

3.3.2.5 Interchange Analysis: Bottlenecks and Congested Segments on Limited-Access Highways

Much like arterial roadways, where bottlenecks and delays are usually found at signalized intersections (and at intersections with other controls), limited-access highways tend to have delays at locations where traffic merges, diverges, or weaves, or where vehicles change lanes frequently. These locations include points of lane discontinuity (where traffic must merge due to a lane reduction) as well as interchanges. This CMS analysis specifically focused on interchanges, where high ramp volumes, short weaving distances, inappropriate lane assignments at direct ramp merge points, and lack of appropriate acceleration and deceleration treatments often cause delays and lengthy queues.

Table 3.18 presents the following interchange characteristics: average daily traffic entering the interchange, average observed peak-hour speeds, expressway design characteristics, and safety parameters. These characteristics are listed together to highlight congestion and safety conditions, thus identifying bottlenecks that are often caused by any number of the following interchange design and operating characteristics:

- High ramp volumes (where on-ramp traffic forces itself into the mainline and creates traffic turbulence)
- Ramps with substandard superelevation (which can contribute to truck rollover crashes)
- Short weaving distances (which cause delays and/or sideswipe crashes)
- Short acceleration or deceleration lanes (which can lead ramp queues to back up into the main stream of traffic)
- Interchanges with direct ramps where the total number of lanes merging onto a highway segment is higher than the total number of lanes beyond the merge
- High-speed rotary interchanges (where traffic merges at high speeds)

The analysis indicates that interchange bottlenecks, crash rates, and crash severity are closely correlated. Some of the most congested and crash-plagued interchanges include: I-95/Route 128 at Route 1 in Lynnfield/Peabody, Route 1 at Route 129 in Lynnfield, Route 1 at Route 60 (Copeland Circle) in Revere, Route 1A at Route 60 and Route 16 (Mahoney Circle) in Revere, Storrow Drive at Fenway/Charlesgate in Boston, I-93 at I-95/Route 128 in Woburn, I-90/MassPike at I-95/Route 128 in Weston, I-93 at Route 38 (Mystic Avenue) in Somerville, and I-495 at I-90/MassPike in Hopkinton/Westborough.

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 1 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
Route 1 North⁴									
I-95, Peabody, to I-93, Charlestown									
I-95	79,500	50	53	51	41	45	6	61	10
Route 128	126,000	50	49	37	25	41	6	123	5
Route 129/Salem Street	136,500	50	57	41	35	51	6	111	6
Route 129/Walnut Street	139,000	50	55	45	53	57	6	350	2
Lynn Fells Parkway	135,000	50	55	47	50	55	6	86	11
Main Street	127,500	50	55	45	50	55	6	206	3
Essex Street	128,000	50	55	43	50	55	6	205	4
Route 99	112,500	50	55	51	46	55	6	78	8
Salem/Lynn Street	93,500	50	55	19	45	55	4	75	9
Route 60/Copeland Circle	89,500	50	59	19	45	55	4	466	1
Sargent Street	66,500	50	63	59	57	57	6	1	15
Route 16/Webster Street	83,000	50	57	57	61	63	6	85	7
Carter Street	59,500	50	53	53	57	61	6	21	13
Fourth/Fifth Street	59,500	50	53	53	57	61	6	30	12
Beacon Street/Everett Avenue	67,500	50	53	53	55	57	6	18	14
Route 1A/Route 60⁴									
Route 1, Revere, to the Callahan/Sumner Tunnels, Boston									
Route 60 on-ramp to Route 1 NB	52,500	40	36	16	12	5	4	NA	NA
Northgate Mall traffic signal	52,500	40	24	14	14	5	4	38	7
Brown Circle entry	52,500	40	32	26	50	50	4	80	4
Revere Street	52,500	40	34	12	48	52	4	89	6
Mahoney (Bell) Circle traffic signal	52,500	40	36	34	48	48	4	243	1
BP Oil traffic signal	52,500	40	35	30	16	28	4	26	8
Boardman Street traffic signal	65,500	40	36	12	28	42	4	55	5
Curtis Street on-ramp	65,500	40	56	42	16	32	4	71	2
Route 145/Chelsea off-ramp	65,500	40	52	50	22	26	4	63	3
Logan Airport off-ramp	65,500	40	41	43	33	26	4	15	9
Porter Street off-ramp	65,500	40	44	38	28	25	4	NA	NA

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 2 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
Route 2									
Route 27, Acton, to Route 16/Alewife Brook Parkway, Cambridge⁴									
Route 27 Main Street on-ramp	NA	45	45	47	49	43	4	55	4
Route 111 on-ramp	NA	45	45	47	47	45	4	17	NA
Railroad crossing	NA	45	28	51	47	45	4	NA	NA
Concord Rotary	NA	25	7	34	35	7	4	197	1
Baker Avenue	NA	25	26	29	29	9	4	23	8
Route 62 West traffic signal	NA	40	26	29	31	27	4	82	2
Route 62 East traffic signal	NA	40	9	27	33	30	4	NA	NA
Sudbury Road traffic signal	NA	45	9	34	40	30	4	48	6
Route 126 traffic signal	NA	45	15	37	36	26	4	49	5
Route 2/2A intersection	NA	45	39	41	26	24	4	38	7
Bedford Road traffic signal	NA	45	13	41	45	45	4	51	3
I-95, Waltham, to Route 16/Alewife Brook Parkway, Cambridge									
Int. 52, Route 128	103,500	55	49	53	50	63	6	149	1
Int. 53, Spring Street	83,000	55	49	53	50	63	6	47	3
Int. 54, Waltham Street	88,500	55	49	53	63	63	6	56	2
Int. 55, Pleasant Street	88,500	55	61	61	61	61	8	22	6
Int. 56, Winter/Watertown Street	88,000	55	61	61	61	61	8	45	4
Int. 57, Dow Avenue	82,500	55	61	61	61	61	8	17	7
Int. 58, Park Avenue	79,500	55	59	61	59	59	8	15	8
Int. 60, Lake Street	66,000	55	43	57	41	41	4	25	5

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 3 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
Storrow Drive/Fresh Pond Parkway⁴									
Route 2 at Route 16/Alewife Brook Parkway, Cambridge, to Leverett Circle, Boston									
Route 2 at Route 16 traffic signal	NA	30	10	11	9	10	4	115	4
Rindge Avenue traffic signal	NA	30	10	11	11	7	4	39	9
Concord Rotary	NA	30	10	13	15	17	4	39	8
Huron Avenue traffic signal	NA	25	16	15	19	15	4	64	6
Mt. Auburn Street traffic signal	NA	25	12	13	25	22	4	52	7
Memorial Drive traffic signal	NA	40	28	23	18	21	4	51	NA
Soldiers Field Road traffic signal	NA	40	10	21	47	43	4	30	11
Mass. Pike/River Street	83,000	40	41	19	49	41	4	159	3
Fenway/Charlesgate	105,000	40	44	45	45	32	4	244	2
Arlington Street	95,500	40	33	29	31	25	6	29	10
Charles Circle	132,000	30	31	15	31	23	6	279	1
Leverett Circle	117,500	30	13	13	31	23	7	92	5
Route 3 North									
New Hampshire State Line to I-95/Route 128, Burlington									
Int. 36, Middlesex	70,000	55	64	60	50	64	4		
Int. 35, Route 113	75,500	55	64	60	50	64	4		
Int. 34, Westford Road	79,000	55	63	55	40	64	4		
Int. 33, Route 40	81,500	55	63	40	40	64	4		
Int. 32, Routes 3A & 4	98,000	55	63	35	20	64	4		
Int. 31, Route 110	88,000	55	62	35	13	64	4		
Int. 30, I-495	102,000	55	63	35	10	60	4		
Int. 30N, Lowell Connector	99,000	55	63	35	8	62	4		
Int. 29, Route 129	103,500	55	62	35	12	62	4		
Int. 28, Treble Cove Road	92,500	55	61	25	25	62	4		
Int. 27, Concord Road	93,500	55	61	30	40	58	4		
Int. 26, Route 62	91,500	55	61	50	55	62	4	113	1

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 4 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
Route 3 South									
Route 14, Duxbury, to I-93, Braintree									
Int. 11, Route 14	61,500	60	58	62	60	56	4	62	8
Int. 12, Route 139	75,500	60	58	62	60	56	4	68	6
Int. 13, Route 53	86,000	60	57	62	58	54	4	33	7
Int. 14, Route 228	99,500	60	54	60	58	52	4	90	5
Int. 15, Derby Street	103,500	60	38	58	58	48	4	83	4
Int. 16, Route 18	133,500	60	28	58	60	40	6	232	1
Int. 17, Union Street	152,000	55	26	58	60	35	6	207	2
Int. 19, T Station	138,500	55	35	55	55	18	6	126	3
I-93: Southeast Expressway									
Route 3, Braintree, to Storrow Drive, Boston									
Route 3 & Route 128	169,000	55	50	55	58	28	6	216	6
Int. 8, Furnace Brook Parkway	188,500	55	45	58	58	34	8	291	2
Int. 9, Adams Street Milton	174,500	55	50	58	60	46	8	77	13
Int. 11, Granite Avenue	173,000	55	20	58	60	50	8	138	11
Int. 12, Route 3A/Neponset	198,000	55	15	56	60	52	8	220	8
Int. 13, Freeport Street	193,000	55	15	56	60	52	8	31	14
Int. 14, Morrissey Boulevard	194,000	55	18	56	58	48	8	150	9
Int. 15, Columbia Road	200,000	55	14	60	48	34	8	221	5
Int. 16, Southampton Street	160,500	45	14	40	44	16	8	156	10
Int. 17–18, Massachusetts Avenue	172,500	45	14	28	42	12	6	263	4
Demolished/Reconfigured Int. 20, Mass Pike/Local	184,500	45	10	14	40	12	6	461	1
Demolished/Reconfigured Int. 21, South Street	167,000	45	16	6	40	12	6	NA	NA
Demolished/Reconfigured Int. 22, Congress/Atlantic	187,100	35	26	4	38	10	6	34	15
Demolished/Reconfigured Int. 23, Northern Avenue	183,000	35	28	4	38	10	6	NA	NA
Demolished/Reconfigured Int. 24, Callahan/Sumner Tunnels	209,500	35	38	16	26	14	6	216	7
Demolished/Reconfigured Int. 25, Causeway Street	173,000	35	38	14	26	14	6	65	12
Demolished/Reconfigured Int. 26, Storrow Drive	198,000	35	32	16	32	34	6	NA	NA
Demolished/Reconfigured Int. 27, Route 1	163,000	35	36	28	9	34	6	393	3

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 5 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
I-93 North									
New Hampshire State Line to I-95/Route 128, Woburn/Reading									
Int. 48, Route 213	110,500	65	70	68	65	68	6		
Int. 47, Pelham Street	93,500	65	70	65	65	70	6		
Int. 46, Routes 110 & 113	138,500	65	70	55	65	70	6		
Int. 45, River Road/S. Lawrence	137,000	65	70	55	64	70	6		
Int. 44, I-495	166,000	65	68	66	57	70	6		
Int. 43, Route 133, Andover	137,000	65	70	66	50	70	6		
Int. 42, Dascomb Road	146,000	65	68	64	56	70	6		
Int. 41, Route 125	153,000	65	68	66	34	70	8	92	3
Int. 40, Route 62	154,500	65	68	64	34	70	8	120	1
Int. 39, Concord Street	161,000	65	68	64	28	70	8	69	4
Int. 38, Route 129	167,500	65	66	64	36	64	8	115	2
I-95/Route 128, Woburn/Reading, to Route 28, Somerville									
Int. 37, I-95	235,000	65	66	44	38	54	8	678	1
Int. 36, Montvale Avenue	198,500	65	66	53	62	66	8	261	4
Int. 34 & 35, Route 28 & Border Road	189,500	65	66	58	62	66	8	41	7
Int. 33, Roosevelt Circle	190,000	65	66	58	62	66	8	225	5
Int. 32, Route 60/Medford Square	181,000	65	66	52	60	66	8	145	6
Int. 31, Route 16/Mystic Valley Pkwy.	186,000	55	66	52	60	64	8	295	3
Int. 30, Route 38/Mystic Avenue	156,500	55	66	51	58	64	8	415	2
Int. 29, Routes 28 and 38	150,000	55	53	44	40	64	8		
I-93 South									
Route 3, Braintree, to I-95, Canton									
Int. 7, Route 3 at Southeast Expressway	185,000	55	54	18	60	44	6	216	4
Int. 6, Granite/Willard Street	213,000	55	56	31	60	62	8	313	1
Int. 5, Route 28	205,000	55	64	35	62	62	8	116	6
Int. 4, Route 24	234,000	55	60	48	58	48	6	213	3
Int. 3, Ponkapoag Road	173,000	55	40	60	56	44	6	52	7
Int. 2, Route 138	193,500	55	40	64	40	44	6	134	5
Int. 1, I-95S	210,000	50	32	59	58	36	6	295	2

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 6 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
I-95/Route 128 Southwest									
I-93/I-95, Canton, to Route 9, Wellesley									
Int. 13, University Avenue	158,500	55	30	62	60	20	6	64	9
Int. 14, East/Canton Street	161,000	55	33	62	62	20	6	187	5
Int. 15, Route 1	175,000	55	31	58	62	30	6	117	6
Int. 16, Route 109	158,000	55	27	58	62	42	6	95	7
Int. 17, Route 135	153,000	55	46	58	60	40	6	66	10
Int. 18, Great Plain Avenue	152,500	55	56	63	62	52	6	59	8
Int. 19, Highland Ave./Needham St.	179,500	55	48	61	48	34	6	197	3
Int. 20, Route 9	195,000	55	40	50	58	40	6	241	2
I-95/Route 128 Northwest									
Route 9, Wellesley, to I-93, Woburn/Reading									
Int. 21, Route 16	182,000	55	40	56	58	44	8	133	4
Int. 22, Grove Street	182,500	55	40	56	56	50	8	47	11
Int. 23, 24, & 25, Recreation Road/Mass. Pike/Route 30	206,000	55	26	58	60	54	8	378	1
Int. 26, Route 20	210,500	55	36	52	60	46	8	219	8
Int. 27, Trotten Pond Rd./Winter St.	205,000	55	56	52	42	36	8	368	3
Int. 28, Trapelo Road	194,500	55	60	46	30	38	8	126	10
Int. 29, Route 2	214,500	55	60	42	26	36	8	149	9
Int. 30, Route 2A	177,000	55	60	50	36	38	8	99	11
Int. 31, Routes 4 & 225	198,000	55	50	44	50	55	8	190	7
Int. 32, Middlesex Turnpike and Route 3	173,500	55	50	50	52	54	8	280	4
Int. 33, Route 3 and Route 3A	199,500	55	60	39	48	58	8	221	5
Int. 34, Winn Street	190,500	55	52	28	40	58	8	102	12
Int. 35, Route 38	192,500	55	61	30	40	58	8	204	6
Int. 36, Washington Street/Mishawum	203,500	55	60	26	40	62	8	301	2
Int. 37, I-93	231,500	55	50	31	26	50	8	678	1

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 7 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
I-95/Route 128 North									
I-93, Woburn/Reading, to I-95, Peabody									
Int. 38, Route 28	155,000	55	62	45	28	56	6	104	3
Int. 39, North Avenue	140,500	55	62	48	36	62	6	63	5
Int. 40, Route 129	139,500	55	62	52	42	60	6	105	2
Int. 41, Main Street	131,500	55	64	54	60	60	6	31	7
Int. 42, Salem Street	129,500	55	64	56	60	64	6	30	8
Int. 43, Walnut Street	127,000	55	64	56	54	66	6	40	6
Int. 44, Route 1 and 129	153,500	55	64	56	58	52	6	123	1
Int. 45, I-95	105,500	55	64	58	60	54	8	86	4
Route 128									
I-95, Peabody, to Blackburn Circle, Gloucester									
Int. 28, Centennial Drive	103,500	55	42	30	56	56	4	54	10
Int. 26, Lowell Street	103,500	55	60	35	55	50	4	213	1
Int. 25, Route 114	103,500	55	58	40	51	48	4	191	2
Int. 24, Endicott Street	88,500	55	56	52	52	50	4	176	3
Int. 23, Route 35	86,000	55	58	52	56	55	4	127	4
Int. 22, Route 62	88,500	55	56	50	54	55	4	125	5
Int. 21, Trask Lane	74,500	55	56	54	54	58	4	7	NA
Int. 20, Route 1A	79,000	55	56	54	60	58	4	81	6
Int. 19, Brimball Avenue	63,000	55	56	56	60	60	4	76	7
Int. 18, Route 22	52,000	55	56	56	60	60	4	32	14
Int. 17, Grapevine Road	51,000	55	NA	NA	NA	NA	4	25	13
Int. 16, Pine Street	44,500	55	NA	NA	NA	NA	4	18	NA
Int. 15, School Street	42,000	55	NA	NA	NA	NA	4	23	12
Int. 14, Route 133	43,000	55	NA	NA	NA	NA	4	37	11
Int. 13, Concord Street	42,000	55	NA	NA	NA	NA	4	24	NA
Int. 12, Crafts Road	40,500	55	NA	NA	NA	NA	4	16	15
Int. 11, Grant Circle	NA		NA	NA	NA	NA	4	69	9
Int. 10, Blackburn Circle	NA		NA	NA	NA	NA	4	79	8

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 8 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
Route 24									
I-495, Bridgewater, to I-93 (Route 128), Randolph									
Int. 14, I-495	93,000	65	60	66	62	50	6		
Int. 15, Route 104	85,000	65	60	66	68	60	6		
Int. 16, Route 106	92,500	65	62	70	70	66	6		
Int. 17, Route 123	101,000	65	60	68	70	66	6		
Int. 18, Route 27	111,000	65	60	66	70	66	6		
Int. 19, Harrison Boulevard	117,000	65	33	68	70	66	6		
Int. 20, Route 139	123,500	65	28	68	60	58	6	121	2
Route 128 NB/SB split	110,500	50	33	66	56	56	6	213	1
Route 24 to I-93 SB on-ramp	66,500	50	35	50	NA	NA	2	NA	NA
Route 24 to I-93 NB on-ramp	50,000	50	30	50	NA	NA	2	NA	NA
I-95 South									
I-495, Foxborough, to I-93/Route 128, Canton									
Int. 6, I-495	133,500	65	58	60	60	66	6	NA	NA
Int. 7, Route 140	110,500	65	58	60	70	68	6	51	5
Int. 8, Main/Mechanic Street	105,500	65	60	68	70	67	6	47	4
Int. 9, Route 1	110,500	65	55	68	70	66	6	76	2
Int. 10, Coney Street	103,500	65	40	70	70	66	6	30	6
Int. 11, Neponset Street	117,500	65	38	68	68	66	6	76	3
Int. 11A, Dedham Street	104,000	65	38	68	68	66	6	NA	NA
Int. 12, I-93/Route 128	100,500	65	25	68	50	50	2	295	1

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 9 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
I-90: Massachusetts Turnpike and Massachusetts Turnpike Extension									
Interchange 14, Weston, to the Central Artery, Boston									
Int. 14, I-95/Route 128	106,000	50	56	66	42	44	6	378	2
Int. 15, Weston	96,500	55	24	36	35	28	6	175	4
Int. 16, West Newton	112,500	55	52	44	64	58	6	133	5
Int. 17, Newton Corner	135,000	55	56	60	64	40	8	252	3
Int. 18, 19, & 20, Allston-Brighton	137,500	55	48	56	25	24	8	163	6
Int. 22, Prudential/Copley	101,500	55	56	54	54	55	8	52	7
Int. 24, Central Artery	68,500	25	30	30	47	46	6	461	1
I-495									
Route 109, Milford, to Route 2, Littleton									
Int. 20, Route 85	82,500	65	62	70	68	68	6	58	7
Int. 21, EB off-ramp	94,500	65	56	70	66	57	6	81	5
Int. 22, Mass. Pike off-ramp	88,500	65	56	68	66	60	6	213	2
Int. 23, Route 9 EB off-ramp	86,000	65	59	66	62	66	6	NA	NA
Int. 24, Route 20	88,000	65	58	64	48	64	6	109	3
Int. 25, I-290	96,500	65	68	66	66	64	6	166	1
Int. 26, Route 62, Berlin	93,000	65	64	66	62	68	6	NA	NA
Int. 27, Route 117, Bolton	94,500	65	68	68	66	68	6	93	4
Int. 28, Route 111, Harvard	96,500	65	68	68	68	66	6	28	8
Int. 29, Route 2, Acton	100,000	65	68	68	66	68	6	81	6
Route 2, Littleton, to Route 125, Haverhill									
Exit 30, Route 2A, Littleton	101,500	65	70	68	68	68	6	24	2
Exit 31, Route 119, Groton	103,500	65	68	68	66	68	6	62	1
Exit 32, Boston Road, Westford	105,000	65	66	68	68	68	6		
Exit 33, Route 4, Chelmsford	108,500	65	68	68	68	68	6		
Exit 34, Route 110, Chelmsford	110,500	65	68	68	68	66	6		
Exit 35, Lowell Connector/Route 3N	115,500	65	62	66	66	56	6		

Table 3.18. Analysis of Interchanges on Limited-Access Highways (page 10 of 10)

Interchange	Average Daily Traffic Entering Freeway (veh/day) ¹	Speed Limit (mph)	Peak-Hour Approach Speed (mph) ²				Total # of Lanes	Total Reported Crashes (1997–1999)	Crash Severity Index Rank ³
			Northbound/ Eastbound		Southbound/ Westbound				
			AM	PM	AM	PM			
I-495 (continued)									
<i>Exit 37, Woburn Street, Lowell</i>	115,500	65	68	50	64	60	6		
<i>Exit 38, Route 38, Lowell</i>	115,500	65	64	56	64	66	6		
<i>Exit 39, Route 133, Tewksbury</i>	115,500	65	66	62	58	66	6		
<i>Exit 40, I-93</i>	98,000	65	66	58	54	66	6		
<i>Exit 41, Route 28, Lawrence</i>	98,000	65	68	58	58	66	6		
<i>Exit 42, Route 114, Middleton</i>	98,000	65	68	66	64	68	6		
<i>Exit 44, Merrimac Street, Lawrence</i>	98,000	65	68	56	58	66	6		
<i>Exit 45, Marston Street, Lawrence</i>	98,000	65	68	56	64	68	6		
<i>Exit 46, Route 110, Methuen</i>	96,500	65	68	37	64	66	6		
<i>Exit 47, Route 213, Methuen</i>	100,000	65	66	52	66	66	6		
<i>Exit 48, Route 125 Connector</i>	94,500	65	68	62	60	66	6		
<i>Exit 49, Routes 110 & 113, River Street</i>	87,500	65	68	58	68	68	6		
<i>Exit 50, Route 97, Haverhill</i>	82,500	65	68	64	68	68	6		
<i>Exit 51A, Route 125, Haverhill</i>	61,500	65	68	64	68	68	6		

Shaded values denote speeds in the LOS range of E and F: for limited-access highways, this corresponds to speeds lower than 55 mph; for Class I/II arterial roadways, speeds lower than 22 mph.

NA: Data is not available

Italicized interchanges are located outside the Boston Region MPO area. For these interchanges, this table does not present crash data.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound

1. "Average Daily Traffic Entering Freeway" is a partial measure of the traffic activity at the interchange. It is defined by the sum of the ADT entering the interchange from the on-ramps and the ADT of the highway segment before the first off-ramp of the interchange.

ADT volumes were collected in 1997–1999.

2. Speeds were collected during spring 1999–fall 2000.

3. "Severity Index" is based on MassHighway's *Top 1000 High Crash Locations*, which contains the most current data of 1997–1999. MassHighway uses a weighted scoring system, based on crash severity, to rank crash locations (see Section 3.3.1.6 of this CMS report). Interchanges are ranked for each roadway.

4. Class I/II arterial roadway.