large projects under development that use this finance model. Texas may allow the Availability Payment model in the future. It is not currently allowed only because the model was not specifically described in the enabling legislation that allowed alternative project delivery including Toll Concessions.

Availability Payment projects are generally financed using multiple sources including equity financing by the developer, taxable debt bank financing the developer arranges, Federal, State and local funding, TIFIA financing and Private Activity Bonds (PABs). [Refer to Section 2.7 for descriptions of funding sources]. On Availability Payment projects, the developer's equity contribution helps provide assurance that the banks and other lending institutions are protected in the event availability payments fall short of financial predictions. In times of financial challenge, the banks and lending institutions get paid first before the equity contributors get a paycheck.

Availability Payment projects generally include an operations component as well as maintenance. The developer may need the operations authority to make sure capacity is available per contract terms.

Availability Payment projects use complex formulas to determine how much is paid to the developer on a yearly basis. The formulas are project-specific. The Technical Provisions in the Request for Proposals (RFPs) for these projects detail the DOT's expectations for highway capacity availability. The expectations do consider extraordinary situations that may limit lane mile availability and also consider the need for routine maintenance that may limit availability.

2.5.2 Risk Transfer and Cost Sharing under a DBMF Availability Payment Model: The developer generally takes full risk for delivering the project for the price and schedule agreed to in the contract. And, the developer generally takes full risk for maintaining and financing the project, including the risk for non-payment from the DOT should the capacity not be available according to the contract. The risk transfer to the developer in an Availability Payment model is much greater than the transfer under a DB, DBM or DBMF (gap financing) model because of the contract term is longer and there is a more extensive transfer of operations and maintenance obligations to the developer.

As in a DBMF Gap Financing model, there are opportunities for cost sharing under a DBMF Availability Payment model to cover unforeseeable construction and maintenance issues and interest rate volatility.

Two examples of DBMF Availability Payment projects are the **I-4 Ultimate Managed Lanes** Project in Florida and the **Portsmouth Bypass Project** in Ohio.

2.5.3 DBMF Availability Payment Project Examples: The **I-4 Ultimate Managed Lanes** project in Florida is one of the largest Availability Payment PPPs now underway in the US. I-4 provides a crucial link between Tampa, FL on the west coast and Daytona Beach, FL on the east coast. The interstate also plays a vital role serving one of the world's most popular travel destinations. The I-4 project will add two managed lanes in each direction along I-4, from Kirkham Road in Orange County, FL to SR 434 in Seminole County, FL, a distance of 21 miles. The project will also include the construction of 15 new interchanges, 56 new bridges and the replacement of 70 bridges. Construction is expected to be completed by 2021. I-4 Mobility Partners, a team consisting of Skanska, John Laing, Granite, Lane Construction, HDR, Jacobs Design, and Infrastructure Corp. of America (lead O&M firm), was chosen by Florida DOT (FDOT) as the best value proposer at the end of April, 2014.

Under the development agreement, the developer is responsible for designing, building, financing, operating and maintaining the facility for approximately 40 years. The developer earns "availability" payments from FDOT upon meeting set performance standards to keep the facility open and maintained for travelers. Benefits of this PPP include transferring cost overrun risks for construction and long-term upkeep of the facility to the private sector.

This $2.3 billion managed lane project is expected to achieve financial close in the 3rd quarter of 2014. According to *Infra-Americas,* project financing will include a $950 million TIFIA loan and $487 million in bank loans (mostly from non-US banks). PABs will not be used. The developer, a joint venture of Skanska and John Laing, will contribute $105 million in equity. Maximum annual availability payments have been set at $80.7 million in 2014 dollars, with 29.5% escalated at the Consumer Price Index (CPI) and the remainder not escalated. The CPI-based index is a form of cost sharing to mitigate the developer's risk.

The I-4 Ultimate developer will earn payments during construction, final acceptance payments following construction, and annual performance-based availability payments during the 40-year operations and maintenance period. The PPP mechanism will allow FDOT to share financial risk with a private developer, who will finance a portion of the project — much like a home mortgage. FDOT's plan includes committing public funds through its work program to finance a portion of the project. Federal, state, local and private funding sources that may be used to make payments to the PPP developer include managed lane toll revenues collected by the Central Florida Expressway Authority (CFX) and Turnpike. Revenues from the I-4 Express Lanes (variable-priced managed lanes) will fund more than half of the project during the 40-year partnership.

For more information about the I-4 Availability Payment model go to:

http://i4ultimate.com/project-info/faqs/#sthash.EJB7scw4.dpuf

The **Portsmouth Bypass** is a four-lane, divided, limited-access highway around the City of Portsmouth in Scioto County, Ohio. The highway, to be designated State Route 823, will include 16 miles of highway, bypassing approximately 26 miles of US 52 and US 23 through Portsmouth. This estimated $605 million project will improve travel and regional mobility, avoiding significant numbers of traffic signals, intersections, and driveways over the current 26 mile route using US 52 and US 23.

Ohio DOT (ODOT) evaluated the use of a PPP procurement approach and compared this to a traditional DBB approach. The evaluation indicated that there is value in using a DBFM procurement financed using an Availability Payment model. The term of this DBMF is 40 years. The maximum amount of the TIFIA Loan is anticipated to be $230 million. ODOT has also received a provisional allocation for PABs for the project from USDOT.

On September 6, 2013, ODOT announced that three teams had been invited to submit technical and financial proposals for the Portsmouth Bypass project. The final RFP was issued April, 2014. Technical and price proposals were due September 19, 2014. The Best Value proposer was just announced. "Portsmouth Gateway Group" was provisionally selected.

The RFP documents include the Instructions to Proposers, the Draft Contract and the Project Scope and Technical Provisions document. Copies of the Request for Qualifications (RFQ), RFP and the composition of the selected team are available on the ODOT web site:

http://www.dot.state.oh.us/Divisions/InnovativeDelivery

2.6 Design-Build-Maintain-Finance/Toll Concession Model

2.6.1 Project Characteristics: Under this model, the DOT selects a developer to finance, design, build, operate and maintain the project in exchange for the a right to the earn toll or other revenues from the transportation facility for the duration of the concession. Toll concession projects tend to be much longer term than Availability Payment projects. In Texas, toll concessions are allowed to run 52 years. In other states, concessions may run as long as 100 years. Many concession toll projects do not achieve a positive cash flow for 10 to 20 years or longer, so a longer concession period is necessary to make the concession attractive to developers.

While the developer "owns" the right to collect the toll revenues, the ownership of the asset remains in the DOT's hands. With limited funding available through conventional state and federal motor fuel taxes, states are increasingly looking to Toll Concession projects to add new capacity to their urban highway networks or to rehabilitate or expand existing highways.

Toll Concession projects can be conventional toll roads, where the general purpose lanes are tolled and the frontage roads, if any, are not tolled. Or, Toll Concession projects can include tolled managed lanes with general purpose lanes and frontage roads not tolled. Toll managed lanes are becoming more widely used in Texas and other states that permit Toll Concessions. In the DFW region, there are now four major tolled managed lane projects in various stages of completion with more to follow.

Toll Concession toll rate maximum charges are generally established by local jurisdictions with the understanding that a local jurisdiction severely limiting toll rates can reduce developer interest in the project. In north Texas, the Regional Transportation Council (RTC) established a policy, which limits maximum toll rates on highways during the first six months of operations. The RTC is a committee of local elected officials in the DFW region including county commissioners, mayors and council members. After the introductory period, the RTC policy allows the developer to increase rates as necessary to cover costs and manage traffic to maintain minimum speeds. However, developers know the public has alternative highway choices, so rates must be set based on market considerations. Discouraging toll way use by charging exorbitant rates is not in the developer's best interest. On managed lanes, variable pricing allows higher rates during peak travel periods and lower rates at other times.

Toll Concession developers sometimes pay up front concession fees based on the present value of projected net revenues from the project for the right to develop the concession and earn the toll revenues throughout the concession term. Some of these upfront fees are enormous and can help a DOT finance other needed transportation projects in the region. For example, on the Sam Rayburn Toll Road (S. H. 121) north of DFW, the conditionally selected, best value proposer, Cintra, offered to pay an upfront concession fee of more than $2.7 billion in addition to developing and maintaining the project for the rights to the toll revenues for the 52-year concession period. This provided a strong indicator of the value developers placed on this toll project that had very positive, long term traffic and revenue forecasts. However, in the case of the Sam Rayburn project, under strong pressure from local political leaders, TxDOT accepted a public sector comparator bid from the North Texas Toll Authority (NTTA). NTTA was required, however, to exceed the private sector upfront concession fee of $2.7 billion and submitted a bid for $3.2 billion, which TxDOT, in accordance with State law, has made available for design and construction of other DFW region transportation projects. On the other end of the concession fee scale, Cintra offered only approximately $25 million for the SH 130 Segments 5 and 6 toll road concession, because this project had a much lower expected present value of net revenue stream than the Sam Rayburn Toll Road.

Toll Concession projects are generally financed using multiple sources including equity financing by the developer, bank financing the developer arranges, federal, state and local funding, TIFIA financing and PABs. [Refer to Section 2.7 for a description of funding sources].

One very significant advantage of a Toll Concession project to the DOT is the amount of "coverage" required for the toll revenue bonds or other debt instruments compared to public agency toll roads. On a public project, higher toll rates must be charged to fund an account to cover potential toll revenue losses if not funded by the DOT from other sources; otherwise bond buyers would not be as interested in purchasing this public debt, thus resulting in higher interest rates. On a Toll Concession project, the developer's equity contribution helps provide assurance that the banks and other lending institutions are protected. The expected revenue stream from a Toll Concession project can therefore support a much larger capital investment.

Some Toll Concession developers establish special purpose entities or corporations for specific projects. These entities help provide some protection to the developer in the event the enterprise fails.

Most Toll Concession projects have an operations component as well as maintenance. In some jurisdictions, DOTs will want the developer to handle toll collection including pursuit of toll violators as allowed by state law. In others, such as Texas, established toll collection systems are already in place. In north Texas, for example, the NTTA will collect tolls for private developers on tolled managed lane projects such as North Tarrant Express and LBJ Express. The NTTA has an established "back office operations" to collect tolls and pursue toll violators. The NTTA's "Toll Tag" electronic tolling system is interoperable with TxDOTs electronic toll system and the system Harris County (Houston area) uses, so drivers only have to have one tag on their windshield to cover the entire state. Recently, NTTA established interoperability with Oklahoma to allow residents in both states to have only one tag. With such a well-established system, it is much more efficient for managed lane developers in north Texas to use the NTTA system.

2.6.2 Risk Transfer and Cost Sharing under a DBMF Toll Concession Model: Toll Concession projects transfer the most risk from the DOT to the private sector, much more so than Availability Payment projects. Under a Toll Concession project the developer accepts traffic and revenue risk for the duration of the concession. If future traffic does not meet original predictions, the developer can lose substantial sums. To mitigate these risks, developers generally prepare their own traffic and revenue models, rather than rely on the models prepared by the DOT. Many Toll Concession projects experience negative cash flows for several years before the traffic has grown enough to generate profits. Long term concession periods create considerable risk for the developer including: economic downturns; changes in driving habits (working from home or living closer to work); and competing facilities (parallel roads or mass transit). Long term maintenance (50 years+) adds substantial risk as well.

Some Toll Concession projects have run into financial difficulties. The SH 130 Segments 5 and 6 project in Texas (mentioned above) is facing serious financial challenges. The developer, Cintra, has just completed the restructuring of $1 billion in debt to avoid project bankruptcy. Since completion approximately two years ago, SH 130 has experienced far lower traffic volumes that originally forecast. While public debt is also at risk with these Toll Concession projects, the public ultimately takes ownership of the completed transportation facility if the developer's project fails.

As in a DBMF Availability Payment model, there are opportunities for cost sharing under a DBMF Toll Concession model to cover unforeseeable construction and maintenance issues and interest rate volatility. Additionally, many Toll Concession projects cannot be supported on toll revenues alone. An initial investment from the DOT is required in these cases. Tolled managed lane projects are not usually supported just by toll revenues and therefore, they need some public sector contribution. However, the benefit to the DOT for cost sharing can be substantial when a major highway/bridge project can be constructed several years earlier than planned, because public funds can be leveraged with developer investments.

2.6.3 Toll Concession Project Examples: On January 29, 2009, the Texas Transportation Commission (TTC) conditionally awarded the **North Tarrant Express** project to NTE Mobility Partners, which was contracted to finance, design, construct, operate and maintain the 13-mile corridor for the 52-year concession period. The original concession project included:

- Segments 1 and 2A: A concession to design, develop, construct, finance, maintain, and operate 13-mile section along IH820 and SH121/SH183 from IH35W to SH121 in Tarrant Co. Texas.

- Segments 2B – 4: A pre-development agreement to develop master plans for remainder of the 36-mile corridor along SH183 from SH121 to SH161, IH820 east from SH121/SH183 to Randol Mill Road, and along IH35W from IH30 to SH170 in Tarrant and Dallas counties. NTEMP was later authorized to proceed with development of some of the Segments 2B -4.

Federal, state, regional and local funds in the amount of $573 million were used along with private financing to deliver the $2 billion project for Segments 1 and 2A. This is a tolled, managed lanes project with variable pricing to maintain minimum speeds of 50 mph on the managed lanes. When the overall DFW tolled managed lanes system is completed, the system will interlink NTE with the managed lanes on S.H. 183 (Airport Freeway) described above and the LBJ Express, described below.

Based on demand projections it is estimated that the initial toll rates charged on NTE's managed lanes will be as follows:

Price per Mile	2015 (today's $)
High	0.53
Low	0.09

It is estimated that the toll rates charged at the end of the term will be as follows:

Price per Mile	2061 (today's $)
High	0.78
Low	0.09

The concession agreement specifies an initial maximum toll rate of $0.75 /mile. This maximum toll rate cannot be exceeded during the first 180 days after traffic operations commence on the managed lanes. After the first 180 days, dynamic pricing goes into effect, as required by the RTC managed lane policy, which means that after the first 180 days:

- If demand is low, such as during off-peak hours, a lower toll rate will be charged.
- If demand is high, such as during peak commute times, a higher toll rate will apply.

During dynamic pricing, the toll rate will be subject to increase or decrease in not less than five minute intervals depending on average traffic flows or average speeds.

NTE Mobility Partners primarily consists of:

- Cintra U.S.
- Meridiam Infrastructure
- Dallas Police and Fire Pension System
- Ferrovial
- W.W. Webber
- Earth Tech
- AECOM

Cintra, Meridium and the Dallas Police and Fire Pension System were the original equity partners on this concession. Overall, the original concession project was funded with 2/3 private funding and 1/3 public funding. Public funds included TIFIA loans and PABs. The first concession project is expected to be completed in late 2014 or early 2015.

For more information about the North Tarrant Express Toll Concession project including the RFP and Concession Agreement, go to:

http://www.txdot.gov/business/partnerships/current-cda/north-tarrant-express/nte-cda.html

On February 26, 2009, the TTC conditionally awarded the **LBJ Express** project to LBJ Infrastructure Group, which was contracted to finance, design, construct, operate and maintain the corridor for 52 years. I-635 is called the LBJ Freeway. The LBJ Express extends 10 miles on I-635 from west of I-35E at Luna Road to east of US75 at Greenville Avenue, and it extends four miles on I-35E from Loop 12 to Valwood Parkway north of I-635. The project includes:

- Reconstructing the eight, non-tolled, general-purpose lanes on I-635
- Reconstructing the frontage roads on I-635
- Constructing new, continuous frontage roads on I-635
- Constructing six new, tolled managed toll lanes on I-635
- Constructing new, elevated managed toll lanes on I-35E with direct connector ramps to I-635

Federal, state, regional and local funds in the amount of $490 million are being used along with private financing to deliver the $2.6 billion project, representing a substantial leverage of public funds. Public funds included TIFIA loans and PABs. Substantial project completion is expected in 2016, though one managed lane section opened for tolling in 2014. This section links managed lanes on US 75 to managed lanes on LBJ improving travel time for commuters passing through Dallas' High 5 Interchange.

Based on demand projections it is estimated that the initial toll rates charged will be as follows:

Price per Mile	2015 (today's $)
High	0.53
Low	0.09

It is estimated that the toll rates charged at the end of the term will be as follows:

Price per Mile	2061 (today's $)
High	2.36
Low	0.38

The methodology for increasing toll rates on the LBJ Express is essentially the same as for the NTE Toll Concession project as both projects are governed by policies adopted by the Regional Transportation Council of North Texas.

LBJ Infrastructure Group primarily consists of:

- Cintra U.S.
- Meridiam Infrastructure Finance
- Dallas Police & Fire Pension System
- Ferrovial Agroman
- W.W. Webber
- Bridgefarmer & Associates
- Macquarie Capital

Cintra, Meridiam, and Dallas Police & Fire are the equity partners.

For more information on the LBJ Express project including the RFP and Concession Agreement, go to:

http://www.txdot.gov/business/partnerships/current-cda/635-lbj-cda.html

2.7 Public Private Partnership Funding Sources

The following funding sources are used on PPP projects including DB variants with a finance component and Availability Payment and Toll Concession models. Not all sources are used on every project. States and individual projects often compete for limited federal funding sources and some sources are not permitted in states that have not enacted appropriate enabling legislation:

2.7.1 Equity Financing is at-risk capital contributions to the project, similar to a down payment a prospective home owner makes when purchasing property. Mortgage companies generally expect home purchasers to have some "skin in the game." If the homeowner defaults on the mortgage, the bank takes the house in satisfaction of the mortgage, and the homeowner loses the down payment investment. If the home appreciates in value, the homeowner benefits from a return on the equity invested at risk. In highway finance, the developer generally takes some equity finance risk and seeks other partners to contribute at-risk capital to be equity partners. Because of the risk, equity partners expect a much higher return on their investment. Even in today's low interest environment, it is not unusual for equity partners to expect returns more than 10% to 15% on their investment. Equity financing is used on Availability and Concession Toll projects.

2.7.2 Bank Financing is provided through commercial bank loans that are secured by the expected revenue stream of the project or the asset value of the project, if the project goes bankrupt. These commercial loans are far less risky than the equity finance portion, so return on investment is much lower, generally based on current interest rates. Because this is taxable debt, the interest rates are generally higher than interest rates on tax-exempt public revenue bonds or general obligation bonds. Bank financing is used on DB variants with a finance component and on Availability Payment and Concession Toll projects.

2.7.3 Federal, State and Local Funding represents conventional funding provided by the FHWA, the State DOT or the local city or county jurisdictions where the project is located. Federal funding comes through the Highway Trust Fund which is funded through federal motor fuel taxes and other sources. State funding comes through state motor fuel taxes, vehicle registration fees and other state sources. City and county agencies contribute funding from available cash or through general obligation bonds supported by property or sales taxes. Federal, state and local funding is used on DB variants and Availability and Toll Concession Projects.

2.7.4 TIFIA Financing is provided under the federal Transportation Infrastructure Finance and Innovation Act (TIFIA) program. This loan program provides Federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. Because of the repayment structure and patient lender provisions in the loan agreement, TIFIA credit assistance provides improved access to capital markets, flexible repayment terms, and potentially more favorable interest rates than can be found in private capital markets for similar instruments. TIFIA can help advance qualified, large-scale projects that otherwise might be delayed or deferred because of size, complexity, or uncertainty over the timing of revenues. Many surface transportation projects - highway, transit, railroad, intermodal freight, and port access - are eligible for assistance. Current TIFIA interest rates are 3.4% on a 35-year loan. States apply for TIFIA funds, but even if granted, those funds only cover up to 49% of the entire cost of financing a project as limited by federal regulation. TIFIA financing is used on Availability Payment and Toll Concession Projects.

2.7.5 Private Activity Bonds are issued by or on behalf of local or state governments for the purpose of financing the project of a private user. These bonds provide interest rates lower than commercial banks with taxable debt, but may not be as attractive to bond buyers as conventional general obligation (GO) or revenue bonds as interest income on PABs is subject to the Alternative Minimum Tax (AMT) under the Internal Revenue Code. Because of AMT, PAB interest rates are higher than GO or revenue bond rates.

Exhibit 2.7 provides a summary of the funding sources for the referenced projects in the above section.

Exhibit 2.7 Table of Referenced Projects Showing Funding Sources

Project Name	Location	Status	Total Estmated Cost	Funding Type	Federal State & Local Funding	Equity Funding	PABs	Bank Loans	TIFIA	Annual Availability Payments	Contract Term	Comments
S.H. 183	Dallas, Texas	Contract Awarded; Commercial and Financial Close 4th Qtr. 2014	$ 847 Million	Gap Financing; Factoring Receivables	$ 600 Million	$0	$0	$0	$0	$0	25 years	$247 in gap financing with TxDOT making $50 million payments annually beginning after substantial completion
I-4 Ultimate Managed Lanes	Central Florida	Contract Awarded; Commercial and Financial Close Achieved	$ 2.3 Billion	Availability Payment	$ 758 Million	$ 105 Million	$0	$ 487 Million	$ 950 Million	$80.7 Million	40 years	Avialability Payments Escalated by CPI; DOT Earns Any Toll Revenues from Managed Lanes
Portsmouth Bypass	South Central Ohio	Selection and Contract Award 4th Qtr. 2014	$ 605 Million	Availability Payment	To be determined	To be determined	To be determined	To be determined	$ 230 Million	To be determined	40 years	ODOT Accepts Intererest Rate Risk
North Tarrant Express	Fort Worth, Texas	Construction Completion in October 2014	$ 2.05 Billion	Concession Toll Road	$ 573 Million	$ 426 Million	$ 400 Million	$ 100 Million	$ 650 Million	$0	52 years	Variable Priced Managed Lanes
LBJ Express	Dallas, Texas	Some Segments Now Open to Tolling; Final Completion 4th Qtr. 2015	$ 2.7 Billion	Concession Toll Road	$ 490 Million	$ 664 Million	$ 615 Million	$ 81 Million	$ 850 Million	$0	52 years	Variable Priced Managed Lanes
S.H. 130 Segments 5, 6	Austin, Texas	Operating	$ 1.38 Billion	Concession Toll Road	None	$ 210 Million	$0	$685 Million	$ 430 Million	$0	50 years	Tolled Main Lanes; 85 mph Speed Limits
DFW Connector	Fort Worth, Texas	Operating	$1.1 Billion	All Public	$1.1 Billion	$0	$0	$0	$0	$0	15-yr Max Maintenance Period	Use of Federal ARRA Funds ($260 million); TxDOT will Operate and Earn Toll Revenues from Variable Priced Managed Lanes

3.0 Public Private Partnership Programmatic Issues

PPP programmatic issues associated with incorporation of PPPs into a state's transportation program include the following:

3.1 Legislative Authorization: States generally need to pass enabling legislation or modify existing statutes to allow the use of some PPP delivery methods. Some states, including Texas, Virginia, Ohio, California and Florida, have already passed such legislation. Other states wanting to pass such legislation could use the tested statutes from Texas, Virginia, California and Florida to help draft legislation to accomplish the state's specific goals for PPP development of transportation and other public works projects. At a minimum, enabling legislation should address the following issues that have been contentious in some states:

- **Qualifications-based selection (QBS) of professional services team members.** Some states follow the Federal Brooks Act that requires engineers and other professional service providers to be selected based on qualifications rather than price bidding. Price bidding is common practice in other countries where many developers are often based. PPP delivery can accommodate QBS if the enabling legislation requires the developer choose professional services providers based on qualifications before asking them to price the work.
- **Post award bid shopping.** Some developers will attempt to change key team member firms through bid shopping after contract award to increase developer profits. Under this scenario, the DOT is not getting the team selected. This practice can be significantly reduced by clearly stating it is not allowed under state law (assuming support for such legislation), and the practice can be further deterred by charging the developer stiff penalties based on the projected or actual savings as a result of the change in key personnel or key member firms after award, unless limited extenuating circumstances require the change.
- **Oversees design centers.** There are cost advantages using oversees design centers. State and local leaders would like more jobs to remain in the region, but international developers have established low cost design production centers that can help deliver the project more efficiently. One method to limit this practice is to require the developers to strictly follow all professional licensing practices, which in the case of engineers, requires direct supervision of the work by the professional who seals the plans. Some CAD work can be off-shored, but most of the engineering design must be done locally to comply with licensing regulations.
- **Allowing unsolicited proposals.** See discussion below.
- **Relative weighting of price vs. technical qualifications.** Some enabling statutes require minimum weighting on price to limit subjectivity in proposer evaluations. For example, Texas policy requires that price be given a minimum of 75% of the selection points in a non-concession DB selection. This requirement reduces subjectivity in evaluations, but it drives the project towards "low bid," at the possible expense of innovation and quality.

3.2 Project Identification and Screening: PPP projects should be identified by the regional office of the DOT working with local leaders with jurisdiction over the project area. Most candidates for PPP development will be new or expanded/rehabilitated urban highways or major rural routes that provide a bypass for urban areas. Once the project is identified the screening process must be handled by a statewide agency or political body to allow statewide project comparisons. Limited ability to access federal and state grant funding and limited TIFIA and PAB allocations for the state require that projects be ranked according to need and regional or statewide significance. Many states require feasibility studies to support project candidates. State transportation commissions can fill the screening role, but statewide elected officials often serve on screening committees.

3.3 Project Development: PPP project development includes planning studies such as route selection, schematic design, cost estimating, environmental analysis, and traffic forecasting. Development includes FHWA coordination, public involvement (including meetings with potential stakeholders and opposition groups), ROW mapping, utility mapping, preliminary geotechnical analysis and other activities to prepare the project for procurement. The DOT can perform many of these services in-house, or choose to contract the services to professional firms. The project must be reasonably well defined before PPP procurement begins. Schematic designs and preliminary cost estimates are used to define projects sufficiently to allow fair competition.

During project development, the DOT can evaluate alternative delivery methods and seek industry input on how best to deliver the project. TxDOT often asks PPP industry professionals to prepare their recommendations on project development and to respond to specific questions. TxDOT will seek industry opinions on how much of the project can be financed with tolls, and what level of additional funding may be required through grants, TIFIA, PABs etc. These industry reports are very preliminary and are not considered proposals, just suggestions.

During the project development period, the DOT may decide the project should include a maintenance component, special warranty provisions or that construction should be phased to keep initial costs within estimated funding sources.

During project development, the environmental studies should be initiated, but final environmental clearance is not required to start procurement. However, while the selected developer may begin some work before final environmental clearance, design completion, right-of-way acquisition, permitting and construction must wait for final environmental clearance.

In Texas, the Texas Transportation Commission (TTC) establishes local citizen advisory committees to review how projects should be developed along major urban corridors. These committees consider the use of conventional DBB and PPP projects. TxDOT, the Texas Transportation Institute (TTI) and the local transportation experts provide technical assistance to these committees as they study alternative delivery options.

3.4 Project Approval: In most states PPP projects are approved at the state level, either by a transportation commission, state legislature, governor or a designated committee made up of professionals, citizens and elected officials. In some states such as Texas, the State Legislature must approve projects to be considered for PPP Toll Concession development. In these states, the Transportation Commission or Board can approve projects for non-concession PPP development as long as the projects meet criteria established in state statutes governing number of projects permitted each year and minimum project size. In Texas, for example, the TTC can give conditional approval to the award of a Toll Concession project, subject to approval of the Texas Legislative Budget Board (LLB) and legal sufficiency determination by the Texas Attorney General. Because the Texas Legislature meets only every other year, the LLB, a standing committee, reviews Toll Concession project shortlists and final selection recommendations. The Texas LLB includes:

Joint-Chair	Lieutenant Governor
Joint-Chair	Speaker of the House of Representatives
Automatic Members	Chair, House Committee on Appropriations; Chair, House Committee on Ways and Means; Chair, Senate Finance Committee
Appointed Members	Two House members appointed by the Speaker; Three Senate members appointed by the Lieutenant Governor

In Texas, the Attorney General provides a "Legal Sufficiency Review" of the final Toll Concession agreement.

3.5 Public Comment: The public is given many opportunities to comment on PPP projects during development. The environmental process includes multiple opportunities for public meetings and for a formal public hearing. Many DOTs use social media or web sites to provide project information. During project execution, the DOT or developer often maintains a project information office where the public can get important information, such as upcoming construction activities that may cause detours or other disruptions. These information offices provide opportunities for the public to express their views, or they can use email or access the project web site. TxDOT holds public hearings for the disclosure of financial information concerning PPP Toll Concession projects before the projects are approved for procurement.

3.6 Solicited versus Unsolicited Proposals: Many states allow unsolicited proposals. The problem with many unsolicited proposals is that DOT usually must seek competing proposals during a limited time period, forcing the DOT to produce solicitation documents under a rushed schedule. While the unsolicited proposal should have a strong advantage over the competing proposals, in Texas, unsolicited proposals have often cost proposers large sums with little benefits to show for their investments. This was the case in 2005, when a consortium led by AECOM, submitted an unsolicited proposal to develop the southern portion of SH 161 as a concession toll road. This highway located in Irving, Texas runs north-south, just east of DFW Airport. TxDOT later competed the project through a formal solicitation, but then abandoned the solicitation before awarding a contract. The project was ultimately developed as an NTTA toll road serving as the southern extension of the President Bush Turnpike connecting to I-20. NTTA paid TxDOT an upfront concession fee for the rights to develop and toll this state project. In the end, AECOM lost their investment in developing the unsolicited proposal.

3.7 Risk Transfers: The risks transferred or allocated with a PPP DB, Gap Financing, Availability Payment or Toll Concession contract are much different than those for a DBB contract. For a DBB project, the DOT assumes most, if not all, project risks. PPP projects allocate project risks between DOT and developer with most of the risk transferred to the developer. As a part of a PPP procurement, project risks are carefully identified and evaluated to determine how risks should be allocated. The PPP draft contract and TPs documents (part of the RFP) identify these risk allocations. Managing these risks in accordance with the allocations set forth in the documents requires both parties have a mutual understanding of the original intent and the specific contract language associated with the allocated risk responsibility. The DOT has the right to assume that each proposer has evaluated these risks for both cost and schedule impacts, and has factored them into their proposals. Part of the innovation the DOT is seeking through the PPP process is the strategies to mitigate and/or manage the allocated risks. It is critical to a successful PPP project that the DOT allows the developer the flexibility to mitigate and manage these risks pursuant to the terms of the final contract and TPs. In implementing a PPP project, both the DOT and the developer need to be cautious that decisions do not result in the unintended reallocation of project risks.

The actual allocation for risk is a project specific exercise. The DOT goes through a formal risk allocation process that is designed to identify risks, their potential impact to a project, and efficient ways to mitigate these risks. Examples of risks that a DOT might assume on a PPP project include:

- Meeting response time requirements of the contract;
- Discriminatory changes in standards and law; and
- Pre-existing hazardous materials.

Typically the developer is required to assume risks such as:

- Design and construction, including schedule and price;
- Quality control and quality assurance;
- Maintenance and project condition at handback (if required);
- Traffic and revenue risk (if required); and
- Finance risk, including cost of capital (if required).

In addition to risks that are predominantly allocated to either the DOT or the developer, there may also be categories of shared risks. Examples include:

- Non-discriminatory changes in standards;
- Third party hazardous material;
- Unknown utilities; and
- Subsurface conditions.

These are just broad examples of the type of risk allocations that occur on a PPP project. Each party's specific risk allocations and mitigation responsibilities are set forth in the contract. However, there are some best practices that DOTs should incorporate into its risk allocation process. These include:

- Allocating the risks to the party most capable of managing that risk;
- Using coordination to ensure that both parties meet the terms of the contract;
- Identifying new risks as they arise; and

- Evaluating new risks as a team to determine how to best manage the risk, and executing the plan to mitigate these new risks.

Throughout a PPP project's development, procurement and implementation, the DOT monitors risks. Generally DOTs use a risk matrix that considers the probability of an event occurring and the severity of its impact on the project. Based on this evaluation, a score for each risk is calculated and a mitigation strategy is developed, including transferring the risk to the developer or sharing the risk. Most proposers go through their individual risk evaluations, including using a risk matrix as part of the proposal development process. The outcome of these separate analyses forms the basis of much of the discussion that occurs between the DOT and the shortlisted proposers during the industry review and the proposal phase of procurement.

3.8 Quality Control/Quality Assurance: In a traditional DBB contract, Quality Control (QC) is the responsibility of the construction contractor and Quality Assurance (QA) is the responsibility of the DOT. However, in a PPP contract, the developer is generally responsible for both QC and QA. In a PPP contract, the developer's risk and the DOT's involvement are inversely related. As more project components (design, construction, finance, maintain and operate) are transferred to the developer, more risk is incurred by the developer and the DOT gets less involved. For that reason, the quality risk is typically assigned to the developer. It is reasonable for a DOT to assume that the developer will generally have a greater incentive for delivering a quality project if that developer is responsible for operating and maintaining the facility for several years and then handing it back to the DOT at some future date. It is, however, very important to identify the quality requirements early during the procurement and development phases to allow the developer to provide a proposal that reflects the intended quality. The developer usually prepares a Quality Management Plan (QMP), which outlines the process the DOT and the developer will follow during project implementation. Following the quality process and procedures established in the QMP will usually minimize disputes, costs and delays, optimize staffing resources, maximize facility quality, reduce audit findings, and will improve project documentation required during implementation and closeout.

Quality activities include quality controls, monitoring, material testing, owner verification testing, materials acceptance, inspections, reporting and audits. The process, timing and duration of these activities are dictated by the schedule and procedures established in the approved QMP and provisions of the contract documents.

3.9 Leverage of Existing Transportation Funds: PPP projects can leverage limited transportation funds in several ways. All PPP contracts with price and schedule guaranties limit the DOT's liability for cost overruns, thus providing a more certain amount of funds for other projects. PPP projects with a finance component bring new money to the DOT beyond the traditional sources that rely on motor fuel taxes or other state or local debt. This new money creates project funding leverage. For example, TxDOT has achieved in excess of four to one leverage on public funds on its concession toll projects for the LBJ Express and the NTE managed lanes projects. On the combined LBJ Express and NTE projects, existing public transportation funds amounting to just over $1 billion are being leveraged with private financing to deliver $4.6 billion worth of projects.

3.10 Public and Media Relations: PPP projects, especially Toll Concession projects, can become a public and media relations challenge. Challenges include adding toll roads in areas where toll roads are not common. Many citizens object to paying a toll to drive on roads that they feel should be free. Fortunately, citizens in many states with PPP programs are now seeing the benefits of shorter construction times and improved mobility in urban areas. Texas and other states have learned that overcoming public concerns and misinformation requires a focused media relations effort. Utilizing Public Information professionals early in a state's foray into PPP development may alleviate many of the public and media relations difficulties that Texas and other states have experienced.

When the public is first introduced to highway Toll Concession projects, some are often concerned that the government is "selling" the highway to a private company. This concern grows exponentially if the private company is foreign-based, as are many highway concession developers. The most important consideration when responding to those public concerns is to make it very clear that the facility remains the property of the public. Only the revenue stream is "sold" to the private entity for a fixed period and under strict contractual terms regarding maintenance, operation, capacity expansion, and quality of the facilities when handed back to the DOT.

3.11 Stakeholder Relations: There are many stakeholders involved in PPP projects including local residents, businesses, schools, churches, local elected officials, citizen organizations, architectural committees, resource agencies and environmental organizations to name just a few. The best way to maintain positive relations with these groups is for the DOT and the developer to provide constant, open and accurate communication. Projects should be introduced by the DOT early in the planning process to potential stakeholders through town hall meetings or by using dedicated web sites.

The environmental study process provides many opportunities for stakeholder involvement. Through the environmental study process stakeholders see what alternative approaches are being considered including the "no-action" alternative.

Soliciting input on aesthetic issues during planning or preliminary design can also help establish good relations. For example, asking for the public's feedback on retaining wall designs or landscaping plans promotes citizen buy-in and connection to the project.

Once onboard, the developer needs to address traffic impacts caused by construction and the developer needs to be especially sensitive to the impacts of nighttime construction activities.

If the project includes addition of new toll lanes, the DOT or developer needs to clearly explain cost impacts vs. potential time savings and what alternatives motorists have if they want to avoid the tolled lanes. In Texas, state law requires that all motorists have an alternative to paying tolls by using parallel free routes.

3.12 Impact on other State Transportation Priorities: Using PPP delivery on major transportation projects can help the DOT better accomplish other transportation priorities. Cost certainty though PPP delivery and leveraging private funding sources can make more funds available for smaller projects delivered using traditional approaches. Contracting maintenance as part of a PPP can help the DOT make better use of limited internal resources. The NTE and

LBJ Express projects have already shown the benefits of leveraging private funding and will likely show the benefits of contract maintenance for the 52-year concession project. Several city and county transportation projects in the DFW area are being funded through upfront concession fees paid to the State of Texas by developers and regional toll operators for the rights to some of these concessions.

3.13 Programmatic Approach versus Project-by-Project: TxDOT and other states with PPP delivery experience use a programmatic approach to project development. TxDOT has created the Special Projects Division (SPD) within its organization that is focused exclusively on PPP development. SPD includes engineers, project managers, construction personnel, finance experts and legal staff experienced in PPP procurement and project execution. The SPD conrtacts for outside consulting help when needed, such as Procurement Engineers, General Engineering Consultants, Financial Firms, Traffic and Revenue Consultants and Independent Engineers or other quality oversight and audit firms. PPP procurement is much more complicated than procuring a traditional DBB project. Therefore, a dedicated staff supported by outside consultants following a programmatic approach brings about the best long term results for the DOT.

Over the past few years, the TxDOT SPD has developed programmatic model documents that can be modified for use on specific projects, including RFQs and RFPs. The RFPs include standard documents covering draft contracts, Technical Provisions and Instructions to Proposers. With help from PPP industry professionals, SPD has developed training manuals and conducted training of internal staff as well as staff from engineering and construction firms new to PPP delivery. Following a programmatic approach with detailed procedures that apply to all PPP projects helps ensure that consistency in approach and confidentiality is maintained during project procurement. For example, SPD has developed detailed procedures with specifically defined staff responsibilities associated with reviewing Alternative Technical Concepts (ATCs, which are described below). This helps provide a greater level of assurance to proposers that their unique design ideas or construction approaches will be kept strictly confidential during the procurement process.

4.0 Public Private Partnership Procurement Best Practices

4.1 PPP Procurement Goals and Objectives: As the owner of state transportation assets, the DOT has certain goals and objectives for each project. The procurement process for a PPP project can help the DOT to achieve project goals and objectives. On successful PPP projects, the parties work together to introduce innovative means and methods into project delivery. The practical result of this collaboration is that the DOT's objectives and goals balance with commercial realities. This balancing of the owner's goals and objectives with commercial constraints improves competition during the procurement and as a result improves project pricing, schedule, and performance. Ultimately these are the "values" that the PPP procurement process will capture.

Value added elements in a developer's proposal include innovative and creative ideas, which provide the DOT value or quality above the contractual requirements. They can include unique design concepts, delivery approaches, means and methods, products, material or services.

4.2 Two-Step Procurement Process: Most DOTs use a two-step procurement process for their PPP projects. Some states allow a one-step process, but for large, transportation projects, a two-step process is generally used. Most developers do not want to invest in a major proposal effort unless they know there will be a limited number of competitors developed through shortlisting in Step 1 of a two-step process. Step 1 is the RFQ/SOQ phase; Step 2 is the RFP/Proposal phase. The sequence of procurement activities and duration of those activities are described below and shown in **Exhibit 4.1**.

4.2.1 Request for Qualifications: The RFQ is a solicitation for qualified firms or teams that desire to pursue a specific PPP project. The RFQ will generally provide a description of the project and an outline scope of work, which will be required by the successful proposer. The RFQ will set forth the financial qualifications and experience required for the project. Typically the RFQ will also request the identification and qualifications of key personnel, plus a conceptual approach to project delivery.

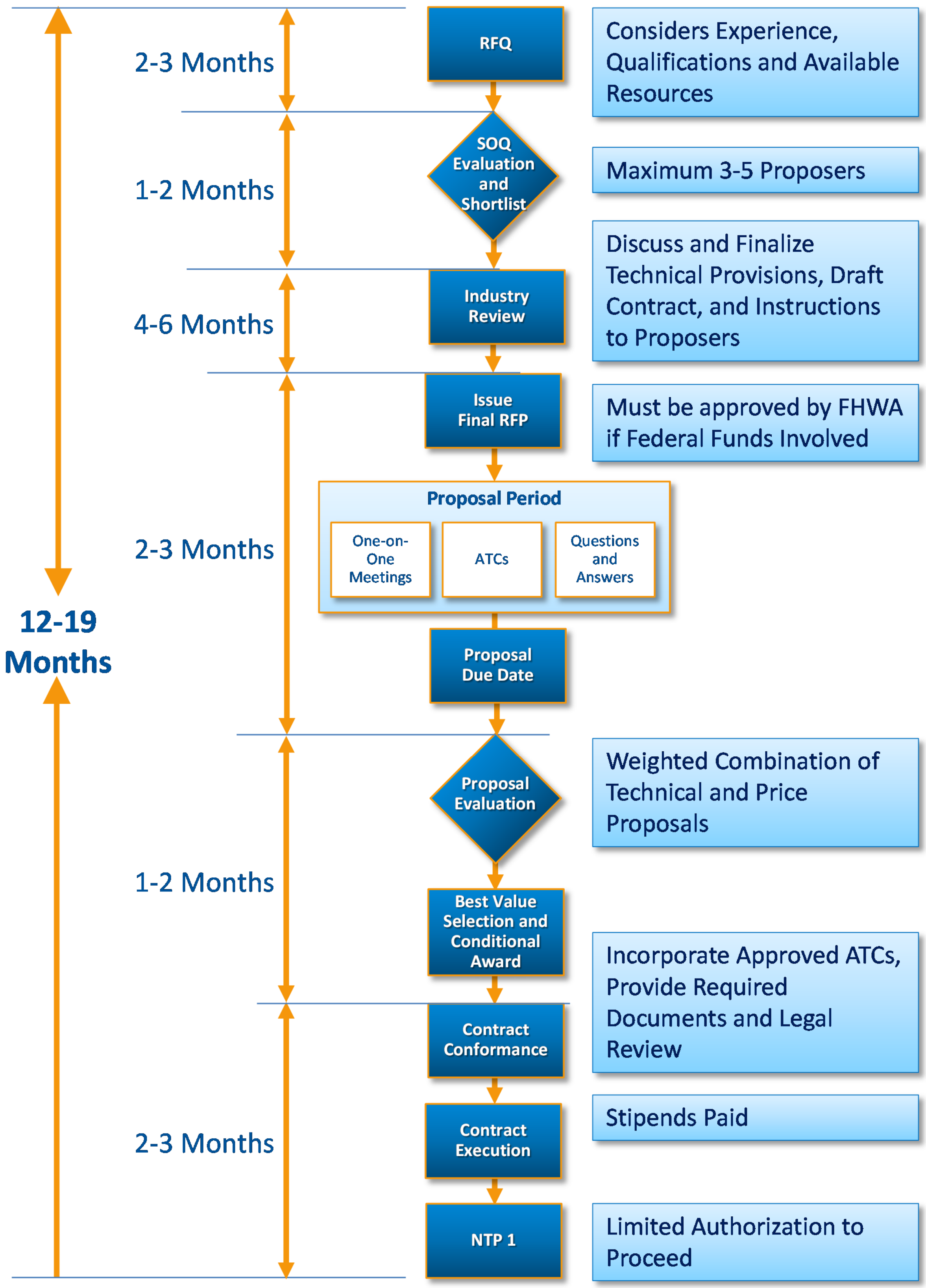
Prior to the issuance of the RFQ, it is not unusual for the DOT to hold a pre-bid meeting or workshop to introduce the project to the industry. This provides a forum for firms to form teams that meet the specific requirements of the project. There are usually no restrictions on who can respond to an RFQ. The RFQ generally provides a formula for determining which firms are most qualified to be shortlisted and given the opportunity to submit a formal proposal in Step 2. The formula usually considers the proposer's past experience; experience of key personnel; financial strength; depth of available resources including labor and equipment; general approach to project delivery; history of litigation; past experience of team members working together; experience meeting minority or disadvantaged business goals; and other factors the DOT considers relevant for the project. Most DOTs do not require any proposer pricing information in the Statement of Qualifications (SOQ) submitted in response to the RFQ.

4.2.2 Shortlisting: The result of the RFQ process is the selection of a limited number of firms or teams that are invited to submit proposals. These firms make up the shortlist. The shortlist is typically limited to three to five firms. The purpose of the shortlist is to focus the rest of procurement process on those firms most qualified for the project. Not only does this provide for a more efficient procurement process, but by narrowing the field of proposers the risk associated with spending significant amounts of money in preparing a proposal and not winning is reduced. And, if the DOT is paying a stipend to unsuccessful proposers, the DOT's cost of the procurement is reduced.

4.2.3 Industry Review: Industry review begins when the draft RFP is released to the shortlisted proposers. The draft RFP is issued to the shortlist to elicit comments that can be addressed before the final RFP is issued. The draft RFP includes three documents:

- **Instructions to Proposers:** Establishes the requirements of the proposal including page lengths, items to be addressed, process, key dates and deadlines, and evaluation criteria to determine the apparent "best value proposer."
- **PPP Draft Contract:** Establishes the proposed commercial agreement between the DOT and the developer. When finalized, the contract becomes the controlling document through the life of the project.
- **Technical Provisions (TPs):** The TPs document the design, construction, and performance standards including quality that determine project requirements. These

4.1 PPP Procurement Flow Chart and Timeline



- are often referred to as "performance-based specifications." However, TPs typically modify elements of the DOT's standard specifications, not replace them in their entirety.

Industry review involves a series of discussions between the shortlisted proposers and the DOT about the Industry Review Draft RFP. These discussions take the form of written questions and individual one-on-one meetings. There are no addendums issued during Industry Review. The DOT's responses take the form of written responses to questions. The Industry Review period ends when the DOT issues a Final RFP.

4.2.4 Performance vs. Prescriptive Specifications: Most DOTs have historically relied on prescriptive specifications on DBB projects that detail the transportation facilities design, rather than performance specifications that describe how the facility is supposed to serve its purpose. DB contracts are usually based on performance specifications allowing the developer greater latitude in delivering the project. Most procurements, however, use both prescriptive and performance specifications. For example, there may be aesthetic requirements that have to be satisfied with detailed prescriptive specs.

- An example of a **prescriptive specification** for an interchange project is: Provide a new four level fully-directional interchange. All ramp connections shall be provided as shown in the plans. Ramp widths, transitions and geometry shall be as shown in the plans. Traffic movements, transitions, pavement widths and vertical clearances shall conform to the detailed construction plans.

- An example of a **performance specification** for an interchange project is: Provide a new, fully-directional interchange with all ramps and traffic movements required to meet or exceed Level of Service and traffic capacities as outlined on the criteria plans.

4.2.5 Final RFP: The Final RFP is the formal document which the shortlisted firms are required to comply with for the proposal submittal. It will reflect any changes that were made by the DOT resulting from Industry Review. If the project has federal participation, the Final RFP will have been approved by FHWA. Failure to meet the requirements of the Final RFP, as subsequently amended or modified by approved Alternative Technical Concepts (ATCs), can result in a proposer being deemed non-responsive and disqualified.

4.2.6 Alternative Technical Concepts (ATCs): ATCs are confidential ideas submitted during procurement specifically to add value to the project. They are a tool intended to give the proposer an opportunity to use innovation and creativity to meet the project goals by thinking outside the box as long as the proposer can justify the exception through added value to the project. ATCs do not comply with the TPs and require modifications to the TPs in order to be considered compliant. To be accepted by the DOT, ATCs must result in equal or greater project performance or quality. The burden of demonstrating this is with each proposer.

Generally, the DOT will not assume any additional risks associated with the implementation of an ATC. All environmental, permitting, governmental approval and additional ROW requirements are solely the responsibility of the proposer. In approving ATCs the DOT can add conditions that will need to be met by the proposers. It is the responsibility of the proposer to demonstrate compliance with these conditions. Even though the DOT may approve, or conditionally approve the inclusion of an ATC in a proposal, it is at the option of the proposer to actually include the ATC in the proposal. After evaluation of each ATC, the DOT can make one of five decisions. These five decisions are:

- the ATC is acceptable for inclusion in the proposal
- the ATC is not acceptable for inclusion in the proposal
- the ATC is not acceptable in its present form but may be acceptable upon satisfaction, in the DOT's discretion, of certain criteria that must be met, or clarification or modification that must be made
- the submittal does not qualify as an ATC but can be in the proposal without an ATC because it complies with the technical provisions
- the submittal does not qualify as an ATC and may not be included in the proposal

4.2.7 Proposal Period: During this period the shortlisted firms are completing preparation of their proposals. Discussions between the DOT and shortlisted proposers remain ongoing during the Proposal Period. These discussions take the form of one-on-one meetings, written questions and answers, and the ATC process. Any changes to the Final RFP are made through formal addenda, which are approved by FHWA if the project has federal participation. Accepted ATCs remain confidential until the conclusion of the Proposal Period.

4.2.8 Best Value Selection: Once proposals are submitted on the proposal due date, the DOT begins an evaluation and selection process. This process involves various review and decision making committees that evaluate each proposal based on the criteria and requirements set forth in the ITP. The process leads to a recommendation to the governing body to award the project to the Apparent Best Value Proposer. Generally, the staff determines the Apparent Best Value Proposer, but the governing body makes the final decision on the Best Value Proposer, after confirming that the staff has thoroughly evaluated all proposers. The formula for determining best value is generally detailed in the RFP. It usually includes weighting factors for price, schedule, technical approach and innovation. The proposal development process from the draft RFP to the final RFP and submittal of proposals can take several months as shown on Exhibit 4.1, because the developer must advance the design from a schematic to 60 or 70% complete design in order to develop pricing and schedule.

4.3 Contract Approval: After the Best Value Proposer is conditionally selected, the contract and the TPs are modified to incorporate any approved ATCs that were included in the winning proposal. The contract and TPs are also modified to reflect any value added elements that were proposed that go beyond the requirements of the RFP. In addition, the DOT usually has the right to negotiate with the Best Value Proposer (developer) to include any ATCs that were proposed by unsuccessful proposers. If both the developer and the DOT agree on these ATCs, the contract and TPs will be modified accordingly. In addition to modifying these documents, the developer is required to provide various items that are a condition of the Notice to Proceed 1 (NTP1). These can include payment and performance bonds, subcontracts, Disadvantaged Business Enterprise (DBE) compliance plan, Buy America Certification, etc. The contract also goes through an internal legal review to ensure compliance with the appropriate state statutes and the requirements of the procurement.

4.4 Contract Execution: Once the contract and TPs are final; all conditions precedent to NTP 1 have been met; and the state's legal review has been completed, the contract is ready for execution and the procurement process ends. Contract execution is also referred to as commercial close. Assuming the DOT is not funding the capital cost from public funds in which case no financial close occurs. If the developer is providing funding, financial close occurs later when the developer has all of the approvals in place for funding the project and has had time to market the sale/award of any debt.

4.5 Notices to Proceed: NTP 1 is the formal start of the implementation phase of the project. NTP 1 is not release for construction, but requires the preparation by the developer of a Project Management Plan (PMP) and other predesign and construction requirements set forth in the PPP contract. NTP2 will follow after the developer has provided all required documents including the PMP, QMP and Safety Plan, and the project has received final environmental clearance and project funding. The DOT may require that sealed plans be submitted for early start construction items before authorizing start of any construction.

4.6 Payment of Stipends: DOTs generally pay stipends to unsuccessful proposers once the contract is executed with the successful proposer. The purpose of paying stipends is to give the DOT an unrestricted right to the unique design or construction concepts proposed by an unsuccessful proposer. This includes any ATCs the DOT has accepted from the unsuccessful proposers. The DOT may ask the successful proposer to incorporate the unique design and construction concepts and ATCs (Intellectual Property) from the unsuccessful proposers into the successful proposer's contract. The amount of the stipend varies from one DOT to another, but the FHWA does support the payment of stipends recognizing the limited overall value gained by incorporating intellectual property from unsuccessful proposers into the project. The actual amount of the stipend can be less than any maximum stipend amount allowed under state statute, as some DOTs including TxDOT will estimate the value of the Intellectual Property provided by the unsuccessful proposer, and the DOT will not pay more than its estimate of value. It should be noted that most stipends do not cover anywhere near the developer's cost to prepare the proposal, but developers do view stipends as an indicator that the DOT is serious about developing the project, and the DOT is not just "fishing" for project ideas.

5.0 Public Private Partnerships New Developments

5.1 Introduction to Progressive Design-Build: A PPP procurement, including the RFQ and RFP phases, can take 12 to 19 months or longer depending upon the size and complexity of the project. And, a PPP procurement can cost millions in staff costs, outside consultants and stipends. However, there is an alternative design-build approach that requires much less time and costs to procure.

Progressive DB is commonly used in the water/wastewater industry, but is only now being considered by DOTs and other transportation providers. It is not yet being used by TxDOT, and it would require enabling legislation to permit its use. It is, however, now being used by Texas cities on water and wastewater projects, where legislation allowing its use is already in place.

5.2 Progressive Design-Build Selection Process and Execution: On a progressive DB project, the developer is selected based primarily on qualifications. After selection, the developer works with the owner to develop the project to the point (possibly 50% design completion) where the developer can offer a guaranteed maximum price (GMP) and a guaranteed schedule to design and build the project. If the owner believes the price is too high at that point, the developer can continue to advance the design thereby eliminating some of the contingency built into the price at 50% design completion and thus reducing the proposed GMP. If the price is still too high as the design nears completion, the owner can direct the developer to complete the design and then the owner can bid the job as a conventional DBB. This "off-ramp" provides protection to the owner. If, however, the owner and developer agree on a GMP, the project is started and costs are tracked with open-book accounting.

On a progressive DB project, through open-book accounting, the developer shows the owner all bids from subcontractors and suppliers and all of the developer's direct and indirect costs. Although the selection is based primarily on qualifications, the owner can ask the proposers to bid profit on costs in their proposals. This allows some consideration of price in the selection process. Because the proposers are not asked to submit detailed bids with their proposals, stipends are generally not paid on Progressive DB projects.

Progressive DB projects can use a single step procurement to further reduce cost and accelerate project delivery. Progressive DB projects can include finance and maintenance components resulting in similar risk transfer to the private sector as seen in other PPP models.

5.3 Progressive Design-Build Advantages and Disadvantages: A major advantage of Progressive DB is that the owner works closely with the developer as the project is developed providing maximum opportunity for owner input. The developer is selected without preparing designs during project procurement. Therefore, the owner and developer are not committed to a specific design at the time of contract award. Owners can choose products or systems they have successfully used in the past. And, they can choose subcontractors that have provided good work for them in the past.

A major disadvantage with Progressive DB for DOT projects is that most highway contractors are not familiar with the method and may fear that the selection process allows too much subjectivity.

5.4 Progressive Design-Build Resources: For more information on Progressive DB, go to the Design Build Institute of America (DBIA) and Water Design-Build Council (WDBC) web sites, where sample RFQs, RFPs and draft contracts are available for download. The WDBC has also published a manual that describes Progressive DB.

www.dbia.org www.waterdesignbuild.com